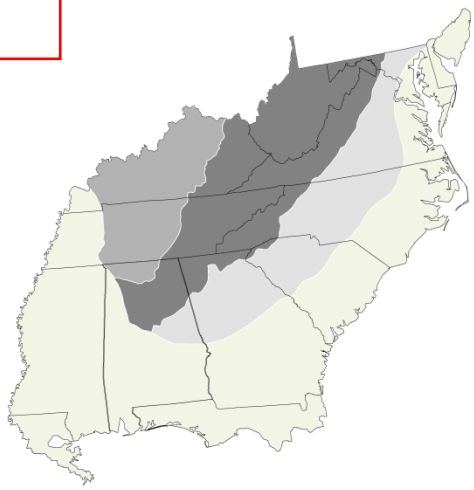
This version of the flora has maps reduced to a few pixels to reduce file size. For a full version, see http://herbarium.unc.edu/flora.htm

This version is also divided into parts to see if this will work better on mobile devices. This is part 2 of 4: Monocotyledonae (Monocots), pages 1-12 (intro) and 126-418 (Monocots)

Flora of the Southern and Mid-Atlantic States

Working Draft of 28 September 2012



by

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INTRODUCTION

The Flora

Floras serve as the basic reference of the plant biota of an area; they are critical tools that serve botanists, conservationists, ecologists, foresters, gardeners, agronomists, researchers, and the general public. In the nineteenth and early twentieth centuries, the botanical exploration of an area and writing a flora to summarize that information was seen as a basic societal need leading to the discovery of economically valuable information. Financial support for the research and writing of floras has waned in recent decades, though, as they have been increasingly regarded as "old science" and resources have shifted to areas of plant science seen as more "cutting edge." Even in taxonomic research, the advent of molecular techniques has largely supplanted detailed taxonomic research (at generic levels and below) and the writing of floras, and the great majority of papers in plant systematics now address phylogenetic relationships within a particular group of plants, and mostly at higher taxonomic levels. Traditional monographic taxonomy, with descriptions of taxa, keys to facilitate their identification, distribution maps, and assessments of habitat and relative abundance or rarity, has become increasingly rare.

Yet, paradoxically, the societal uses and needs for the translation of taxonomic information to a useable form, such as floras, have never been greater. Globalization of human societies and economies has meant that plants are regularly introduced far away from their regions of nativity, and many become established and can be either benign or cause economic and conservation damages. Increasing human utilization of land resources has fueled a biodiversity crisis, with many species now considered imperiled. In the United States and elsewhere, this has resulted in considerable governmental and nongovernmental activity focused on biodiversity inventory and conservation, "recovery" of endangered and threatened species, ecological studies and ecological restoration, and assessment and suppression of invasive exotics. All these activities require an accurate and sophisticated understanding of the flora of an area. These activities also generate new information about the taxonomy, distribution, and conservation status of components of a region's flora which then needs to be incorporated into new iterations

In the southeastern United States, the publication thirty-seven years ago of the Manual of the Vascular Flora of the Carolinas, by A.E. Radford, H.E. Ahles, and C.R. Bell (Radford, Ahles, & Bell 1968), was a landmark. In the decades since its publication, it has served as the primary reference for the identification of plants in the Carolinas, and throughout the southeastern United States (since most other states were not covered by comparable, recent references). The effort to research and write the Manual of the Vascular Flora of the Carolinas took about 11 years, and resulted in a series of publications, the Guide to Vascular Flora of the Carolinas (Radford, Ahles, & Bell 1964), the Atlas of the Vascular Flora of the Carolinas (Radford, Ahles, & Bell 1965), and finally the Manual itself (1968). Once published, the existence of "the Manual" helped generate an interest in and further studies of the flora of the region; since then, many additional species have been documented as part of the region's flora, additional alien species have become naturalized, new species have been described, monographs have given new taxonomic insights into groups, nomenclature accepted in 1968 has been found to be invalid, new and more reliable keys have been developed, and systematic treatments have changed and advanced. Increasingly, identification of the flora of our area (and other states of the Southeast and Mid-Atlantic) by academic researchers, agency personnel, and the interested public is hampered by the lack of an up-to-date flora. Without such a flora, identification must involve reference to herbaria and thousands of monographs, papers, and other floras – resources not readily available to many people who need them. The absence in the region of a single-source modern standard for the systematic treatment, nomenclature, and identification of the flora compromises scientific studies, ecological research, and agency inventory, management, and monitoring of ecosystem and species biodiversity.

Chapter 1 consists of a new treatment of the flora of the Carolinas, Virginia, and Georgia, to fill the need for a new standard reference to aid in the consistent identification of the flora of the region. While building on the tradition of the Manual, the Flora is not a revision or second edition; it takes some different approaches, has features the Manual lacks, lacks features the Manual has, and has an expanded geographic scope. At the present time, the Flora includes treatment of all species in the flora area of Delaware, Virginia, West Virginia, North Carolina, South Carolina, Georgia, northern Florida (the Panhandle and northeastern Florida, south to and including Dixie, Gilchrist, Columbia, Union, Bradford, Clay, and Duval counties), Alabama, Mississippi, Tennessee, Kentucky, the District of Columbia, and Maryland, and portions of the additional states of New Jersey (southern New Jersey, south of and including Monmouth and Burlington counties), and Louisiana (the Florida Parishes, east of and including West Feliciana, East Baton Rouge, Ascension, St. James, St. John the Baptist, St. Charles, Jefferson, and Plaquemines parishes) (see Figure 1.A.). Approximately 6800 taxa are keyed and treated, making the Flora a comprehensive resource for understanding the flora of all of the Southeastern United States east of the Mississippi River and south of the Ohio River and Mason-Dixon Line, excluding peninsular Florida.

Sources of information.
This new flora is based on all resources available: herbarium specimens, published literature, grey literature, Natural Heritage databases and rare species lists, and personal communication with a regional network of botanists and taxonomic experts. Herbarium specimens have been consulted at major institutions in the region.

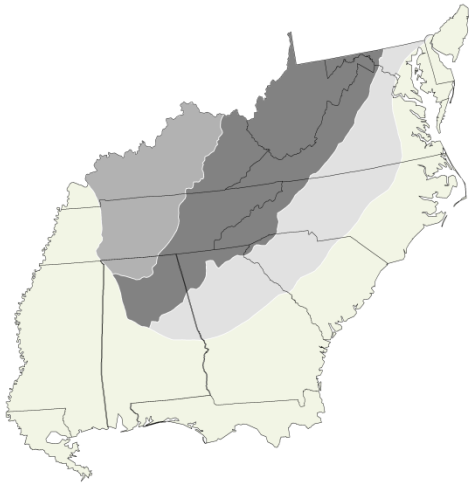


Figure 1.A. Map of the area covered by the Flora.

Criteria for inclusion of taxa.

One of the first challenges that the author of a flora encounters is to decide the criteria for the inclusion of taxa. The general rule in most floras can be simply summarized as "all native taxa and naturalized alien taxa," but within this simplistic phrase hide many complicated issues, and floras often differ widely in the actual criteria and judgments that they apply (Pyšek et al. 2004; Palmer, Wade, & Neal 1995). In particular, coverage of alien species is very uneven in floras, and the frequent exclusion of many alien species from floras hampers ecological studies, conservation efforts, and efforts to minimize the ecological and economic impacts of invasive aliens.

The following categories of taxa are included and treated fully as "primary" species:
1. Native taxa documented from the Flora (Georgia, South Carolina, North Carolina, Virginia, West Virginia, Delaware, and northern Florida, Alabama, Mississippi, Tennessee, Kentucky, Maryland, District of Columbia, Maryland, eastern Louisiana, and southern New Jersey), whether extant or presumed extinct. Some authors, such as Isely (1990), have "excluded" taxa from a flora if they believed them to be extinct or extirpated. This philosophy seems poorly considered: these taxa may prove not to be extinct or extirpated and their inclusion in the Flora will facilitate possible rediscovery, even if never found again specimens of them in the herbarium need to be identified or confirmed, and their former existence in the region should be documented.
2. Alien taxa introduced by whatever means and demonstrably established and reproducing (sexually or vegetatively) as a component of the flora. Parallel to #1 above, established alien taxa which have been presumably eradicated (such as *Striga asiatica* in the Carolinas) are included, as their eradication may not have been effective, they may be reintroduced, specimens need to be identifiable using the Flora, and their former existence should be documented.
3. Alien taxa substantially cultivated in the Flora area as crops, such as *Triticum aestivale*, *Zea mays*, *Vitis vinifera*, and *Pinus clausa*. Such species are variably represented in herbaria, and are often included in floras only if one or more herbarium specimens indicate that the species is persisting, or has been collected around a dump or in the edge of a field "out of cultivation." This seems an arbitrary criterion to apply to species which are among the most commonly seen and economically most important in a region, and may cover many thousands of acres or square miles in the region covered by the flora.

Additional categories of taxa are included and treated as "secondary" species:
1. Native taxa with uncertain documentation, this varying from literature reports not definitely verifiable with specimens (some of these old and some new), to sight reports regarded as probably correct. Taxa in this category are included as secondarily-treated taxa, and their imperfect documentation is described.

Species which have been reported from the Flora area but which are excluded for one reason or another are also listed and the reason for their exclusion mentioned or discussed.

Taxonomic philosophy. Taxonomic treatments generally follow recent monographic and revisionary work, but an effort has been made to provide a certain rough consistency of "splitting" vs. "lumping" across different taxonomic groups. As is generally true in recent treatments, generic and family concepts are often narrower than those used in the Radford, Ahles, and Bell (1968) Manual, based on new evidence, including (but not limited to) cladistic methods applied to morphologic and molecular data.

Ironically, these results have often resulted in a validation of earlier, narrower generic (and familial) concepts espoused by J.K. Small, P.A. Rydberg, and others (see Weakley 2005 for extensive discussion). Varieties are less frequently recognized than by Fernald (1950), though a considerable number of species and infraspecific taxa "lumped" by Radford, Ahles, and Bell (1968) are recognized (generally following more recent monographic or revisionary work). Some taxa not formally recognized are discussed and characters for their recognition provided in the text, to draw attention to putative taxa that may warrant recognition after further evaluation.

Format and features.

Detailed keys. Keys have been subjected to rigorous testing in the field and herbarium by hundreds of users. To the degree feasible, keys are structured to emphasize characters that are readily observable and available for long parts of the year, such as vegetative characters; this is not feasible for all groups, of course. Multiple characters are provided. Terminology strives to avoid abstruse technical terms which do not significantly add meaning (for some genera, an introduction to morphological characters and terms used is provided as "Identification notes" preceding the key). Geographic distributions and habitats are sometimes included in the keys as pragmatic, useful, secondary "characters," but are placed in brackets to indicate that they are not "true" characters. The keys include all species from the primary and secondary flora areas (North Carolina, South Carolina, Virginia, Georgia, Alabama, Mississippi, Tennessee, Kentucky, West Virginia, Maryland, Delaware, the District of Columbia , and parts of Florida, Louisiana, and New Jersey). In some cases, several alternate keys are provided. The primary emphasis of the keys is pragmatism – effective and efficient identification. For this reason, a key to a genus sometimes includes closely similar taxa not in the genus that may be mistaken for it. Another example is that the "family key" to ferns and fern allies is actually a key to genera, allowing an emphasis in the key on readily observable characteristics, rather than the technical characters often needed to distinguish fern families. Keys are based on herbarium specimens, though reference is made when characters based on live or fresh plants may differ from those of pressed and dried specimens. Some keys have been adapted from literature cited; where the adaptation is particularly close, credit is given to the source by specific citation.

Habitat. Information is provided about the habitat of the taxon. This information is largely from the field experience of the author, supplemented by information from other botanists, from herbarium labels, and from the literature. For species with wide ecological amplitudes, the habitat may be described simply and broadly ("a wide variety of upland forests"), while the habitat of more localized, specialized, or rare taxa may be described in considerable detail ("moist outcrops of calcareous to semi-calcareous metamorphic rocks, such as mylonite or marble, near waterfalls in humid escarpment gorges with high rainfall, at low elevations").

Native status. The native or alien status is stated. Also, an asterisk prior to the species' name indicates that it is considered alien throughout the primary flora area. Some past floras, including Radford, Ahles, and Bell (1968), were haphazard in their inclusion of this information, which is a very important attribute of each recognized taxon. If there is a question, it is mentioned or discussed. For aliens, an opinion is given as to whether the taxon is naturalized, persistent, waif, etc. in the primary flora area.

Flowering/fruiting dates. Flowering and fruiting dates are provided for the primary flora area. These are derived from herbarium specimens viewed by the author (collected from within the Flora area), from field observations by the author (within the Flora area), and from literature cited.

Distribution of species. A statement of the rangewide distribution of each taxon treated is provided. This is based on published distribution maps and distribution statements in other floras, amended and improved by additional herbarium specimens and published records (such as the "Noteworthy Collections" section in the journal Castanea). The distribution within the primary area is provided by state and physiographic province.

These distribution statements are being replaced by a map.

The map shows distribution within the Flora area symbolically, with each state × physiographic province area, except that on the maps, the very small areas of the DC Piedmont, the DC Coastal Plain, and the DE Piedmont are not shown separately from the MD Piedmont, the MD Coastal Plain, and the MD Piedmont, respectively. The native/alien status of the taxon is shown by squares for native occurrence and triangles for alien occurrence. Note that some species have distributions including both alien and native distributions, so *Dionaea muscipula* for instance is native in the Coastal Plain of NC and SC, but alien in the Coastal Plain of FL. The abundance in that state × physiographic province area is shown by the symbol, an open symbol is rare, a symbol with a dot is uncommon, and a filled symbol is common.

In the lower right corner is a space designated for distributional information. If the species is endemic to the Flora Area, you will see "EN." If the species is alien, you will see the region of the world to which it is native. If the species is native but not endemic, you will see a compass rose. Eight arrows depict the native distribution of the taxon outside of the Flora area. Arrows can be long (common at least somewhere in that region), or short (only uncommon or rare in that region).

The regions to which the eight arrows point are:

N arrow -- ne. North America (PA and n. NJ north to the Canadian maritime provinces, west through QC to se. ON and e. and s. OH);
NW arrow -- nw. North America (w. OH, MI, w. ON, and NU west to AK, BC, and OR, north of and including n. MO, NE, WY, ID, and OR);
W arrow -- w. United States (the western "Southeast" of trans-Mississippi LA, AR, s. MO, OK, and e. TX), west to sw. United States;
SW arrow -- Mexico, Central America, and South America;
S arrow -- peninsular FL;
SE arrow (dashed to indicate oversea) -- West Indies (including Bahamas) and Bermuda;
E arrow (dashed to indicate oversea) -- Asia and/or Africa;
NE arrow (dashed to indicate oversea) -- Europe.

Literature. Nearly all genera have citations to recent, pertinent systematic literature, as well as more limited citations to literature on ecology and population biology. The intent is to provide the user with access into more detailed literature, and to document the literature basis of the treatment followed in the Flora. About 2100 references have been consulted and are cited.

Synonymy. Cited synonymy is provided to regional floras, monographs, revisions, and other significant floristic treatments. This allows comparison of the treatment in the Flora to other treatments, and convenient access to the other treatments. Synonymy is provided comprehensively for the following floras: Radford, Ahles, and Bell (1968), as RAB; Small (1933, 1938), as S; Fernald (1950), as F; Gleason (1952), as G; Godfrey and Wooten (1979, 1981) as GW; Vascular Flora of the Southeastern States (Cronquist 1980, Isely 1990) as SE; Wofford (1989) as W; Gleason and Cronquist (1991) as C; Kartesz (1999) as K or K1; Kartesz (2010) as K2; and Flora of North America (1993b, 1997, 2000, 2002a, 2002b, 2003a, 2004b, 2005, 2006a, 2006b, 2006c, 2007a, 2009, 2010) as FNA; Brown & Brown (1984) as Md; Wunderlin & Hansen (2003) as WH; Strausbaugh & Core (1978) as WV. Synonymy used in recent monographs and revisions is also cited. All names known to me to be attributed to the ***Flora*** area in other floras, monographs, and revisions are accounted for.

Comments and discussion. Miscellaneous comments and discussion are provided for many species and genera, including discussion of biogeography, more details on distribution of rare species, additional notes on identification not included in the keys, information of particular interest on species biology and ecology, habitat, uses, discovery in the flora area or a state, etc. These "idiosyncratic comments" add to the general usefulness and interest of what is intended to be a rigorous, practical, and interesting flora.

Acknowledgments

Reviews, comments, contributions, and support for the new flora have been gratefully received over many years from the following: Jim Allison, Jame Amoroso, Lewis Anderson (now deceased), Loran Anderson, Wayne Barger, Matthew Barnett-Lawrence, Rodney Bartgis, Moni Bates, Jeffery Beam, Allen Belden, Caroline Bernard, Arleigh Birchler, Millie Blaha†, Stefan Bloodworth, John Boggan, Steve Bowling, Marj Boyer, Ted Bradley, Patricio Alejandro Brevis, Edwin Bridges, Richard Broadwell, Dan Brunton, Misty Buchanan, A.J. Bullard, Bill Burk, Julian Campbell, Bill Carr, Susan Carr, Jay Carter, Richard Carter, Linda Chafin, Sherri Church, Will Cook, Roy Coomans, Pat Cox, Bob Dellinger, Pete Diamond, Jamey Donaldson, Wilbur Duncan†, Lee Echols, Dwayne Estes, Susan Farmer, Mary Felton†, Gary Fleming, Cecil Frost, Chris Frye, Chick Gaddy, Kanchi Gandhi, Bill Gensel†, Lisa Giencke, Bob Godfrey†, Tom Govus, Joel Gramling, Converse Griffith, Ben Hafer, Arthur Haines, Curtis Hansen, Jim Hardin, Paul J. Harmon, Sunny Hart, Bobby Hattaway, Karin Heiman, Charlie Hickey, Howard Horne, Hal Horwitz, Ron Jones, Walt Judd, John Kartesz, Gary Kauffman, Benson Kirkman, Wes Knapp, Bob Kral, Alexander Krings, Kathy Kron, Mike Kunz, Ron Lance, Julia Larke, Chris Lea, Richard LeBlond, Michael Lee, Harry LeGrand, Jenny Lellinger, Steve Leonard, Chris Liloia, Jerry Long, Jess Long, Wayne Longbottom, Chris Ludwig, Paul Manos, Laura Mason, Jim Massey, Kathy Gould Mathews, Jim Matthews, David McAdoo, Bill McAvoy, Bob McCartney, Kathleen McCoy, Carol Ann McCormick, Patrick McMillan, Jordan Metzgar, Julie Moore, Mike Moore†, Larry Morse†, Bill Moye, Nora Murdock, Zack Murrell, Lytton Musselman, Robert Naczi, Fred Nation, Gil Nelson, John Nelson, Guy Nesom, Claire Newell, Carl Nordman, Cary Norquist, Hugh Nourse, Shawn Oakley, Doug Ogle, Jeff Ott, James Padgett, Tom Patrick, Karen Patterson, Steve Paull, Cary Paynter, Linda Pearsall, Sam Pearsall, Bob Peet, Jeff Pippen, Dan Pittillo, Bert Pittman, Derick Poindexter, Jackie Poole, Richard Porcher, Milo Pyne, Al Radford†, Tom Rawinski, Doug Rayner, Jerry Reece, Chris Reid, Carl Rothfels, Mary Russo, Mike Schafale, Steve Seiberling, John Semple, Joey Shaw, Jason Singhurst, Alan Smith, Inge Smith, Peter Smith, Anita Solomon, Bruce Sorrie, Dan Spaulding, Brent Steury, Don Stone†, Bill Stringer, Dale Suiter, Dave Taylor, John Thieret†, Michael C. Thompson, Johnny Townsend, Erin Tripp, Mike Turner, Julie Tuttle, Leonard Uttal, Nancy Van Alstine, Brian van Eerden, Herb Wagner†, Andy Walker, Dan Ward, Jim Ward, Donna Ware, Richard Ware, Stewart Ware, Allison Weakley, Kristie Wendelberger, Tom Wentworth, Peter White, Brenda Wichmann, Tom Wieboldt, Bob Wilbur, Theo Witsell, Gene Wofford, Donna Wright, Robert Wright, Steve Young, the Flora of Virginia Project, participants in the Carolina Vegetation Survey annual "pulses," NatureServe (Durham Office), the Southern Resource Office of The Nature Conservancy, the North Carolina Natural Heritage Program (Division of Parks and Recreation), the Virginia Division of Natural Heritage, the Conservation Trust for North Carolina, and many herbaria, especially NCU, NCSC, DUKE, UGA, USCH, CLEMS, VDB at BRIT, FSU, US, BRIT, WILLI, BOON, WCUH, HUH, MO, and UNCC herbaria. I ask the forgiveness of anyone omitted inadvertently.

Leaf duration. The longevity of leaves is used in the keys for woody plants. **Evergreen** plants are those that retain full leaf cover through the winter, while **deciduous** plants lose their leaves at the end of the growing season (for some species, sometimes well before autumn). Some plants are also described as **tardily deciduous** or **semi-evergreen**, meaning that they drop leaves gradually into the winter, so that they are sparsely bedecked with leaves or even bare by the time of initiation of new growth in the spring. Unless you are in a position to observe the plant repeatedly through the seasons, leaf duration must be interpreted, and this can be difficult, especially on herbarium specimens. In general, evergreen leaves tend to be darker green (at least on the upper surface), often shinier, and usually thicker in texture and stiffer than deciduous leaves, but there are exceptions to all these tendencies. It can be helpful to see if the specimen or living plant has two obviously different ages of leaves present: older, tougher, more ragged and insect-eaten leaves of last year as well as younger leaves of the year. On many woody plants, it is easy to determine what is new (this year's) growth from older growth, and the younger vs. older leaves may be spatially separated on shoots of the season vs. on older wood. Note, though, that some "evergreen" shrubs or trees essentially replace all their leaves at leaf-out in the spring, all of last year's leaves being sloughed as the current year's leaves are emerging.

Growth form or habit. The basic growth form or habit of the plant is used extensively in the keys. **Woody** plants have substantial secondary or diameter growth of wood, which makes their stems (in general) thicker, stronger, stiffer, and tougher; they also have "perennating structures" (normally buds) borne above ground on their woody stems. **Woody plants** are further subdivided into **trees**, **shrubs**, **rosette shrubs**, **subshrubs**, **rosette subshrubs**, and **lianas**. **Trees** are generally more than 5 meters tall at maturity and usually have single stems which are not interconnected by subterranean rhizomes (forming clonal patches). However, some tree species are characteristically multi-trunked or tend to produce a multi-trunked growth form as a result of stump-sprouting following logging, and stressful ecological conditions (such as shallow soil over rock or maritime exposure) can produce trees shorter than 5 meters. **Shrubs** are generally less than 5 meters tall and are often multi-stemmed from the base or near it (though some shrubs are characteristically single stemmed); quite a few are also clonal and produce many above-ground stems from a series of interconnected underground rhizomes). Some species grow as both trees and shrubs or have an ambiguous form; these are generally keyed as both trees and shrubs. Note that trees have seedlings or saplings that are shorter than 5 meters tall and may be multi-stemmed in growth form, especially in burned habitats; these are <u>not</u> keyed as shrubs and can generally be recognized as tree seedlings or saplings by the presence in the habitat of adult trees of the same species and by their lack of sexual reproduction (flowers, fruits, cones, etc.) because of their juvenile condition. **Subshrubs** are somewhat to strongly woody, but short in stature (often < 2 dm tall); while they have woody growth, they are often mistaken for herbs. **Rosette shrubs** and **rosette subshrubs** have basal leaves (see **Leaf location**, below) from an above-ground but short woody stock. **Lianas** are woody vines: in essence shrubs with specialized structures for climbing, including a) adventitious roots, b) twining growth of main stems, or c) simple or branched tendrils that either twine themselves or have adhesive "holdfast" tips. Some plants are keyed both as lianas and as shrubs. **Herbaceous plants** lack substantial secondary growth of wood and are either annual or have perennating organs (such as buds) on subterranean rhizomes, crowns, caudices, or corms. Herbaceous plants are further subdivided into **herbs** and **herbaceous vines**. **Herbs** are erect, sprawling, or trailing, but lack specialized adaptations for climbing (twining, tendrils, etc.); whereas **herbaceous vines** have these specialized adaptations. The interpretation of "woodiness", between shrub and herb (and liana and herbaceous vine), can be difficult, especially with herbarium specimens. Some herbaceous plants can become suffrutescent: tough, fibrous, or thick in ways that mimic or approach woodiness. The presence ofvegetative buds (not flower buds) in the axils of leaves on the aerial stems clearly indicates a woody plant. Some plants which are ambiguously woody and likely to be mistaken one way or the other are keyed both ways.

Leaf disposition. The disposition of the leaves, whether basal or cauline, is used as a distinction to separate some of the major subkeys (in the woody plants separating Keys A7, B1, and E from the others, and in the herbaceous plants separating Key N from Keys O, P, Q, R, and S), as well as in a few other places. **Basal leaves** arise from underground buds (on rhizomes, crowns, caudices, or corms) or from the very base (ground level) of an aerial stem. **Stem leaves** (cauline leaves) are those which arise from above-ground (aerial) stems of the plant. Many plants, however, have **basally disposed** leaves, where the largest leaves are basal (and usually persistent through the growing season as a "basal rosette"), but smaller stem leaves extend up the above-ground stem. This can be ambiguous, though, and the persistence of basal leaves can be affected by season and conditions. While many taxa are keyed both in Key N and in one or more of Keys O, P, Q, R, and S), if this choice seems at all ambiguous and keying one way does not work well, the other choice should be tried.

Leaf type. Leaves are described as either **simple** or **compound**. Simple leaves are not divided into separate leaflets; the leaf tissue is continuous with all other leaf tissue of the leaf. By contrast, compound leaves are separated into 2 or more separate leaflets, connected only by various stalks (petiolules, rachises, rachillas) that lack leaf tissue. Simple leaves may be **unlobed**, **pinnately** lobed, or **palmately** lobed, and the lobes may be variously shallow or cut nearly to the midvein or base of the leaf. Perhaps the easiest way to determine whether leaf lobing is pinnate or palmate is to look at the major veins in the leaf. Pinnately lobed leaves have lobes arrayed in a line along either side of the midvein, and the lobes are associated with the major secondary veins of the (pinnately veined) leaf. The lobes of palmately lobed leaves are associated with the 3 or more palmate veins that arise together from the base of the leaf blade (note that the lobes of palmately lobed leaves are sometimes themselves sublobed, and that these sublobes are often pinnately arrayed: the leaf is still considered palmately lobed). **Compound leaves** are further classified by the number of leaflets, whether the leaflets are arrayed in a pinnate or palmate manner, and whether there is a single order of division or 2 or more orders of division. **Palmately compound** leaves have all leaflets attached at a single point, at the end of the petiole. Palmately compound leaves in our flora have from 3 to ca. 21 leaflets and are never further compound beyond the single order of division (in other words, the leaflets are not themselves compound). **Pinnately compound** leaves have leaflets attached to one or more axes (rachises, rachillas) that extend beyond the end of the petiole, and many taxa have 2 or more orders of division. Bifoliolate (**2-foliolate**) leaves are very rare in our flora. Trifoliolate leaves (**3-foliolate**, and sometimes called "ternate") are very common in our flora and can be either **palmately 3-foliolate** or (especially in the Fabaceae) **pinnately 3-foliolate.** Pinnately compound leaves have a short rachis extending past the end of the petiole (and the point of attachment of the 2 lateral leaflets via their petiolules), with the terminal leaflet attached at the end of this rachis via its petiolule; the joint between the rachis and the terminal petiolule is usually obvious because of a change in diameter, color, vestiture, and/or texture. The distinction between palmately 3-foliolate and pinnately 3-foliolate leaves is not used in the <u>Key to Genera and Families</u> but is important in the some other keys, especially the key to genera of the Fabaceae. Pinnately compound leaves with 4 or more leaflets are very common in our flora, especially in some families. **Even-pinnately compound** leaves (the less common situation) have an even number of leaflets, often paired along the rachis or rachillas, and lack a terminal leaflet at the tip of the rachis or rachilla and extending along its axis; these taxa are concentrated in the Fabaceae and a few other smaller families. **Odd-pinnately compound** leaves have a terminal leaflet and therefore usually an odd number of leaflets. Odd-pinnately compound leaves with 2 or more orders of division are typically described in the keys as **complexly compound**. Other floras variously describe leaves of this sort as 2-pinnate, 3-pinnate, decompound, biternate, or other terms, but these have largely been avoided in the keys in this work because the "compoundness" is often complex, mixed between pinnate and ternate, and therefore difficult to describe accurately with such terminology. For instance, many members of the Apiaceae have complexly compound leaves, which are initially 3-forked (ternate), each of these forks may then be 3-forked again (though with the lateral forks supporting fewer or smaller leaflets than the terminal one), and these 3-order divisions are then often pinnately compound. Note that **deeply lobed leaves** can sometimes be easily mistaken for **compound leaves**. Compound leaves have no leaf tissue connecting the individual leaflets, whereas lobed leaves have at

least a narrow flange of leaf tissue along the rachis or rachilla that connects the leaf tissue of one lobe with the leaf tissue of the next. In some taxa, this is difficult to interpret, and these have generally been keyed both ways.

Lobes and teeth. The presence, absence, number, and shape of **lobes** or **teeth** along the margin of the leaf are very useful vegetative characters. The term "tooth" or "teeth" is here used in a broad sense to include any of the small marginal projections covered under the terms dentate, denticulate, serrate, serrulate, crenate, crenulate, spinose, spinulose, doubly serrate (biserrate), or erose. In other words, teeth can be rounded, pointed, or spine-tipped, and of various shapes and sizes. The term "tooth" or "teeth" does not include undulations out of the main plane of the leaf, hairs, or epidermal projections in the plane of the leaf margin, described by terms such as ciliate, ciliolate, or scabrous-margined. Teeth are often regular in size and position but in some species are irregular in form, shape, and even presence (these species are keyed in several places). The term "lobe" or "lobes" is also used in a broad sense to mean a larger feature of the leaf margin. Relative to teeth, lobes are typically both actually larger and relatively larger in relation to the size of the leaf, and also more widely spaced, often with a sinus (the depression between 2 lobes) extending $1/10^{th}$ to $9/10^{th}$ of the way from the outer leaf outline to the midrib. Lobes are typically spaced 1 cm or more apart, though the term is also applied to more closely spaced features with relatively deep sinuses (at least $3/10^{th}$ of the way to the midrib), especially in pteridophytes and in flowering plants with small leaves. Teeth are truly marginal, typically meeting 2 or 3 of the following 3 conditions: spaced < 1 cm apart, the sinuses between them usually extending < $1/10^{th}$ of the way to the midrib, and the tooth itself (measured on its shorter side if it not equilateral) < 4 mm long. Occasionally we have also used the number of "**points**" as a character in the keys. This is the total number of lobe points and tooth points along one side of the leaf (base to apex on one side of the midvein). Note that some leaves are unlobed except for the presence of 2 basal lobes (one on either side, often described as cordate, sagittate, auriculate, or hastate depending on the shape, size, and orientation of the lobes); this situation is not keyed in the "lobed" sections of the key (as noted in the pertinent couplets).

Learning families. Learning plant families, especially those that are particularly important in Virginia's flora or that are especially distinctive, is an extremely useful aid in identifying plants. While "learning" a family often starts with understanding its distinctive characteristics, often including some rather technical characteristics, with experience it becomes a more "gestalt" sense that, for instance, "that plant just looks like Asteraceae", even if the features that would allow it to be keyed are not present. Knowing plant families often allows one to bypass the Key to Genera and Families entirely or facilitates decisions at particular couplets in it. A few of the families that are particularly useful to learn are Apiaceae, Asteraceae, Brassicaceae, Cyperaceae, Euphorbiaceae, Fabaceae, Juncaceae, Lamiaceae, Poaceae, Ranunculaceae, Rosaceae, and Rubiaceae.

Sleuthing characters. Some characters used in the key may seem initially impossible to find on your plant or specimen, but may actually be findable or deducible. Old fruits can sometimes be found on woody species, or on the ground under the tree or shrub. Old flower stalks (from the previous year) are sometimes present in perennial herbs, allowing the size of the plant and the type of inflorescence to be assessed. The calyx is often persistent after the petals have fallen, and calyx merosity (number in the whorl) and symmetry is usually the same as the merosity and symmetry of the corolla (though not always). Various fruit characters can sometimes be deduced from the flowers, and various flower characters can be deduced from the fruits. When capsules are immature (sometimes even in the stage of an ovary while in flower), dehiscence can often be deduced by the presence of visible lines on the fruit (sutures, visible at 10×). The number of carpels and locules can usually be determined from either the ovary or the immature or mature fruit, by making a careful ×-section. Stamens are sometimes present as shriveled remants on fruits, allowing the number od stamens to be determined. Hair types (e.g., simple vs. stellate) may seem impossible if the leaf appears superficially glabrous, but hairs often remain to the end of the season on even apparently glabrous leaves in protected places, especially on the lower surface in the main vein axils. The bulbous or papillose bases of some hairs remain after the rest of the hair has worn off. Hairs with bulbour or papillate bases Deducing the presence of stipules is often possible by looking for scars (usually linear) that extend beyond the leaf scar proper.

Winter identification. Note that no attempt has been made to make the key work consistently for plants in winter condition. Woody plants with evergreen foliage will generally be "keyable" in Keys B, D, E, F, G, H, I, and J, but deciduous species will not; there are various winter twig and bud keys available in print and online for the winter identification of trees and shrubs. Herbaceous plants with winter rosettes or otherwise green winter foliage will generally be found in Key N, but an impractical number of ambiguous or "dead end" leads will be encountered.

Botanical terminology. While the use of specialized terminology and jargon has been reduced, some of these terms are useful and unavoidable, and provide a precise meaning without a lengthy explanation. Terms can be found in the glossary, and there are print and online resources that provide definitions and often illustrations as well. Particularly recommended at the time of writing is Harris and Harris (2001), Plant Identification Terminology: an Illustrated Glossary.

Characteristics of major groups of vascular plants. At various points in the key, a kind of shorthand is used in key leads to indicate the main evolutionary group involved: Lycophytes, Pteridophytes, Gymnosperms, Basal Angiosperms, Eudicots, and Monocots. This shorthand is not placed in every couplet in which it could be, but is used where it is likely to be helpful to the user. While the readily visible characteristics of these groups have many exceptions, the following table} will aid in their recognition (note that this table is pragmatically based only on the characteristics of those taxa in our flora).

SECTION 5: MONOCOTYLEDONAE (MONOCOTS)

29. ACORACEAE Martinov 1820 (Calamus Family) [in ACORALES]

The family consists only of *Acorus*. Although traditionally treated as part of the Araceae, a wide variety of morphological, anatomical, and embryological evidence supports the segregation of the Acoraceae (Grayum 1987), a segregation additionally supported by molecular studies (Duvall et al. 1993, Chase et al. 1993). The spathe in *Acorus* is not morphologically equivalent to the spathe of the Araceae. References: Thompson in FNA (2000); Bogner & Mayo in Kubitzki (1998b).

Acorus Linnaeus 1753 (Calamus, Sweetflag)

A genus of 2-4 species, widespread in north temperate and subtropical regions. References: Thompson in FNA (2000); Grayum 1987; Haines (2000).

1 Midvein of the leaves not well-developed, about equally as prominent as 1-5 well-developed lateral veins; mature fruits produced; vegetative leaves (0.3-) avg. 0.8 (-1.3) cm wide ..... ***A. americanus***
1 Midvein of the leaves well-developed, distinctly more prominent than the lateral veins (though there are better-developed lateral veins, they are distinctly less prominent than the midvein); mature fruits not produced; vegetative leaves (0.5-) avg. 1.2 (-2.0) cm wide ..... ***A. calamus***

Acorus americanus (Rafinesque) Rafinesque, American Calamus, Sweetflag. Marshes, wet meadows, other wet areas, limey seeps. May-June. Widespread in ne. North America. This species is apparently a fertile diploid. Because this species has not generally been recognized in floras, its distribution is poorly known; additional distributional records should be expected and sought. [= FNA, K, Pa; < *A. calamus* Linnaeus – RAB, C, F, G, GW; < *A. americanus* – W]

* ***Acorus calamus*** Linnaeus, European Calamus, Sweetflag. Marshes, wet meadows, other wet areas; native of Eurasia, now widespread in e. North America. May-June. The aromatic rhizome and leaves have been used medicinally and candied as a confection. Populations of *A. calamus* in our area are apparently sterile triploids introduced from Europe, though diploid and tetraploid populations of *A. calamus* are known from Asia. [= FNA, K, Pa; < *A. calamus* Linnaeus – RAB, C, F, G, GW (also see *A. americanus*); < *A. americanus* – W]

30. ARACEAE A.L de Jussieu 1789 (Arum Family) [in ALISMATALES]

A family of about 100-110 genera and about 3000-4000 species, herbs and reduced aquatic herbs, cosmopolitan, but mostly tropical and subtropical. The Lemnaceae is phylogenetically embedded in the Araceae, and is here included in it as subfamily Lemnoideae (Angiosperm Phylogeny Group 1998, 2003; Keating 2004). References: Thompson in FNA (2000); Cusimano et al. (2011); Mayo, Bogner, & Boyce in Kubitzki (1998b); Keating (2004); Serviss, McDaniel, & Bryson (2000); Landolt in FNA (2000); Landolt (1980); Landolt (1986); Landolt in Kubitzki (1998b); Les & Crawford (1999); Bown (2000).

1 Plant a floating aquatic (or stranded), the individual leaves <2 cm long; [subfamily *Lemnoideae*].
  2 Fronds rootless; fronds without nerves; reproductive pouch 1, terminal.
    3 Fronds thick, globoid, < 2 mm long ..... ***6. Wolffia***
    3 Fronds flat, elongate and curved, 4-14 mm long ..... ***7. Wolffiella***
  2 Fronds with roots; fronds with 1 or more nerves; reproductive pouches 2, lateral.
    4 Roots 1 per frond; fronds with 1-5 (-7) nerves ..... ***4. Lemna***
    4 Roots (1-) 2-21 per frond; fronds with (3-) 5-21 nerves.
      5 Roots (1-) 2-7 (-12) per frond; fronds with (3-) 5-7 nerves; fronds 1.5-3× as long as wide; all of the roots perforating the scalelike leaflet ..... ***5. Landoltia***
      5 Roots 7-21 per frond; fronds with 7-16 (-21) nerves; fronds 1-1.5× as long as wide; only some of the roots perforating the scalelike leaflet (borne on the underside) ..... ***3. Spirodela***
1 Plant terrestrial, rooted in wetlands, or a floating aquatic (if a floating aquatic – *Pistia* – the individual leaves > 2 cm long).
  6 Plant a floating aquatic, with gray-green, velvety, cabbage-like leaves; [subfamily *Aroideae*, tribe *Pistieae*] ..... ***11. Pistia***
  6 Plant rooted (even when growing in water), the leaves various, but not as above.
    7 Leaves compound; [subfamily *Aroideae*, tribe *Arisaemateae*].
      8 Bulblets lacking on the petiole; spadix free from the spathe; [native, common] ..... ***13. Arisaema***
      8 Bulblets present at base and summit of the petiole; spadix fused to the spathe; [alien, rare] ..... ***14. Pinellia***
    7 Leaves simple.
      9 Leaves peltate and cordate-hastate; [subfamily *Aroideae*, tribe *Colocasieae*] ..... ***12. Colocasia***
      9 Leaves not peltate, either cuneate, rounded, cordate, or hastate.
        10 Spathe absent or obscure; leaf blade 2.5-5× as long as wide, cuneate at the base, lanceolate or narrowly elliptic; leaf venation parallel; [subfamily *Orontioideae*, tribe *Orontieae*] ..... ***1. Orontium***
        10 Spathe present, surrounding the spadix, at least at its base; leaf blade 1-2.5× as long as wide, either hastate at the base (*Arum*, *Peltandra*, and *Xanthosoma*), or rounded (*Symplocarpus*), or cordate (*Calla*), broadly ovate in outline.
          11 Spathe white; leaves cordate; plants from elongate rhizomes; [MD northward]; [subfamily *Calloideae*] ..... ***8. Calla***
          11 Spathe green or white; leaves hastate or rounded at base; plants from fibrous roots, a short thick rhizome, tuber, or a corm; [collectively widespread].
            12 Leaves ovate, rounded or subcordate at the base; spathe purple, or purple flecked with white; [subfamily *Orontioideae*, tribe *Symplocarpeae*] ..... ***2. Symplocarpus***
            12 Leaves hastate at the base (somewhat arrowhead-shaped); spathe green or white; [subfamily *Aroideae*].
              13 Larger leaf blades > 5 dm long; longer petioles 10-20 dm long; [subfamily *Aroideae*, tribe *Caladieae*] ..... ***9. Xanthosoma***

13 Larger leaf blades < 5 dm long; longer petioles < 7 dm long.
14 Plant from a horizontal tuber; leaves variegated; [alien, of moist soils]; [subfamily *Aroideae*, tribe *Areae*] ..... ***15. Arum***
14 Plant from fibrous roots; leaves not variegated; [native, of wetlands]; [subfamily *Aroideae*, tribe *Peltandreae*] ..... ***10. Peltandra***

1. Orontium Linnaeus 1753 (Golden Club)

A monotypic genus, an aquatic herb, of e. North America. References: Thompson in FNA (2000); Mayo, Bogner, & Boyce in Kubitzki (1998b).

Orontium aquaticum Linnaeus, Golden Club, Bog Torches, Never-wet. Generally in peaty and stagnant water, such as beaver ponds, blackwater streams, swamps, pools in low pocosins, streambeds in the Piedmont, bogs and swamps in the mountains. March-April. MA and c. NY south to s. FL and west to LA, north in the inland to w. NC, KY, and WV, primarily but by no means strictly Coastal Plain. Fresh leaves are unwettable, silvery-glistening when forced under water. [= RAB, C, F, FNA, G, GW, K, Pa, S, W, WH3, WV]

2. Symplocarpus R.A. Salisbury ex Nuttall 1818 (Skunk Cabbage)

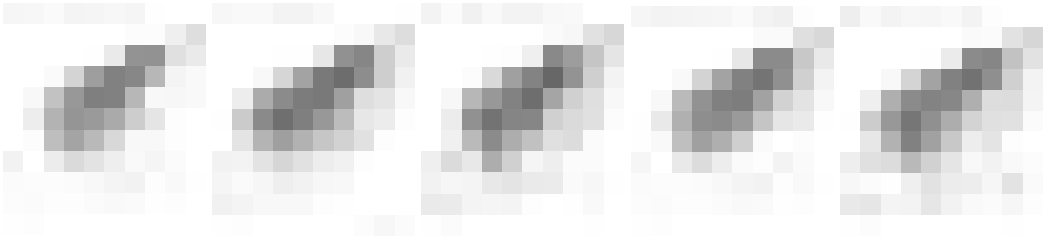
A genus of 3 species, of north temperate e. North America and ne. Asia. References: Thompson in FNA (2000); Mayo, Bogner, & Boyce in Kubitzki (1998b).

Symplocarpus foetidus (Linnaeus) Salisbury ex W.P.C. Barton, Skunk Cabbage. Seepage-fed bogs and nonalluvial swamps. January-March; July-September. NS and s. QC west to MN, south to n. NC, ne. TN, s. OH, and IL. [= RAB, C, F, FNA, G, GW, K, Pa, W, WV; = *Spathyema foetida* (Linnaeus) Rafinesque – S]

3. Spirodela Schleiden 1839

A genus of 2 species (with *Landoltia* removed), cosmopolitan. References: Landolt in FNA (2000); Landolt (1980)=Z; Landolt (1986)=Y; Landolt in Kubitzki (1998b); Les & Crawford (1999)=X. [also see *Landoltia*]

Spirodela polyrrhiza (Linnaeus) Schleiden, Greater Duckweed, Minnow-fole. Still to slowly moving waters of ponds, lakes, beaver ponds, and swamps. Widespread worldwide. [= RAB, FNA, K, X, Y, Z; = *S. polyrhiza* – C, F, G, GW, Pa, S, W, WH3, WV, orthographic variant]



4. Lemna Linnaeus 1753 (Duckweed)

A genus of 13 species, cosmopolitan. References: Landolt (1980)=Z; Landolt (1986)=Y; Landolt in Kubitzki (1998b); Landolt in FNA (2000). Key adapted closely from Landolt (1980, 1986) and Landolt in FNA (2000).

1 Margin of fronds denticulate in the distal portion; fronds narrowed basally to an elongated, persistent, green stalk, the fronds therefore cohering in long, often branched chains of 3-50 fronds; fronds submerged (except when flowering or fruiting); [section *Hydrophylla*] ..... ***L. trisulca***
1 Margin of fronds entire; fronds rounded basally, with a very small white stipe soon decaying, the fronds therefore cohering in simple clusters of 2-5; fronds normally floating.
2 Fronds with (0-) 1 nerve; anthocyanin absent in fronds (fronds green); [section *Uninerves*].
3 Fronds 1-2× as long as wide; nerve indistinct to fairly prominent, reaching at most 2/3 of the distance from node to apex (nerve about as long as or shorter than the aerenchymatous portion of the frond); fruit 0.6-1.0 mm long ..... ***L. minuta***
3 Fronds 1.3-3× as long as wide; nerve mostly prominent, reaching at least 3/4 of the distance from node to apex (nerve longer than the aerenchymatous portion of the frond); fruit 1.0-1.35 mm long ..... ***L. valdiviana***
2 Fronds with 3-5 (-7) nerves; anthocyanin absent or present in fronds (fronds green or red).
4 Root sheath winged at the base; root tip sharply pointed; roots not longer than 3 cm long; anthocyanin absent in fronds; [section *Alatae*].
5 Seeds with 8-26 prominent ribs, brownish, falling from the fruit when ripe; fronds with only 1 papilla above the node, which is smaller than the papule at the apex; wing of the root sheath 1-2.5× as long as wide ..... ***L. aequinoctialis***
5 Seeds with 35-70 obscure ribs, whitish, remaining in the fruit when ripe; fronds very often with 2-3 papilla above the node, which are larger than the papule at the apex; wing of the root sheath 2-3× as long as wide ..... ***L. perpusilla***

4 Root sheath not winged at the base; root tip mostly rounded; roots often longer than 3 cm long; anthocyanin present or absent in fronds; [section *Lemna*].
6 Plants forming small, olive-brown rootless turions, 0.8-1.6 mm in diameter, which sink to the bottom..... ***L. turionifera***
6 Plants without distinct turions.
7 Fronds not reddish on the lower surface (or if so only slightly so and much less so than on the upper surface); greatest spacing of veins near the middle of the frond or toward its base..... ***L. minor***
7 Fronds often reddish on the lower surface (and more intensely so than on the upper surface); greatest spacing between the veins near the middle of the frond or toward its tip.
8 Fronds often gibbous; fronds with very distinct papillae above the node and near the apex on the upper surface, but not between the node and the apex; seeds with 10-16 distinct ribs..... ***L. obscura***
8 Fronds flat; fronds with mostly distinct papillae on the midline on the upper surface; seeds with 3-60 indistinct ribs..... ***L. turionifera***

Lemna aequinoctialis Welwitsch, Lesser Duckweed. Still to slowly moving waters of ponds, lakes, beaver ponds, and swamps. Widespread worldwide, except in n. North America and n. Eurasia. [= FNA, K, WH3, Y, Z]

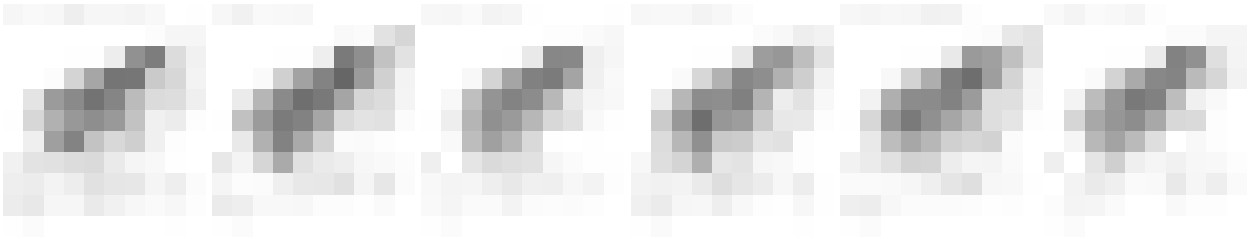
Lemna minor Linnaeus, Common Duckweed. Still to slowly moving waters of ponds, lakes, beaver ponds, and swamps. Widespread in the Northern Hemisphere; scattered in the Southern Hemisphere, where perhaps in part introduced. [= FNA, K, Pa, WH3, Y, Z; < *L. minor* – RAB, C, F, G, W, WV (also see *L. obscura*)]

Lemna minuta Kunth, Least Duckweed. Quiet waters, seepages. Widespread in North America, Central America, and South America; more local in Europe and Japan. [= C, FNA, K, WH3; = *L. valdiviana* Philippi var. *abbreviata* Hegelmann – F; = *L. minuscula* Herter – Y, Z]

Lemna obscura (Austin) Daubs, Little Duckweed. Still to slowly moving waters of ponds, lakes, beaver ponds, and swamps. NY west to MN and NE, south to s. FL, TX, Mexico, and the Bahamas. [= FNA, K, Pa, WH3, Y, Z; < *L. minor* – RAB, C, F]

Lemna perpusilla Torrey, Tiny Duckweed. Still to slowly moving waters of ponds, lakes, beaver ponds, and swamps. QC west to MN, south to NC, TN, and TX. [= RAB, C, F, FNA, G, K, Pa, W, Y, Z]

Lemna trisulca Linnaeus, Star Duckweed, Ivy-leaved Duckweed. Still to slowly moving waters of ponds, lakes, beaver ponds, and swamps. Widespread in the Northern Hemisphere; scattered in the Southern Hemisphere. [= C, F, FNA, G, K, Pa, W, Y, Z]



Lemna turionifera Landolt, Turion Duckweed, Red Duckweed. Mesotrophic to eutrophic, quiet waters. Circumboreal, in North America from NL (Newfoundland) west to AK, south to c. PA (Rhoads & Klein 1993; Rhoads & Block 2007), WV, KY, n. AL (FNA), TX, NM, AZ, and CA. [= FNA, K, Pa; < *L. minor* Linnaeus – C]

Lemna valdiviana Philippi, Pale Duckweed. Still to slowly moving waters of ponds, lakes, beaver ponds, and swamps. Widespread in North America, Central America, and South America. [= RAB, C, FNA, G, K, Pa, W, WH3, WV, Y, Z; = *L. valdiviana* var. *valdiviana* – F]

5. Landoltia D.H. Les & D.J. Crawford (Duckmeat)

A monotypic genus, now cosmopolitan. References: Landolt in FNA (2000); Landolt (1980)=Z; Landolt (1986)=Y; Landolt in Kubitzki (1998b); Les & Crawford (1999)=X.

* ***Landoltia punctata*** (G.F.W. Meyer) D.H. Les & D.J. Crawford, Dotted Duckmeat. Still to slowly moving waters of ponds, lakes, beaver ponds, and swamps; native of the Southern Hemisphere. Widespread worldwide. An introduced aquarium plant. Les & Crawford (1999) make a good case for recognition of this species in the monotypic genus *Landoltia*, very possibly more closely related to *Lemna* than to *Spirodela*. [= FNA, Pa, WH3, X; = *Spirodela punctata* (G.F.W. Meyer) C.H. Thompson – C, GW, K, Y, Z; = *Spirodela oligorrhiza* (Kurz) Hegelmann – RAB, F, G]

6. Wolffia Horkel ex Schleiden 1844 (Watermeal, Mud-mary, Rootless-duckweed)

A genus of 11 species, cosmopolitan. References: Landolt in FNA (2000); Landolt (1980)=Z; Landolt (1986)=Y; Landolt in Kubitzki (1998b).

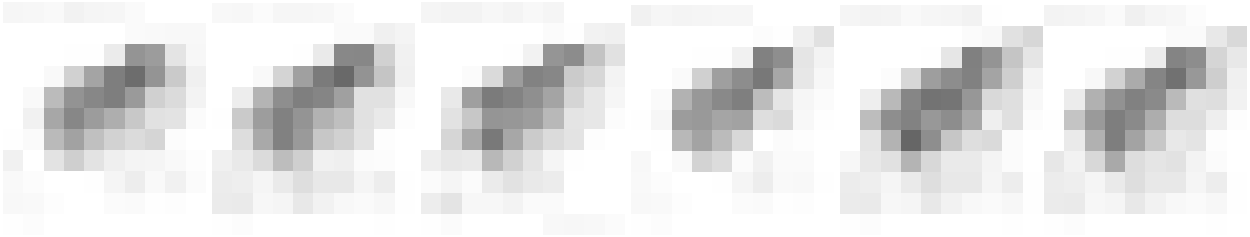
1 Fronds globoid to ovoid, 1-1.5× as deep as wide; thallus not brownish punctate above
2 Fronds 1.0-1.3× as long as wide, 0.4-1.2 mm wide..... ***W. columbiana***
2 Fronds 1.3-2.0× as long as wide, 0.3-0.5 mm wide..... ***W. globosa***
1 Fronds nutshell-like, 0.5-1.0× as deep as wide; thallus punctate above with brownish pigment cells (most visible on dead fronds).
3 Frond 1.3-2.0× as long as wide, the upper side slightly convex, with an upward point apically..... ***W. borealis***

3 Frond 1.0-1.5× as long as wide, the upper side with a prominent papilla centrally ..... ***W. brasiliensis***

Wolffia borealis (Engelmann) Landolt, Northern Watermeal. Still to slowly moving waters of ponds, lakes, beaver ponds, and swamps. QC west to BC, south to PA, VA (?), KY, TN, MO, and CA. The occurrence in VA is uncertain. [= FNA, K, Pa, Y, Z; = *W. punctata* Grisebach – C, F, G, GW, misapplied; < *Bruneria punctata* (Grisebach) Nieuwland – S, misapplied]

Wolffia brasiliensis Weddell, Brazilian Watermeal. Still to slowly moving waters of ponds, lakes, beaver ponds, and swamps. Widespread in e. North America, Central America, and South America. [= FNA, K, Pa, W, WH3, Y, Z; = *W. papulifera* C. Thompson – RAB, C, F, G, GW; < *Bruneria punctata* (Grisebach) Nieuwland – S; = *Wolffia punctata* – WV]

Wolffia columbiana Karsten, Colombian Watermeal. Still to slowly moving waters of ponds, lakes, beaver ponds, and swamps. Widespread in North America, Central America, and South America. [= RAB, C, F, FNA, G, GW, K, Pa, WH3, Y, Z; = *Bruneria columbiana* (Karsten) Nieuwland – S]



* ***Wolffia globosa*** (Roxburgh) den Hartog & Plas, Asian Watermeal. Still to slowly moving waters of ponds, lakes, beaver ponds, and swamps; native of Asia. [= FNA, WH3]

7. Wolffiella Hegelmann 1895

A genus of 10 species, cosmopolitan. References: Landolt in FNA (2000); Landolt (1980)=Z; Landolt (1986)=Y; Landolt in Kubitzki (1998b).

1 Fronds (4-) 6-15 (-20)× as long as wide; angle of pouch 25-50° ..... ***W. gladiata***
1 Fronds 1.5-8× as long as wide; angle of pouch 45-90° ..... ***W. oblonga***

Wolffiella gladiata (Hegelmaier) Hegelmaier, Mud-midgets. Ponds, ditches, beaver-ponds millponds. April-June. MA and n. IL (s. WI?) south to s. FL and TX; Mexico. [= FNA, K, Pa, WH3, Y, Z; > *Wolffiella floridana* (Donnell-Smith) C. Thompson – RAB, C, F, G, GW, S; > *W. gladiata* – GW]

Wolffiella oblonga (Philippi) Hegelmaier. Quiet waters. N. peninsular FL, MS (?), LA, TX, south to Mexico, Central America, South America; West Indies. [= FNA, GW, K, WH3]

8. Calla Linnaeus 1753 (Calla)

A monotypic genus, of circumboreal distribution. References: Thompson in FNA (2000); Mayo, Bogner, & Boyce in Kubitzki (1998b).

Calla palustris Linnaeus, Wild Calla, Water-arum. Swamps. A circumpolar species of seepage swamps, ranging south in North America to sw. PA, w. MD, n. IL, c. MN, and BC. [= C, F, FNA, G, K, Pa]

9. Xanthosoma Schott 1832

A genus of about 60 species, herbs, of tropical Central and South America. References: Mayo, Bogner, & Boyce in Kubitzki (1998b); Serviss, McDaniel, & Bryson (2000)=Z.

* ***Xanthosoma sagittifolium*** (Linnaeus) Schott, Arrowleaf Elephant-ear. Ditches; native of tropical America. It can be seen in ditches adjacent to ornamental plantings; it is uncertain whether it can be considered naturalized in the more northern parts of our area. It is superficially similar to *Colocasia*, differing in its non-peltate leaves. [= K, WH3, Z; = *Xanthosma sagittifolium* – GW, orthographic error]

10. Peltandra Rafinesque 1819 (Arrow-arum)

A genus of 2 species, endemic to e. North America. References: Thompson in FNA (2000); Blackwell & Blackwell (1974)=Z; Mayo, Bogner, & Boyce in Kubitzki (1998b).

Identification notes: *Peltandra* is often confused in vegetative condition with *Pontederia* and *Sagittaria*, superficially similar emergent aquatics with hastate or sagittate leaves. *Peltandra* leaves have pinnate venation, a prominent midvein, a prominent vein running parallel to the leaf margin, and the hastate lobes with rounded to acute apices. *Pontederia* leaves have parallel venation, lack a prominent midvein and a prominent vein parallel to the leaf margin, and have hastate lobes with broadly rounded apices. The leaves of sagittate species of *Sagittaria* have parallel venation, a prominent midrib, a vein at 90 degrees to the midrib at the junction of the main blade and each of the hastate lobes that forks, with at least one fork directed apically and at least one fork directed into the basal lobe, lack a prominent vein parallel to the margin, and have hastate-sagittate lobes with acuminate apices.

1 Spathe green at base, bright white above (the white portion not merely a margin), flared open and therefore only loosely surrounding the spadix, succulent below, the white portion thin and herbaceous, the margins generally nearly entire and plane; fruits red; distal portion of leaf blade lacking broad, coarse veins similar to the midvein (all the veins alike and fine) ..... ***P. sagittifolia***
1 Spathe green (rarely with a narrow cream-colored or whitish margin up to 1.7 cm wide), tightly surrounding the spadix, thick and succulent throughout, the margins crisped; fruits green to dark purplish-green; distal portion of leaf blade often with several broad, coarse veins similar to the midvein, the remainder of the veins fine (sometimes the distal portion of the leaf with fine veins only) ..... ***P. virginica***

Peltandra sagittifolia (Michaux) Morong, Spoonflower, White Arrow-arum. Pocosins of the outer Coastal Plain, sphagnous swamps. July-August. A Southeastern Coastal Plain endemic: e. NC south to c. peninsular FL and west to se. LA. The reduction of *P. sagittifolia* to a subspecies of *P. virginica* (Blackwell & Blackwell 1974) was based on confusion of true *P. sagittifolia* with forms of *P. virginica*. The two species are distinct. [= FNA, GW, K, WH3; = *P. sagittaefolia* (Michaux) Morong – RAB (an orthographic variant); = *P. glauca* (Elliott) Feay – S; = *P. virginica* ssp. *luteospadix* (Fernald) Blackwell & Blackwell – Z]

Peltandra virginica (Linnaeus) Schott, Green Arrow-arum, Tuckahoe. Marshes, bogs, beaver ponds, pocosins, other stagnant, aquatic situations. May-June. ME, s. QC, and n. MI south to s. FL and e. TX. [= RAB, C, FNA, G, GW, K, Pa, S, W, WH3; > *P. virginica* – F; > *P. luteospadix* Fernald – F; > *P. virginica* ssp. *virginica* – Z]

11. Pistia Linnaeus 1753 (Water Lettuce)

A genus of probably a single species, widespread in the tropics of both hemispheres. References: Thompson in FNA (2000); Mayo, Bogner, & Boyce in Kubitzki (1998b).

Pistia stratiotes Linnaeus, Water Lettuce. Stagnant or slow-moving waters of rivers, sometimes cultivated in ponds, where it persists for a while (presumably eventually eliminated by cold winters). This floating aquatic, pantropically distributed, appeared in the Waccamaw River of SC (downstream from NC) in 1990 and 1991, apparently successfully overwintering (Nelson 1993). Farther south it is variously and paradoxically considered as native and a noxious water-weed. Its occurrence as a naturalized component of GA's flora is undocumented; it is at least present as a cultivated plant in water gardens and presumably escapes. The original distribution is unclear. [= FNA, GW, K, S, WH3]

12. Colocasia Schott 1832 (Elephant's-ear, Taro, Dasheen)

A genus of about 8 species, of tropical Asia. References: Thompson in FNA (2000); Mayo, Bogner, & Boyce in Kubitzki (1998b); Serviss, McDaniel, & Bryson (2000)=Z.

* ***Colocasia esculenta*** (Linnaeus) Schott, Elephant's-ear, Taro, Dasheen. Ditches, shores, bottomland hardwood forests; native of the Tropics. Frequently planted for its "tropical" appearance, becoming naturalized, for instance at Lake Waccamaw, Columbus County, NC, where it grows scattered along much of the shoreline, spread by fragments of rhizome. In our area, it is generally infertile. In the Tropics, *Colocasia* is a food crop cultivated for its rhizomes and shoots. The rhizomes are the source of "poi," a starchy staple of the Hawaiian Islands. See Serviss, McDaniel, & Bryson (2000) for a discussion of various varieties cultivated in the southeastern United States, their identification, and their weediness. [= FNA, GW, K, WH; > *C. antiquorum* Schott – S; > *C. esculenta* var. *antiquorum* (Schott) Hubb. & Rehder – Z; > *C. esculenta* var. *esculenta* – Z]

13. Arisaema Martius 1831 (Jack-in-the-pulpit, Indian-turnip)

A genus of about 150-170 species, of Asia, e. North America, e. Africa, and Arabia. The taxa of the Arisaema triphyllum complex have been variously treated as species, subspecies, varieties, and forms. They are here treated as species with relatively subtle morphological distinctions; they are broadly sympatric, and sometimes occur together in mixed populations with little sign of introgression or hybridization. *A. quinatum* has often been teated as a full species. *A. stewardsonii* seems amply distinct in morphology, northern distribution, and boggy habitat. *A. triphyllum* is tetraploid and does not produce fertile seed when crossed with the other (diploid) subspecies, including A. pusillum, with which it is broadly sympatric (Treiber 1980). References: Thompson in FNA (2000); Huttleston (1981)=Z; Treiber (1980)=Y; Huttleston (1949)=X; Gusman & Gusman (2002)=Q; Renner, Zhang, & Murata (2004); Mayo, Bogner, & Boyce in Kubitzki (1998b). Key based on the references.

1 Leaf with (5-) 7-15 leaflets, arranged pedately on a semicircular axis; spadix 9-20 cm long, attenuate, long-exserted from the spathe; [section *Tortuosa*] ..... ***A. dracontium***

1 Leaf with 3-5 leaflets, arranged palmately; spadix 3.5-8 cm long, clavate or cylindrical and blunt, included in the spathe; [section *Pedatisecta*].
2 Leaves glaucous beneath at maturity; spathe flange 2-9 mm broad; spathe hood green, or green with purple stripes; sterile spadix (appendix) clavate or cylindrical.
3 Lateral leaflets (of primary leaf if more than one) 2-parted or 2-lobed (rarely unlobed); sterile spadix 1-3 mm in diameter, cylindrical, curved outward; spathe hood green.....***A. quinatum***
3 Lateral leaflets (of primary leaf if more than one) undivided (rarely lobed); sterile spadix 4-10 mm in diameter, clavate, straight; spathe hood green, or green striped with purple.....***A. triphyllum***
2 Leaves green beneath at maturity (very rarely glaucous); spathe flange 1-3 mm broad; spathe hood green with white stripes, green with purple stripes, solid green, or solid purple; sterile spadix (appendix) cylindrical.
4 Spathe tube not fluted (rarely weakly fluted); spathe hood solid green or solid purple..... ***A. pusillum***
4 Spathe tube strongly fluted; spathe hood green with white or purple stripes..... ***A. stewardsonii***

Arisaema dracontium (Linnaeus) Schott, Green Dragon. Bottomlands and floodplains. May; July. S. QC, MI, and WI, south to n. peninsular FL and e. TX. [= RAB, C, F, FNA, G, GW, K, Pa, Q, W, WH3; = *Muricauda dracontium* (Linnaeus) Small – S]

Arisaema pusillum (Peck) Nash, Small Jack-in-the-pulpit. Swamps and moist forests. March-May. CT, NY, and IN, south to FL and LA. This taxon is diploid (2n=28). [= *A triphyllum* (Linnaeus) Schott ssp. *pusillum* (Peck) Huttleston – K, Pa, X, Z; < *A. triphyllum* – RAB, F, FNA, GW, W, WH3; = *A. triphyllum* var. *pusillum* Peck – C, G; > *A. pusillum* (Peck) Nash – S; > *A. acuminatum* Small – S; < *A. triphyllum* ssp. *pusillum* – Q, Y (also see ssp. *quinatum*)]

Arisaema quinatum (Nuttall) Schott, Southern Jack-in-the-pulpit, Preacher John. Mesic forests. March-April. Sc. NC, sw. NC, se. TN south to Panhandle FL and e. TX. This taxon is of controversial validity and rank; Treiber lumps it with ssp. *pusillum*, while Huttleston recognizes it as a full species (Huttleston 1949) or as a subspecies (Huttleston 1981). This taxon is diploid (2n=28). [= GW, S, WH3, X; = *A. triphyllum* (Linnaeus) Schott ssp. *quinatum* (Nuttall) Huttleston – K, Z; < *A. triphyllum* – RAB, FNA, W; < *A. triphyllum* ssp. *pusillum* – Q, Y; ? *A. polymorphum* Buckley]

Arisaema stewardsonii Britton, Bog Jack-in-the-pulpit. Bogs and peaty swamps. April-May. NS west to MN, south to w. NC, e. TN, and n. IN (Treiber 1980). This taxon is the most northern, and also has the most distinctive habitat, being restricted to distinctly wet, peaty sites. This taxon is diploid (2n=28). [= F; = *A. triphyllum* (Linnaeus) Schott ssp. *stewardsonii* (Britton) Huttleston – K, Pa, Q, X, Y, Z; < *A. triphyllum* – RAB, FNA, GW, W; = *A. triphyllum* var. *stewardsonii* (Britton) G.T. Stevens – C, G]

Arisaema triphyllum (Linnaeus) Schott, Common Jack-in-the-pulpit. Mesic forests. March-April. NB west to se. MB, south to FL, LA, and e. TX (Treiber 1980). This taxon is tetraploid (2n=56). [= S; = *A. triphyllum* (Linnaeus) Schott ssp. *triphyllum* – K, Pa, Q, X, Y, Z; < *A. triphyllum* – RAB, FNA, GW, W, WH3; = *A. triphyllum* var. *triphyllum* – C; > *A. triphyllum* – F; > *A. atrorubens* (Aiton) Blume – F]

14. Pinellia Tenore 1839 (Pinellia)

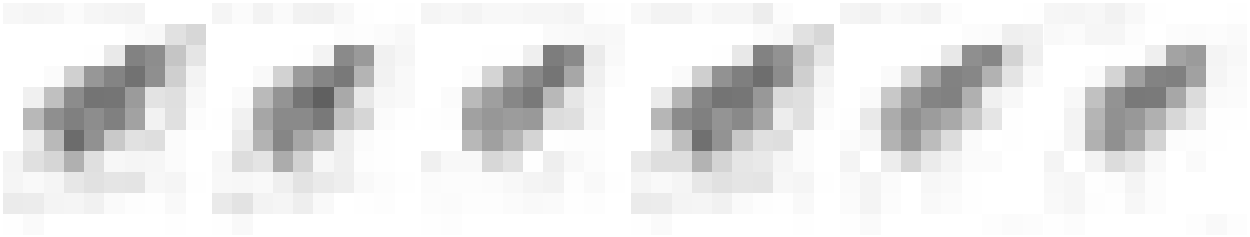
A genus of about 6 species, herbs, of temperate e. Asia. References: Thompson in FNA (2000); Mayo, Bogner, & Boyce in Kubitzki (1998b).

* ***Pinellia ternata*** (Thunberg) Makino ex Breitenbach, Pinellia. Suburban woodlands; native of Japan. Introduced from Japan and rarely naturalized, at least in the northern portion of our area snfd other nearby areas, as in DC, se. PA, NJ, and s. NY. [= C, F, FNA, G, K]

15. Arum Linnaeus 1753 (Arum)

A genus of about 26 species, of temperate Eurasia. References: Thompson in FNA (2000); Boyce (1993)= Z; Linz et al. 2010); Mayo, Bogner, & Boyce in Kubitzki (1998b).

* ***Arum italicum*** Linnaeus *ssp.* ***italicum***, Arum. Suburban woodlands; native of Europe and n. Africa, weakly naturalizing from horticultural use. It has a large (> 10 cm long) white spathe. Reported for Fairfax County, VA (Steury 2010). [= Pa, Z; < *A. italicum* – FNA]



31. TOFIELDIACEAE Takhtajan 1994 (False-asphodel Family) [in ALISMATALES]

A family of 5 genera and about 30 species, of disjunct distribution in north temperate and subarctic areas, and in the Guayana Shield and northern Andes areas of n. South America. There is controversy about the circumscription of the genera in the Tofieldiaceae *Tofieldia* relative to the related genera *Pleea* and *Triantha* (here recognized, but sometimes subsumed into *Tofieldia*). Some believe that *Tofieldia*, *Triantha*, and *Pleea* should be treated together in a broadly circumscribed *Tofieldia* (Utech 1978, Zomlefer 1997c); others that all three should be treated separately (Ambrose 1980; Packer 1993; Cruden 1991). Packer in FNA (2002a) has recently recognized *Triantha*, *Pleea*, and *Tofieldia* as separate genera, a conclusion followed here in part because of the ancient, relictual nature of these units. Reveal & Zomlefer (1998) place the Tofieldiaceae in the monotypic order Tofieldiales, only distantly related to the Liliaceae. Tamura in Kubitzki (1998a) treats this group as subfamily Tofieldioideae of the Nartheciaceae; this treatment does not seem tenable following more recent research. References: Zomlefer (1997c, 1999); Tamura in Kubitzki (1998a).

1 Inflorescence 1-flowered; tepals yellow; seeds yellowish; [endemic to Panhandle FL] ..... ***Harperocallis***
1 Inflorescence a raceme or thyrse; tepals white to pale cream (fading to yellowish on dried specimens); seeds brown; [collectively widespread].
  2 Bracts of the inflorescence large, spathelike, acuminate-aristate at the tip; tepals 9-17 mm long; stamens (6-) 9 (-12) ..... ***Pleea***
  2 Bracts of the inflorescence minute; tepals 2.5-5 mm long; stamens 6.
    3 Inflorescence a raceme (the flower pedicels attached to the scape singly); scape smooth; flowering (late August-) late September-October ..... ***Tofieldia***
    3 Inflorecence a thyrse (flower pedicels attached to the scape in groups of 3-7); scape scurfy-scabrous; flowering June-August .... ***Triantha***

Harperocallis McDaniel 1968 (Harper's Beauty)

A monotypic genus, perennial, of southeastern United States. References: Remizowa et al. (2011)=X; Campbell (2010); McDaniel (1968)=Y; Zomlefer (1997c)=Z; Utech & Anderson in FNA (2002a).

Harperocallis flava McDaniel, Harper's Beauty. Pineland bogs, nearby road margins. Endemic to FL Panhandle (Franklin, Liberty, and Bay counties) (Keppner & Anderson 2008). [= FNA, K, Y, WH, Z; = *Isidrogalvia flava* (McDaniel) Remizowa et al. – X]

Pleea Michaux 1803 (Rush-featherling)

A monotypic genus, of se. North America, sometimes included in *Tofieldia*. References: Zomlefer (1997c)=Z; Tamura in Kubitzki (1998a); Packer in FNA (2002a).

Pleea tenuifolia Michaux, Rush-featherling. Locally abundant in wet savannas, pocosin margins, usually in peaty soil, locally abundant in a few counties in se. NC, rare inland (very rarely as far as Cumberland County, NC). September-October; October-November. A Southeastern Coastal Plain endemic: se. NC and ne. SC south to sw. GA, n. FL and s. AL, but apparently absent from s. SC and ne. GA. When in flower in wet savannas and powerline rights-of-way in Brunswick County, *Pleea* visually dominates areas up to hundreds of hectares. In sterile condition, it is recognizable by its leathery equitant leaves, bright red at their bases. [= RAB, FNA, GW, K, S, WH; = *Tofieldia tenuifolia* (Michaux) Utech – Z]

Tofieldia Hudson 1778 (Bog Asphodel)

A genus of about 7-8 species, of temperate to subarctic North America and Eurasia. There is controversy about the circumscription of *Tofieldia*.relative to the related genera *Pleea* and *Triantha* (here recognized, but sometimes subsumed into *Tofieldia*). Some believe that *Tofieldia*, *Triantha*, and *Pleea* should be treated together in a broadly circumscribed *Tofieldia* (Utech 1978, Zomlefer 1997c); others that all three should be treated separately (Ambrose 1980; Packer 1993; Cruden 1991). Packer in FNA (2002a) has recently recognized *Triantha*, *Pleea*, and *Tofieldia* as separate genera, a conclusion followed here in part because of the ancient, relictual nature of these units. References: Zomlefer (1997c)=Z; Packer (1993); Ambrose (1980); Utech (1978); Hitchcock (1944)=Y; Tamura in Kubitzki (1998a); Packer in FNA (2002a); Cruden (1991).

Identification notes: In sterile condition, *Tofieldia glabra* can be distinguished from *Iris verna* by its minutely upwardly-scabrous margins (*Iris* has smooth margins).

Tofieldia glabra Nuttall, Carolina Bog Asphodel, White Asphodel. Savanna-pocosin ecotones, wet savannas, seepage bogs. (Late August-) late September-October; October-November. Endemic to the Coastal Plain (including Sandhills) of NC and northern SC; reports from GA are dubious. [= RAB, FNA, GW, K, S, Z]

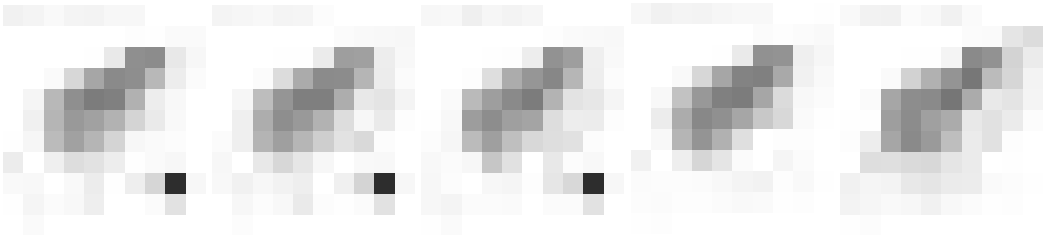
Triantha (Nuttall) Baker (Bog Asphodel)

A genus of ca. 4 species, herbs, of North America and Japan. References: Zomlefer (1997c)=Z; Hitchcock (1944)=Y; Cruden (1991).

1 Perianth equal to or longer than the capsule; seeds with tails 1/2 or less as long as the body ..... ***Tr. racemosa***
1 Perianth shorter than the capsule; seeds with at least 1 tail equal to or longer than the body ..... ***Tr. glutinosa***

Triantha glutinosa (Michaux) Baker, Northern Bog Asphodel, Sticky Bog Asphodel. Bogs and seeps, especially over mafic or calcareous rocks. July-August; September-October. NL (Newfoundland) west to BC, south to w. NC, ne. GA (Jones & Coile 1988), WV, OH, n. IN, WI, MT, and OR. [= FNA, K, S; = *Tofieldia racemosa* var. *glutinosa* (Michaux) H.E. Ahles – RAB; = *Tofieldia glutinosa* (Michaux) Persoon – F, G, GW, W, WV; > *Tofieldia glutinosa* ssp. *glutinosa* – Y, Z; > *Tofieldia glutinosa* var. *glutinosa* – C]

Triantha racemosa (Walter) Small, Southern Bog Asphodel, Coastal Plain Bog Asphodel. Savannas, savanna-pocosin ecotones, seepage bogs, sinkhole ponds (dolines) in the mountains of VA. June-early August; late September-October. NJ south to nw. FL, west to e. TX; disjunct in c. TN. [= FNA, K, S; = *Tofieldia racemosa* var. *racemosa* – RAB; = *Tofieldia racemosa* (Walter) Britton, Sterns, & Poggenburg – C, F, G, GW, W, WH, Z]



32. ALISMATACEAE Ventenat 1799 (Water-plantain Family) [in ALISMATALES]

A family of about 13 genera and 80 species, herbs, subcosmopolitan in distribution. References: Haynes & Hellquist in FNA (2000); Rogers (1983); Haynes, Les, & Holm-Nielsen in Kubitzki (1998b); Lehtonen & Myllys (2008); Lehtonen (2008).

1 Pistils in a single whorl, borne on a flat receptacle; stamens 6; inflorescence compound, many of the primary nodes bearing whorled branches which in turn bear whorled branches or whorled flowers ..... ***1. Alisma***
1 Pistils spiraled in several to many whorls, borne on a globose receptacle; stamens 6-many; inflorescence racemose (or in some species of both *Echinodorus* and *Sagittaria* somewhat compound, with the lowermost node or two bearing branches which in turn bear whorled flowers).
  2 Achenes flattened, with winged margins and often also with irregular corky ornamentations on the faces; flower whorls subtended by 3 bracts, with no additional bracteoles ..... ***4. Sagittaria***
  2 Achenes turgid, with ribs or ridges; flower whorls subtended by 3 bracts and additional bracteoles.
    3 Leaf blades 5-20 cm long, 3-15 cm wide; achenes (pistils) 45-250 per head; stamens ca. 21; petals 6-12 mm long, scapes 20-120 cm tall, erect or arching/reclining ..... ***3. Echinodorus***
    3 Leaf blades 1-3 cm long, 0.2-2 cm wide; achenes (pistils) 10-20 per head; stamens 6 or 9; petals 1-3 mm long; scapes 5-10 cm tall, erect ..... ***2. Helanthium***

1. Alisma Linnaeus 1753 (Water-plantain)

A genus of about 9 species, herbs, subcosmopolitan in distribution. References: Haynes & Hellquist in FNA (2000); Haynes, Les, & Holm-Nielsen in Kubitzki (1998b).

1 Leaf blades 2.7-5× as long as wide (or even narrower on submerged leaves), tapering at the base; petals pink, 2.3-3.7 mm long; achene with a dorsal ridge flanked by two dorsal grooves ..... ***A. gramineum***
1 Leaf blades 1.3-2.5 (2.7)× as long as wide, rounded to subcordate at the base; petals white, **either** 1.8-2.5 mm **or** 3.8-4.5 mm long; achene with a single dorsal groove.
  2 Petals 1.8-2.5 mm long, 1.4-2.0 mm wide ..... ***A. subcordatum***
  2 Petals 3.8-4.5 mm long, 3.0-3.9 mm wide ..... ***A. triviale***

Alisma gramineum Lejeune, Grassleaf Water-plantain. In seasonally flooded areas in impoundments. June-August. This species is circumboreal, ranging in North America south to e. VA, NY, WI, MO, NM, and CA. The occurrence of this species in our area may be the result of dispersal by waterfowl; first reported for our area by Wieboldt et al. (1998). [= C, F, FNA, K; < *A. plantago-aquatica* Linnaeus var. *americanum* J.A. Schultes – G]

Alisma subcordatum Rafinesque, Southern Water-plantain. Marshes, ponds, stream edges. April-November. MA west to ND, south to GA and TX. [= RAB, C, F, FNA, G, GW, K, Pa, S, W, WV; = *A. plantago-aquatica* Linnaeus ssp. *subcordatum* (Rafinesque) Hultén; *A. plantago-aquatica* var. *parviflorum* (Pursh) Torrey]

Alisma triviale Pursh, Northern Water-plantain. Marshes and swamps. NL (Newfoundland) west to AK, south to s. NJ, s. PA, OH, IN, AR, OK, NM, AZ, CA, and n. Mexico (and according to Fernald to MD and WV). [= C, F, FNA, K, Pa, WV; < *A. plantago-aquatica* Linnaeus var. *americanum* J.A. Schultes – G]

2. Helanthium (Bentham & Hooker f.) Engelmann ex J.G. Smith 1905 (Dwarf-burhead)

A genus of 2-9 species, annual and perennial herbs. Lehtonen & Myllys (2008) conducted a cladistic analysis of morphological and molecular data of *Echinodorus* and related genera and determined that *Helanthium* should be separated at the generic level. References: Haynes & Hellquist in FNA (2000); Lehtonen & Myllys (2008); Haynes, Les, & Holm-Nielsen in Kubitzki (1998b).

Helanthium tenellum (Martius) Britton, Mud-babies, Dwarf-burhead. On drawdown zones of Coastal Plain ponds, pineland ponds, blackwater riverbanks, or ponds in the Mountains with Coastal Plain affinities (Augusta County, VA). MA west to MN, south to c. peninsular FL and e. TX, but widely scattered and disjunct in that range. See Belden et al. (2004) for a discussion of the species in Virginia. [= *Echinodorus tenellus* (Martius) Buchenau – FNA, G, K, WH3; > *Echinodorus parvulus* Engelmann – G, GW; > *Echinodorus tenellus* (Martius) Buchenau var. *parvulus* (Engelmann) Fassett – C; > *Helanthium parvulum* (Engelmann) Britton – S]

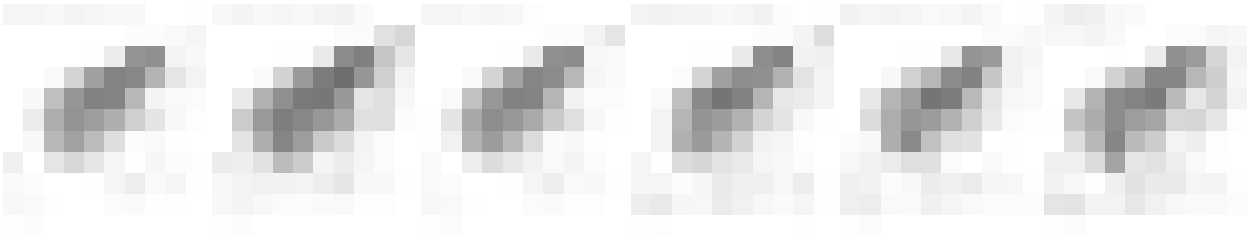
3. Echinodorus L.C. Richard ex Engelmann 1848 (Burhead)

A genus of about 27 species, herbs, primarily of the American tropics and subtropics. References: Lehtonen (2008, 2009)=Z; Haynes & Hellquist in FNA (2000); Lehtonen & Myllys (2008); Haynes, Les, & Holm-Nielsen in Kubitzki (1998b).

1 Leaf blades 1-3 cm long, 0.2-2 cm wide; achenes (pistils) 10-20 per head; stamens 6 or 9; petals 1-3 mm long; scapes 5-10 cm tall, erect..... .....[see ***Helanthium***]
1 Leaf blades 5-20 cm long, 3-15 cm wide; achenes (pistils) 40-250 per head; stamens ca. 21; petals 6-12 mm long, scapes 20-120 cm tall, erect or arching/reclining.
  2 Scapes arching and rooting down at maturity; veins of the sepals papillose-roughened..... ***E. cordifolius***
  2 Scapes rigidly erect at maturity; veins of the sepals smooth.
    3 Stamens 9-15; plants to 70 cm tall ..... ***E. berteroi***
    3 Stamens 21; plants to 200 cm tall ..... ***E. grandiflorus***

Echinodorus berteroi (Sprengel) Fassett, Tall Burhead. Ponds, marshes, ditches. April-October. OH, IL, and ND south to e. Panhandle FL, sw. GA, and TX, south through Mexico; West Indies; South America. [= FNA, K, WH3, Z; > *E. berteroi* var. *lanceolatus* (Engelmann ex S. Watson & Coulter) Fassett – C; = *E. cordifolius* – S, misapplied; ? *E. rostratus* (Nuttall) Engelmann – GW] {synonymy}

Echinodorus cordifolius (Linnaeus) Grisebach, Creeping Burhead. Swamps, ditches, wet thickets, especially on base-rich substrates, such as over calcareous or mafic rocks. June-November. MD south to c. peninsular FL, west to TX, south into tropical America (Mexico, South America, West Indies), and north in the interior (primarily in the Mississippi Embayment) to s. IL. [= RAB, F, G, GW, K, WH3, Z; > *E. cordifolius* ssp. *cordifolius* – FNA; > *E. cordifolius* var. *cordifolius* – C; = *E. radicans* (Nuttall) Engelmann – S]



* ***Echinodorus grandiflorus*** (Chamisso & Schlechtendal) Micheli, Large Burhead. Swamps. *E. floridanus*, recently named as an endemic of Escambia County, FL (Haynes & Burkhalter 1998) appears instead to be an introduction of the South American *E. grandiflorus* (Lehtonen 2008, 2009). [= Z; > *E. floridanus* R.R. Haynes & J.R. Burkhalter – FNA, K, WH3]

4. Sagittaria Linnaeus 1753 (Arrowhead)

A genus of about 25 species, herbs, primarily of the Americas. References: Haynes & Hellquist in FNA (2000); Bogin (1955)=Z; Wooten (1973)=Y; Beal, Wooten, & Kaul (1982)=X; Sorrie, Keener, and Edwards (2007); Adams (1961); Haynes, Les, & Holm-Nielsen in Kubitzki (1998b).

Identification notes: Portions of this key (and treatment) are provisional. The taxonomy and best characters to use in the linear-leaved species is particularly problematic.

1 Leaf blades sagittate or cordate (at least some of the leaves on a plant with sagittate or cordate basal lobes; some species are keyed both here and below).
  2 Leaf blades pubescent; [subgenus *Sagittaria*] ..... ***S. latifolia*** *var.* ***pubescens***
  2 Leaf blades glabrous.
    3 Sepals appressed in fruit; lower flowers bisexual, the stamens either functional or not; stamen filaments roughened with minute scales (except glabrous in *S. spatulata*); [subgenus *Lophotocarpus*].

4 Leaves primarily phyllodial, lanceolate or spatulate (sagittate leaves rare in the population and few on a given plant); flowers in 1-2 (-3) whorls; stamen filaments glabrous (use 10×); [native, of tidal marshes] ..... ***S. spatulata***

4 Leaves primarily sagittate (phyllodial leaves rare in the population and few on a given plant); flowers in 3-12 whorls; stamen filaments roughened with minute scales (use 10×); [**either** introduced aliens, sometimes in tidal marshes, **or** native, found in inland alkaline sites].

5 Petals white, immaculate; stamens of pistillate flowers functional; [of inland sites, native or introduced at a given locality] .... ***S. calycina***

5 Petals white, with a purple spot at the base; stamens of pistillate flowers generally nonfunctional; [exotic, introduced around coastal ports] ..... ***S. montevidensis***

3 Sepals reflexed or at least widely spreading in fruit; lower flowers pistillate; stamens glabrous (except roughened with minute scales in *S. rigida*); [subgenus *Sagittaria*].

6 Leaves cordate basally, floating; stalks of the pistillate flowers stout, reflexed in fruit; stamens mostly fewer than 15 ..... ***S. filiformis***

6 Leaves sagittate basally, emersed; stalks of the pitillate not notably stout, ascending in fruit; stamens 15 or more.

7 Beak of the achene lateral (at a right angle to the long axis of the achene); bracts of the inflorescence 2-14 mm long, boat-shaped, obtuse or broadly acute.

8 Lowermost (pistillate) flowers on long pedicels (at least 20 mm), the pedicels of the lowermost flowers longer than those in whorls above; inflorescence normally not bent; stamen filaments glabrous ..... ***S. latifolia* *var.* *latifolia***

8 Lowermost (pistillate) flowers sessile or on short pedicels (to 5 mm or rarely 10 mm long), the pedicels of the lowermost flowers notably shorter than those in whorls above; inflorescence normally bent at the lowest whorl of flowers; stamen filaments minutely roughened with minute scales ..... ***S. rigida***

7 Beak of the achene terminal (extending along the long axis of the achene; bracts of the inflorescence 5-40 mm long, either blunt or acuminate, not boat-shaped.

9 Bracts of the inflorescence thick and herbaceous, 5-25 mm long, rounded at the tip; flowers in 2-4 whorls; achenes with facial resin-ducts; [of acidic, blackwater habitats of the Coastal Plain] ..... ***S. engelmanniana***

9 Bracts of the inflorescence papery and tan, 7-40 mm long, acuminate at the tip; flowers in 5-12 whorls; achenes without resin-ducts; [primarily of other habitats, collectively widespread].

10 Petiole sharply 5-wing-angled in cross-section; inflorescence unbranched; fruiting heads 1.0-1.5 cm in diameter, globular..... ..... ***S. australis***

10 Petiole corrugated but not wing-angled in cross-section; inflorescence often branched at the base; fruiting heads (1.2-) 1.7-2.2 cm in diameter, often globular-depressed ..... ***S. brevirostra***

1 Leaf blades linear or lanceolate, or modified as linear, bladeless phyllodia, these often of spongy texture.

11 Stalks of the pistillate flowers reflexed in fruit, often stout; stamen filaments glabrous (except roughened with minute scales in *S. platyphylla* and *S. calycina*).

12 Sepals appressed in fruit; lower flowers bisexual, the stamens either functional or not; [subgenus *Lophotocarpus*].

13 Leaves generally primarily sagittate (phyllodial leaves generally rare in the population); flowers in 3-12 whorls; stamen filaments roughened with minute scales (use 10× magnification); [of inland alkaline sites] ..... ***S. calycina***

13 Leaves primarily phyllodial, lanceolate or spatulate (sagittate leaves rare in the population and few on a given plant); flowers in 1-2 (-3) whorls; stamen filaments glabrous (use 10× magnification); [of tidal marshes] ..... ***S. spatulata***

12 Sepals reflexed or at least widely spreading in fruit; lower flowers pistillate; [subgenus *Sagittaria*].

14 Plant generally with erect, emersed leaves with well-developed blades with firm texture, the blades lanceolate, elliptic, or ovate, 2-8 cm wide; stamen filaments roughened with minute scales ..... ***S. platyphylla***

14 Plant with all leaves phyllodial, if expanded at the summit, the expanded blade of weak texture, floating.

15 Leaves 2-10 (-30) cm long, 3-8 mm wide (sometimes with dilated tip to 20 mm wide); [of tidal, fresh to brackish waters] .... ***S. subulata***

15 Leaves 30-300 (or more) cm long, **either** 1-3 **or** 7-14 mm wide; [of nontidal waters].

16 Leaves very variable from population to population, in swiftly flowing black water typically about 100 cm long and 1-3 mm wide, in more stagnant water (or when emersed by dropping water levels, typically with lax petioles and floating blades, the blades lanceolate, or elliptic, the base cuneate, rounded, or cordate; [of blackwater streams and ponds, MA south to FL, west to s. AL] ..... ***S. filiformis***

16 Leaves 100-300 (or more) cm long, 7-14 mm wide; [of springs and spring-runs, endemic to FL] ..... ***S. kurziana***

11 Stalks of the pistillate flowers ascending or spreading in fruit, not notably stout; stamen filaments roughened with minute scales (except glabrous in *S. engelmanniana* and *S. papillosa*).

17 Stamen filaments linear, less thick than the anther, changing little in diameter from near base to near summit.

18 Leaves all phyllodial, without flattened blades; bracts of the inflorescence strongly papillose; [of s. MS westward] ..... ***S. papillosa***

18 Leaves with flattened blades; bracts of the inflorescence smooth, papillose, or longitudinally striate; [collectively widespread]

19 Bracts of the inflorescence firm in texture, smooth; stamen filaments glabrous; [of inland acidic wetlands] ..... ***S. engelmanniana***

19 Bracts of the inflorescence either papillose or longitudinally striate-ribbed; stamen filaments roughened with minute scales; [of estuarine areas and associated nontidal wetlands].

20 Bracts and sepals striate-ribbed; stamen filaments 2-5 mm long; [rare, from e. SC southward] ..... ***S. lancifolia* *var.* *lancifolia***

20 Bracts and sepals papillose; stamen filaments 1.5-3.5 mm long; [common, throughout our coastal area] .... ***S. lancifolia* *var.* *media***

17 Stamen filaments **either** distinctly dilated toward the base (often broadly conic) **or** thickened throughout, the filament (at least basally) as thick or thicker than the anther.

21 Lowermost (pistillate) flowers sessile or on short pedicels (to 5 mm or rarely 10 mm long); inflorescence normally bent at the lowest whorl of flowers ..... ***S. rigida***

21 Lowermost (pistillate) flowers on longer pedicels; inflorescence normally not bent.

22 Leaves all phyllodia, the phyllodia terete or nearly so.

23 Phyllodia of emersed flowering plants elongate (1/2-1× as long as scape), slender, emersed or laxly ascending and submersed in water; phyllodia of stranded flowering plants elongate (1/3-1× as long as scape, but may be shorter), relatively stiff; [of se. NC and southward] ..... ***S. isoetiformis***

23 Phyllodia of emersed flowering plants short (2-8 cm), very thick, deeply submersed; when plants are stranded, phyllodia of stranded flowering plants elongate (1/2-1× as long as scape), slender, stiffly erect; [of DE-MD and northward] ..... ***S. teres***

22 Leaves with blades and petioles, or if all phyllodia, the phyllodia flattened on upper surface or triangular in cross-section; [collectively widespread].

24 Plants with corms and/or stolons, lacking coarse rhizomes.
25 Blades of emersed leaves lanceolate, narrowly spatulate, > 5 mm wide; [of Mountain and upper Piedmont bogs, swamp forests, and adjacent ditches]..... ***S. fasciculata***
25 Blades of emersed leaves linear (< 3 mm wide, rarely to 4 mm) or phyllodial; [coastal plain depression ponds and impoundments]
26 Achenes 1.5-2.0 (-2.5) mm long; achene faces with 3 or more keels and 2 or more resin ducts; inflorescence bracts connate for > 50% of length; [of se. NC and southward]..... ***S. isoetiformis***
26 Achenes (2.2-) 2.4-3.0 mm long; achene faces with 2-3 keels and 1-2 resin ducts; inflorescence bracts connate for < 40% of length; [restricted to Sandhills region of NC and SC, likely in e GA] ..... ***S. macrocarpa***
24 Plants with coarse rhizomes, lacking corms and stolons.
27 Abaxial wing of fruit scalloped or toothed; [plants of n. AL and nw. GA]..... ***S. secundifolia***
27 Abaxial wing of fruit entire; [plants collectively widespread].
28 Larger phyllodes 0.8-2.5 cm wide, the apices blunt (rarely acute); longer pistillate pedicels 2-5 (-6.5) cm long; median resin duct of mature achene linear, about as wide as the posterior duct (or ducts absent)..... ***S. weatherbiana***
28 Larger phyllodes to 1 cm wide (except sometimes wider in *S. chapmanii*), the apices avute; longer pistillate pedicels 1-4 cm long; median resin duct of mature achene club-shaped and 2× the diameter of the posterior duct.
29 Inflorescence branched at the base (in at least some plants of a population); bracts of the inflorescence only slightly connate, the free tips narrowly triangular, 6-15 mm long..... ***S. chapmanii***
29 Inflorescence unbranched at the base; bracts of the inflorescence slightly to almost fully connate ..... ***S. graminea***

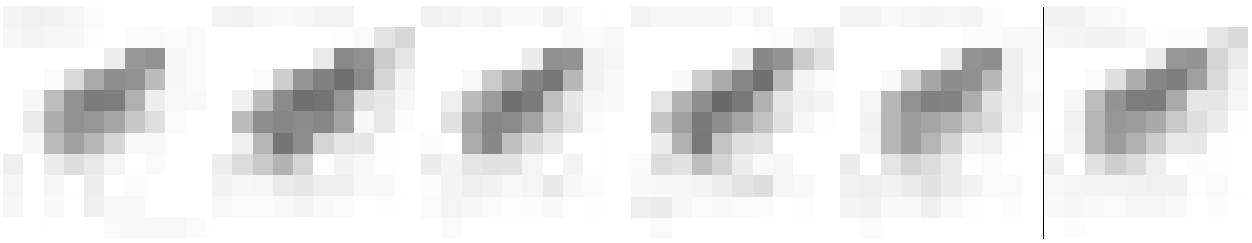
Sagittaria australis (J.G. Smith) Small, Appalachian Arrowhead. Marshes, swamps, rivershores, backwaters, margins of ponds and lakes. June-October. NY west to s. IN and se. MO, south to SC, Panhandle FL, and MS. [= C, F, FNA, K, Pa, S, W, WV, X; = *S. longirostra* – RAB, misapplied; = *S. engelmanniana* J.G. Smith ssp. *longirostra* – G, GW, Z, misapplied; < *S. australis* – WH3]

Sagittaria brevirostra Mackenzie & Bush, Midwestern Arrowhead. {habitat}. June-October. OH west to ND, south to w. VA, e. TN, AL, and TX. [= C, F, FNA, K, W, X; = *S. engelmanniana* J.G. Smith ssp. *brevirostra* (Mackenzie & Bush) Bogin – G, Z]

Sagittaria calycina Engelmann. Ponds. May-September. N. OH and MI west to SD and CO, south to sw. VA, c. TN, LA, TX, and Mexico; disjunct in CA. Presumably only introduced in NC and SC. First reported for SC by Hill & Horn (1997). [= RAB, C, Pa, W; = *Lophotocarpus calycinus* (Engelmann) J.G. Smith – F, WV; = *S. montevidensis* Chamisso & Schlechtendal ssp. *calycina* (Engelmann) Bogin – FNA, G, GW, Z; > *S. calycina* var. *calycina* – K

Sagittaria chapmanii (J.G. Smith) C. Mohr, Chapman's Arrowhead. Limesink (doline) ponds with drawdown hydrology, mucky ditches. May-September. Se. NC south to s. FL, west to LA, AR, and TX (Sorrie & LeBlond 2008). First reported for SC by Nelson & Kely (1997), and for AR, LA, and TX by Sorrie & LeBlond (2008). Analyses of allozyme variation in the *S. graminea* complex revealed great differentiation between *S. graminea*, *S. chapmanii*, and *S. platyphylla*; *S. graminea* and *S. platyphylla* appeared to be more closely related to one another than either was to *S. chapmanii* (Hauber & Legé 1999). Therefore, it seems best to treat these three taxa at equal rank and at the species level. [= S; = *S. graminea* Michaux ssp. *chapmanii* (J.G. Smith) R.R. Haynes & C.B. Hellquist – FNA; = *S. graminea* Michaux var. *chapmanii* J.G. Smith – GW, K, WH3, Y; = *S. graminea* Michaux var. *chapmani* J.G. Smith – Z, orthographic variant]

Sagittaria engelmanniana J.G. Smith. Blackwater streambanks, sphagnum bogs, pocosins, beaver ponds. June-October. MA and NY south to s. FL and s. MS, primarily on the Coastal Plain. [= RAB, C, F, FNA, K, W, X; = *S. engelmanniana* ssp. *engelmanniana* – G, GW, Z; = *S. longirostra* – S; < *S. australis* – WH3]



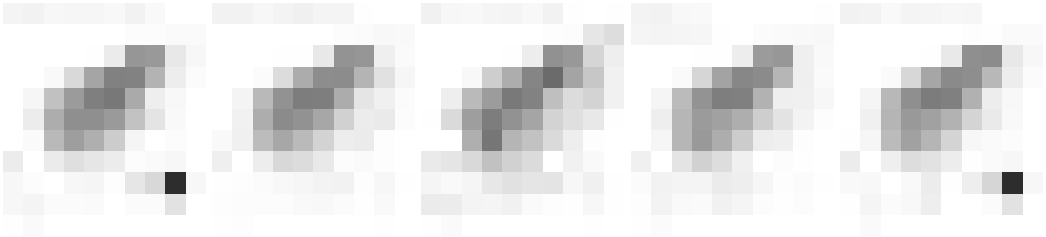
Sagittaria fasciculata E.O. Beal, Bunched Arrowhead. Bogs, ditches adjacent to drained bogs, wooded seepage areas. May-July. Endemic to a several-county area in sw. NC and nw. SC, where most of its former habitat has been drained. [= RAB, FNA, GW, K, W, Y; = *S. macrocarpa* J.G. Smith – S, misapplied; < *S. graminea* Michaux var. *macrocarpa* (J.G. Smith) Bogin – Z, mostly misapplied]

Sagittaria filiformis J.G. Smith. Swiftly flowing water of blackwater rivers and streams, blackwater lake shores. May-September. As conceived here, probably ranging from MA south to FL and s. AL. The forms growing in swiftly flowing black water are remarkable and unlikely to be recognized as a *Sagittaria* unless in flower, with linear leaves over 100 cm long and only 1-3 mm wide, with 5-7 parallel ribbed veins, resembling *S. kurziana*. The proper taxonomic treatment and associated nomenclature to apply to these plants remains unclear (see synonymy). [= FNA, K, Pa, WH3; = *S. subulata* (Linnaeus) Buchenau var. *gracillima* (S. Watson) J.G. Smith – RAB, F, G, Z; = *S. stagnorum* Small – GW; < *S. subulata* – C; > *S. filiformis* – S; > *S. lorata* (Chapman) Small – S; > *S. stagnorum* – S]

Sagittaria graminea Michaux. Marshes, ponds, tidal areas. May-November. NL (Newfoundland) and NL (Labrador) west to MN and SD, south to s. FL and c. TX; West Indies. [= *S. graminea* Michaux var. *graminea* – RAB, C, G, GW, K, Pa, WH3, Y; > *S. graminea* – F; > *S. eatonii* J.G. Smith – F; = *S. graminea* ssp. *graminea* – FNA; > *S. graminea* – S; > *S. cycloptera* (J.G. Smith) C. Mohr – S; < *S. graminea* – W; < *S. graminea* var. *graminea* – Z (also see *S. isoetiformis*); = *S. graminea* – WV]

Sagittaria isoetiformis J.G. Smith. Pineland ponds, clay-based Carolina bays, other seasonally flooded depressions. June-September. Se. NC south to s. peninsular FL, west to s. MS (Sorrie & Leonard 1999). See Godfrey & Adams (1964) for additional discussion of this species. [= FNA, GW, K, S, WH3, Y; < *S. teres* – RAB, S, misapplied; < *S. graminea* Michaux var. *graminea* – Z]

Sagittaria kurziana Glück, Spring-tape. Spring-runs. Panhandle and n. peninsular FL. [= GW, K, S, WH3; = *S. subulata* (Linnaeus) Buchenau var. *kurziana* (Glück) Bogin – Z]



Sagittaria lancifolia Linnaeus *var*. ***lancifolia***. Marshes, swamps. May-June. E. SC south to s. FL, west to FL Panhandle; West Indies; n. South America. [= C; = *S. lancifolia* – RAB; = *S. lancifolia* ssp. *lancifolia* – FNA, GW, K, WH3, Z; > *S. angustifolia* Lindley – S; > *S. lancifolia* – S, in a narrow sense]

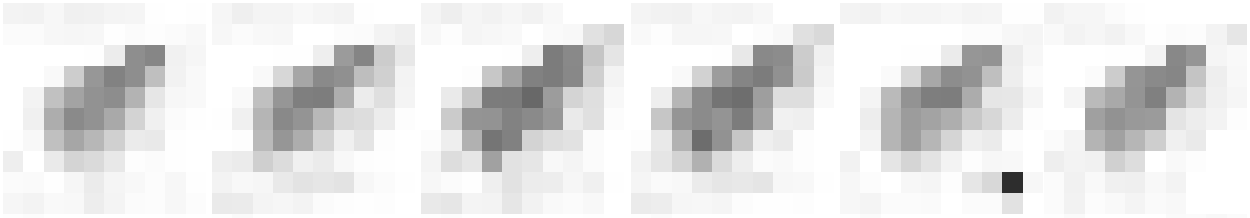
Sagittaria lancifolia Linnaeus *var*. ***media*** Micheli. Freshwater to brackish tidal marshes, ditches. June-October. S. DE south to ne. FL, FL Panhandle, west to TX; scattered in Central America. If recognized as a species, this taxon is *S. falcata*. [= C; = *S. falcata* Pursh – RAB, F, G, S; = *S. lancifolia* ssp. *media* (Micheli) Bogin – FNA, GW, K, WH3, Z]

Sagittaria latifolia Willdenow *var*. ***latifolia***. July-October. Marshes, swamps, farm ponds, ditches, bogs. June-September. NS west to BC, south to tropical America (rare in the Appalachian region). In addition to the pubescence difference, var. *latifolia* and var. *pubescens* can be separated by the presence (var. *latifolia*) or absence (var. *pubescens*) of resin-ducts on the achene-faces. [= C, G, GW, Pa, W, Z; > *S. latifolia* var. *latifolia* – RAB, F; > *S. latifolia* var. *obtusa* (Engelmann) Wiegand – RAB, F; > *S. planipes* Fernald – F; < *S. latifolia* – FNA, K, WH3; > *S. latifolia* – S; > *S. ornithorhyncha* Small – S; > *S. viscosa* C. Mohr – S; = *S. latifolia* – WV]

Sagittaria latifolia Willdenow *var*. ***pubescens*** (Muhlenberg ex Nuttall) J.G. Smith. Bogs, marshes. July-October. C. PA, OH, and TN, south to n. FL and e. TX, primarily in the Appalachians. [= RAB, C, F, G, GW, Pa, W, Z; < *S. latifolia* – FNA, K, WH3; = *S. pubescens* Muhlenberg ex Nuttall – S, WV]

Sagittaria macrocarpa J.G. Smith. Beaverponds, old millponds. Apparently endemic to the Coastal Plain of the Carolinas; potentially to be expected in e. GA. See Sorrie, Keener, & Edwards (2007) for detailed discussion. [< *S. graminea* Michaux var. *macrocarpa* (J.G. Smith) Bogin – Z, misapplied]

* ***Sagittaria montevidensis*** Chamisso & Schlechtendal. Disturbed areas, marshes; native of South America. July. Most of the collections from the southeastern United States are old collections around major seaports, suggesting that this plant was introduced on the ballast of sailing ships. [= RAB, K, S, WH3; = *S. montevidensis* ssp. *montevidensis* – FNA, GW, Z]



Sagittaria papillosa Buchenau, Nipple-bract Arrowhead. Bogs, swamps, ditches, depressions. C. AR and se. OK south to s. LA and c. TX; rarely disjunct east of the Mississippi in se. LA and s. MS. [= FNA, GW, K] {add synonymy}

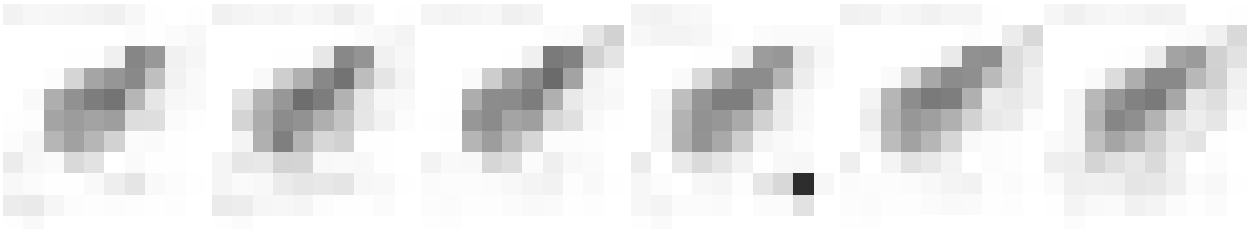
Sagittaria platyphylla (Engelmann) J.G. Smith. Marshes, ditches, farm ponds. June. The distribution of this species is primarily in the Mississippi drainage; occurrences east of the Appalachians may be introduced, either by humans or by waterfowl. First reported for VA by Wieboldt et al. (1998). Known from numerous counties in sc. GA (Jones & Coile 1988). [= F, FNA, K, WH3, Y; = *S. graminea* Michaux var. *platyphylla* Engelmann – RAB, G, Z; > *S. platyphylla* – S; > *S. mohrii* J.G. Smith – S]

Sagittaria rigida Pursh, Sessile-fruited Arrowhead. Mountain ponds, wet meadows. July-October. ME and MN, south to w. VA, nc. TN, MO, and NE. [= C, F, FNA, G, K, Pa, S, W, WV, Y, Z]

Sagittaria secundifolia Kral, Little River Water-plantain. Crevices in sandstone bedrock in streambeds. Nw. GA and nc. AL. See Kral (1982) and Threlkeld & Soehren (2003) for additional information. [= FNA, K]

Sagittaria spatulata (J.G. Smith) Buchenau. Tidal marshes. May-September. NB south to e. NC along the coast. [= C, G; > *Lophotocarpus spongiosus* (Engelmann) J.G. Smith – F; > *S. calycina* var. *spongiosa* Engelmann – K; > *S. montevidensis* Chamisso & Schlechtendal ssp. *spongiosa* (Engelmann) Bogin – FNA, Z]

Sagittaria subulata (Linnaeus) Buchenau. Tidal marshes and mud flats. May-September. MA and NY south to n. peninsular FL and AL. [= FNA, GW, K, Pa, S, WH3; = *S. subulata* var. *subulata* – RAB, G, Z; < *S. subulata* – C (also see *S. stagnorum*); > *S. subulata* var. *subulata* – F; > *S. subulata* var. *natans* (Michaux) J.G. Smith – F]



Sagittaria teres S. Watson. Ponds. MA south to s. NJ. [= C, F, FNA, G, K; = *S. graminea* Michaux var. *teres* (S. Watson) Bogin – Z]

Sagittaria weatherbiana Fernald. Fresh to brackish marshes, streambanks, pineland pools. April-June. Se. VA south to Panhandle FL. Isozyme studies by Hauber & Legé (1999) provide evidence that this taxon should be given species status; its genetic identity with var. *graminea* is low, and comparable to the difference between *S. graminea* (in the narrow sense) and *S. platyphylla*. [= F; = *S. graminea* Michaux var. *weatherbiana* (Fernald) Bogin – RAB, C, G, GW, K, WH3, Y, Z; = *S. graminea* Michaux ssp. *weatherbiana* (Fernald) R.R. Haynes & C.B. Hellquist – FNA]

34. HYDROCHARITACEAE A.L. de Jussieu 1789 (Frog's-bit Family) [in ALISMATALES]

A family of about 18 genera and 120 species, aquatic herbs, cosmopolitan. Here circumscribed to include *Najas*, often traditionally placed in its own family, following the suggestion of Haynes, Holm-Nielsen, & Les in Kubitzki (1998b) and APG (2003, 2009). References: Haynes in FNA (2000), Cook in Kubitzki (1998b), Haynes (1979)=Z; Haynes & Hellquist (1996); Haynes, Holm-Nielsen, & Les in Kubitzki (1998b).

1 Leaves basal, either elongate with parallel sides, or petiolate with a leaf blade.
  2 Leaves differentiated into petiole and blade, the blade ovate to orbicular ..... ***Limnobium***
  2 Leaves straplike, elongate, linear, the sides parallel and not differentiated into petiole and blade.
    3 Leaves to 35 cm long; [saltwater] ..... ***Thalassia***
    3 Leaves usually > 40 cm long; [freshwater] ..... ***Vallisneria***
1 Leaves along the stem or at its summit.
  4 Leaves at only 2-3 closely spaced nodes at the summit of the stem, appearing verticillate or whorled; leaves to 10 cm long; [saltwater]..... ..... ***Halophila***
  4 Leaves at many nodes along the stem, opposite or in whorls of 2-8, < 4 cm long; [freshwater].
    5 Leaves opposite or in whorls of 3 (-4) (no whorls with > 4 leaves).
      6 Leaves slightly narrowed or straight-sided to base, sessile; perianth present..... ***Elodea***
      6 Leaves broadened and sheathing at base, narrowing upward via “shoulders”; perianth absent ..... ***Najas***
    5 Leaves in whorls of (3-) 4-8 (some or most whorls with 4 or more leaves).
      7 Leaves mostly 2-3 cm long, finely toothed with slender, weak teeth on the margins and rarely also the midrib beneath; fresh leaves not noticeably rough to the touch; leaf whorls generally crowded on all stems; petals white, 9-11 mm long..... ***Egeria***
      7 Leaves mostly 1-2 cm long, toothed with stout, sharp teeth on the margins and also on conical bases along the midrib beneath; fresh leaves noticeably rough to the touch; leaf whorls crowded on terminal portions of stems, remote on older stems; petals translucent, 2-5 mm long ..... ***Hydrilla***

Egeria Planchon 1849 (South American Waterweed)

A genus of 2 species, aquatic herbs, native of tropical America (now subcosmopolitan in tropical and warm temerate regions by naturalization). References: Haynes in FNA (2000), Cook in Kubitzki (1998b).

* ***Egeria densa*** Planchon, Brazilian Waterweed, "Elodea," "Anacharis." Ponds and stagnant water of streams or rivers; native of South America. May-November. This is the "Elodea" or "Anacharis" of the aquarium trade. [= RAB, FNA, GW, K, Pa, W, WH; = *Elodea densa* (Planchon) Caspary – F; = *Anacharis densa* (Planchon) Victorin – G; = *Philotria densa* (Planchon) Small & St. John – S]

Elodea Michaux 1803 (Waterweed)

A genus of about 5-12 species, aquatic herbs, native of temperate America. References: Haynes in FNA (2000); Cook in Kubitzki (1998b).

1 Well-developed leaves (1-) avg. 2 (-5) mm wide, mostly 2-5× as long as wide; staminate spathe 4-8 (-15) mm long, the flower at anthesis on an elongated, very slender, flexuous stalk; sepals of pistillate flowers 2-4.5 mm long ..... ***E. canadensis***
1 Well-developed leaves (0.3-) avg. 1.3 (-2) mm wide, mostly 5-10× as long as wide; staminate spathe 2-3 mm long, the flower at anthesis separating from the spathe (and plant) at maturity; sepals of pistillate flowers 1-1.5 mm long..... ***E. nuttallii***

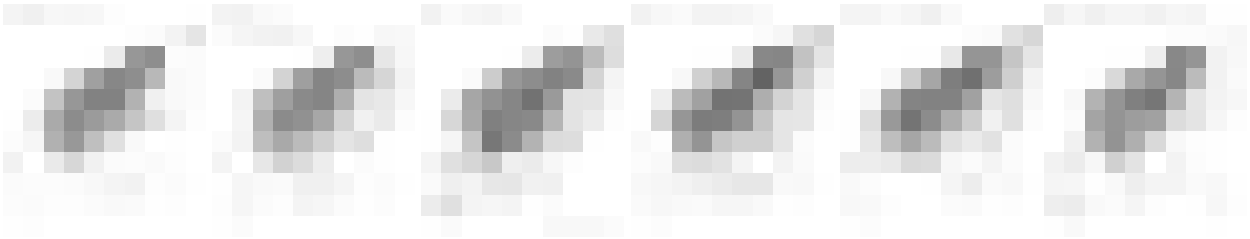
Elodea canadensis Michaux, Common Waterweed. Rivers, lakes, ponds, stagnant waters of streams. July-September. QC west to SK, south to NC, Panhandle FL, OK, NM, and CA. [= RAB, C, F, FNA, GW, K, Pa, W, WH, WV; = *Anacharis canadensis* (Michaux) Planchon – G; < *Philotria canadensis* (Michaux) Britton – S (also see *E. nuttallii*)]

Elodea nuttallii (Planchon) St. John, Nuttall's Waterweed, Free-flowered Waterweed. Lakes, ponds, stagnant waters of streams. July-September. ME and QC west to MN and ID, south to NC, TN, OK, and NM. [= RAB, C, F, FNA, GW, K, Pa, W, WV; = *Anacharis nuttallii* Planchon – G; >< *Philotria canadensis* – S; > *Philotria linearis* Rydberg – S]

Halophila Thouars 1806 (Seagrass)

A genus of about 10 species, seagrasses, of tropical and warm temperate waters of the Caribbean Sea and the Indian/Pacific oceans.

Halophila engelmannii Ascherson ex Neumayer, Engelmann’s Seagrass. Estuarine waters. S. FL, west along Gulf Coast (MS, LA) to TX; Bahamas; West Indies. [= K, WH]



Hydrilla L.C. Richard 1814 (Hydrilla)

A monotypic genus, an aquatic herb, native to the Old World. References: Haynes in FNA (2000); Cook in Kubitzki (1998b).

* ***Hydrilla verticillata*** (Linnaeus f.) Royle, Hydrilla. Ponds, lakes, rivers, often locally abundant; native of the Old World. June-August. This species has become a serious aquatic weed. Reported for SC by Nelson & Kelly (1997). [= C, FNA, GW, K, Pa]

Limnobium L.C. Richard 1814 (Frog's-bit)

A genus of 1-2 species, of se. North America and tropical America. References: Haynes in FNA (2000); Cook in Kubitzki (1998b).

Limnobium spongia (Bosc) L.C. Richard ex Steudel, American Frog's-bit, Spongeplant. Swamps, marshes, ponds, pools. June-September. DE and MD south to s. FL, west to e. TX, north in the interior in the Mississippi Embayment to s. MO and s. IL; disjunct around the Great Lakes (as in n. IN and w. NY); also in tropical America. Often free-floating, the leaves with prominently large cells below. [= RAB, C, F, FNA, G, GW, K, S, WH]

Najas Linnaeus 1753 (Naiad, Bushy-pondweed, Water-nymph)

A genus of about 40 species, nearly cosmopolitan. References: Haynes in FNA (2000); Haynes (1979)=Z; Haynes & Hellquist (1996); Haynes, Holm-Nielsen, & Les in Kubitzki (1998b).

Identification notes: Counts of leaf-teeth do not include the broadened, sheathing base of the leaf. Seeds are necessary for the identification of most species.

1 Plants dioecious; lower side of the midvein of the leaves prickly; [subgenus *Najas*].....***N. marina***
1 Plants monoecious; lower side of the midvein of the leaves smooth; [subgenus *Caulinia*].
  2 Leaf-teeth multicellular, evident at 10× magnification, 7-15 per side; leaves becoming recurved late in the season; seed-coat pitted, the areoles distinctly wider than long, in ca. 12-18 ladder-like rows.....***N. minor***
  2 Leaf-teeth unicellular, not evident at 10× magnification, > 20 per side (except 13-17 per side in *N. gracillima*); leaves spreading to ascending; seed-coat smooth or pitted, if present the areoles longer than wide or about as long as wide.
    3 Seeds smooth, glossy, obovate, broadest above the middle; anthers 1-locular.....***N. flexilis***
    3 Seeds pitted, dull, cylindric, fusiform, or elliptic, broadest at the middle; anthers 1- or 4-locular.
      4 Style offset from the apex of the seed; anthers unilocular.....***N. gracillima***
      4 Style at the apex of the seed; anthers 4-locular.....***N. guadalupensis*** *var*. ***guadalupensis***

Najas filifolia Haynes, Narrowleaf Naiad. Lakes; rare. Sw. GA (Jones & Coile 1988) to FL (Haynes in FNA 2000). [= FNA, K, Z; = *Najas ancistrocarpa* A. Braun – GW] {not yet keyed}

Najas flexilis (Willdenow) Rostkovius & Schmidt, Northern Naiad. Lakes and rivers. July-August. NL (Newfoundland) west to ON, south to VA, MD, MO, and NE; also in the west from AB and SK south to OR and UT. [= C, F, FNA, G, K, Pa, S, W, WV, Z; = *Naias flexilis* – S, orthographic variant]

Najas gracillima (A. Braun ex Engelmann) Magnus, Slender Naiad, Bushy Naiad. Ponds and lakes. July-October. NS west to MN, south to NC, AL, and MO; disjunct in CA (where likely alien). Haynes (1979) reports that this species cannot tolerate pollution and is apparently declining in abundance. [= RAB, C, F, FNA, G, K, Pa, W, WV, Z]

Najas guadalupensis (Sprengel) Magnus *var*. ***floridana*** Haynes & Wentz. Lakes and streams. GA and FL. [= Z; = *Najas guadalupensis* ssp. *floridana* Haynes & Wentz) Haynes & C.B. Hellquist – FNA, K; < *Najas guadelupensis* – GW; < *Naias guadelupensis* – S, orthographic variant] {not yet keyed}

Najas guadalupensis (Sprengel) Magnus *var*. ***guadalupensis***, Common Naiad, Southern Naiad. Lakes and rivers. July-October. Var. *guadalupensis* ranges from ME west to AB and WA, south to n. South America. Haynes (1979) interprets the species as including 3 other varieties – var. *floridana* Haynes & Wentz (in FL, north to AL and GA and to be sought in SC), var. *muenscheri* (Clausen) Haynes (endemic to the Hudson River), and var. *olivacea* (Rosendahl & Butters) Haynes (nearly limited to states bordering the Great Lakes). They differ in characteristics of the leaf and seed (see Haynes 1979). Haynes & Hellquist (1996) treat all infraspecific taxa as subspecies rather than varieties. [= C, Z; < *Najas guadalupensis* – RAB, F, G, GW, Pa, W; = *Najas guadalupensis* ssp. *guadalupensis* – FNA, K; < *Naias guadelupensis* – S, orthographic variant]

Najas marina Linnaeus, Holly-leaf Naiad. Brackish or calcareous waters. [= C, F, FNA, G, K, Pa; = *Naias marina* – S, orthographic variant]

* ***Najas minor*** Allioni, Spinyleaf Naiad. Ponds, lakes, and reservoirs, particularly where eutrophic; native of Eurasia. July-October. This species is apparently a rather recent introduction to North America, now widespread in e. North America. Haynes (1979) reports that it is becoming more abundant in e. North America because of its tolerance for polluted, eutrophic waters. [= RAB, C, F, FNA, G, GW, K, Pa, W, WV, Z]

Thalassia Banks & Solander ex Koenig (Turtlegrass)

A genus of 2 species, seagrasses, of tropical and warm temperate waters of the Caribbean Sea and the Indian/Pacific oceans.

Thalassia testudinum Banks & Solander ex Koenig, Turtlegrass. Seagrass beds in estuarine waters. January-December. E. coast of c. peninsular FL to s. FL, north along the west coast of FL to the Panhandle, and in MS, LA, and TX. [= K, WH]

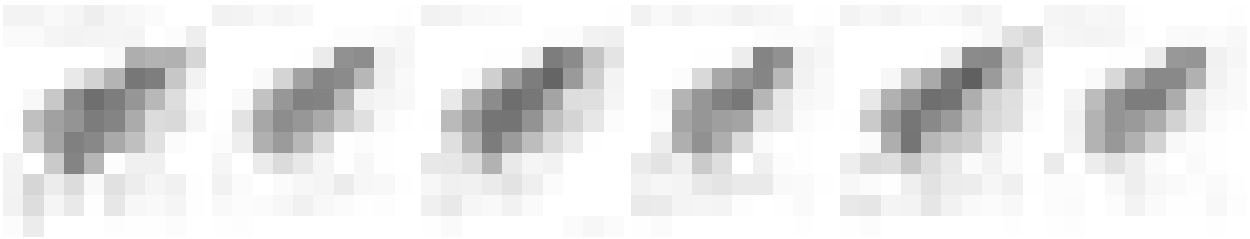
Vallisneria Linnaeus 1753 (Water-celery, Eelgrass)

A genus of ca. 15 species, aquatic herbs, of tropical and warm temperate regions of the Old and New World. References: Les et al. (2008)=Z; Haynes in FNA (2000); Frère Marie-Victorin (1943)=Y; Cook in Kubitzki (1998b).

1 Sepals 2-3 mm long; leaves 5-6 (-10) mm wide; leaves lacking red-purple longitudinal stripes..... ***V. americana***
1 Sepals 4-5.5 mm long; leaves 15-20 mm wide; leaves with red or purple longitudinal stripes .....***V. neotropicalis***

Vallisneria americana Michaux, Vallisneria, Water-celery, Tapegrass, Eelgrass. Lakes, rivers, estuaries, sounds. July-October. NS and QC west to ND, south to FL, TX, NM, AZ; south into tropical America {or is this all or partly *V. neotropicalis*?}. [= Y, Z; < *V. americana* – FNA, GW, K, WH; ? *V. americana* – RAB, F, G, Pa, W, WV; ? *V. americana* var. *americana* – C; > *V. americana* – S; > *V. spiralis* Linnaeus – S]

Vallisneria neotropicalis Marie-Victorin, Large Water-celery, Large Eelgrass. Spring runs; other aquatic habitats. FL Panhandle, s. FL; Cuba. The distinctiveness of this taxon has been defended by Les et al (2008) on morphological and molecular grounds. [= Y, Z; < *V. americana* – FNA, GW, K, WH]



35. SCHEUCHZERIACEAE F. Rudolphi 1830 (Scheuchzeria Family) [in ALISMATALES]

A monotypic family, circumboreal in arctic and cold temperate regions. References: Nienaber in FNA (2000); Haynes, Les, & Holm-Nielsen in Kubitzki (1998b).

Scheuchzeria Linnaeus (Scheuchzeria, Pod-grass)

A monotypic genus, circumboreal in arctic and cold temperate regions. References: Nienaber in FNA (2000); Haynes, Les, & Holm-Nielsen in Kubitzki (1998b).

Scheuchzeria palustris Linnaeus *var*. ***americana*** Fernald, Pod-grass. *Sphagnum* bogs. June-August. NL (Labrador) and AK south to s. NJ, e. WV (Cranberry Glades, Pocahontas County), sc. PA (Rhoads & Klein 1993; Rhoads & Block 2007), IN, IL, IA, WY, and CA. [= F; < *S. palustris* – C, FNA, G, Pa, WV; = *S. palustris* ssp. *americana* (Fernald) Hultén – K; = *S. americana* (Fernald) G.N. Jones]

37. JUNCAGINACEAE L.C. Richard 1808 (Arrowgrass Family) [in ALISMATALES]

A family of 3-4 genera and 20 species, of temperate and boreal regions of the Old and New World. References: Haynes & Hellquist in FNA (2000); Thieret (1988); Haynes, Les, & Holm-Nielsen in Kubitzki (1998b).

Triglochin Linnaeus 1753 (Arrowgrass)

A genus of about 12 species, cosmopolitan. References: Haynes & Hellquist in FNA (2000); Thieret (1988)=Z; Haynes, Les, & Holm-Nielsen in Kubitzki (1998b).

1 Pistils 6, all fertile; fruits 2-4.5 mm long; central axis between the carpels not winged; [of NJ northward] ..... ***T. maritima***
1 Pistils 6, 3 fertile and 3 sterile; fruits 1-2 mm long; central axis between the carpels broadly winged; [of DE and MD southward] ..... ***T. striata***

Triglochin striata Ruiz & Pavón, Southern Arrowgrass. Brackish to nearly freshwater marshes. May-October. The species has an extensive range, occurring in tropical Central and South America, Africa, and Australia; in North America, it ranges from MD and DE south to s. FL and west to LA, and also on the west coast in CA and OR. [= F, FNA, G, K, RAB, WH; = *T. striatum* – C, GW, S, Z, orthographic variant]

Triglochin maritima Linnaeus. Brackish coastal habitats and inland bogs. Circumboreal, south in North America to MD, DE, OH, NE, NM, Mexico; also Patagonia. [= F, FNA, G, K; = *T. maritimum* – C, Z, orthographic variant]

38. ZOSTERACEAE Dumortier 1829 (Eelgrass Family) [in ALISMATALES]

A family of 3 genera and about 18 species, nearly cosmopolitan in distribution. References: Haynes in FNA (2000); Kuo & McComb in Kubitzki (1998b).

Zostera Linnaeus 1753 (Eelgrass)

A genus of about 12 species, aquatic herbs, of nearly cosmopolitan distribution. References: Haynes in FNA (2000); Crow & Hellquist (2000)=Y; Kuo & McComb in Kubitzki (1998b); Green & Short (2003)=Z.

Zostera marina Linnaeus *var*. ***stenophylla*** Ascherson & Graebner, Eelgrass. Estuarine waters. February-March. The species occurs in Eurasia and North America. Var. *stenophylla* is North American, and ranges south along the Atlantic coast to NC and allegedly to FL (though reports from that state are apparently not substantiated and may be based on misidentification of other aquatics). [= F, G, Y; < *Z. marina* – RAB, C, FNA, K, S, Z]

39. POTAMOGETONACEAE Dumortier 1829 (Pondweed Family) [in ALISMATALES]

A family of 6-7 genera and about 100 species (if circumscribed, as here, to include Zannichelliaceae), aquatic herbs, nearly cosmopolitan. Here circumscribed following recent molecular studies to include *Zannichellia* (Lindqvist et al. 2006; Angiosperm Phylogeny Group 2003, 2009). References: Haynes & Hellquist in FNA (2000); Haynes (1978); Les & Haynes (1996); Haynes, Les, & Holm-Nielsen in Kubitzki (1998b); Wiegleb & Kaplan (1998)=Z; Lindqvist et al. (2006). [including *ZANNICHELLIACEAE]*

1 Leaves opposite lobes ..... ***Zannichellia***
1 Leaves alternate.
  2 Stipules not adnate, or adnate to the blade < ½ the length of the stipule; peduncle stiff, the flowering spike elevated above the water's surface; submersed leaves translucent, flat, flexible; floating leaves present or absent ..... ***Potamogeton***
  2 Stipules adnate to the blade for at least 2/3 the length of the stipule; peduncle flexible, the flowering spike submersed; submersed leaves opaque, channeled, stiff; floating leaves absent ..... ***Stuckenia***

Potamogeton Linnaeus 1753 (Pondweed)

A genus of about 80 species, aquatic herbs, nearly cosmopolitan. References: Haynes & Hellquist in FNA (2000); Haynes & Hellquist (1996); Wiegleb & Kaplan (1998). Treatment adapted from Haynes & Hellquist in FNA (2000). [also see *Stuckenia*]

1 Stipular sheaths of submersed leaves adnate with leaf blade base, the tip usually projecting as a ligule ..... **Key A**
1 Stipular sheaths of submersed leaves free from the leaf blade base, or with only a few adnate, the ligule not obvious.
  2 Submersed leaves broadly linear-oblong to lanceolate to elliptic or nearly orbicular, 10-58 mm wide (occasional stranded forms lack submersed leaves) ..... **Key B**
  2 Submersed leaves linear, thread-like or ribbon-like, 0.1-10 mm wide ..... **Key C**

Key A

1 Leaves stiffish, conspicuously 2-ranked, auriculate-lobed to rounded at the junction with the stipule, with 20-60 fine veins ..... ***P. robbinsii***
1 Leaves lax, not conspicuously 2-ranked, lacking basal lobes, with fewer than 20 veins.
2 Tips of submersed leaves obtuse to acute; floating leaves rounded at apex.
3 Tips of submersed leaves acute; fruit 1-2 mm wide, the lateral keel with acute tips, beak minute ..... ***P. diversifolius***
3 Tips of submersed leaves obtuse; fruit 1.3-2.4 mm wide, the lateral keel with blunt tips, beak lacking..... ***P. spirillus***
2 Tips of submersed leaves acute to long-tapering; floating leaves acute at apex.
4 Submersed leaves 0.1-0.6 mm wide, without obvious lacunae; floating leaves 3-7 veined..... ***P. bicupulatus***
4 Submersed leaves 0.2-1 (-2) mm wide, with abundant lacunae; floating leaves 9-23 veined..... ***P. tennesseensis***

Key B

1 Leaf margins conspicuously serrate; stem flattened; fruit beak 2-3 mm long; turions commonly formed, hard ..... ***P. crispus***
1 Leaf margins entire; stem terete; fruit beak < 1 mm long; turions rarely formed.
2 Submersed leaves clasping the stem; floating leaves absent.
3 Leaves orbicular to ovate, often lanceolate in soft water, 1-6 cm long, with 3-25 delicate veins; stipules deteriorating and deciduous, absent on lower portions of stem ..... ***P. perfoliatus***
3 Leaves ovate-lanceolate to narrowly lanceolate, 1.6-13 cm long, with 3-35 coarse veins; stipules disintegrating to persistent fibers, even on lower portions of stem ..... ***P. richardsonii***
2 Submersed leaves petioled or sessile, not clasping the stem; floating leaves absent or present.
4 Submersed leaves 19-49 veined, distinctly arcuate..... ***P. amplifolius***
4 Submersed leaves with fewer than 29 veins, not arcuate.
5 Stems conspicuously black-spotted; submersed leaves crisped along the margin; floating leaves 15-21 veined ..... ***P. pulcher***
5 Stems inconspicuously spotted or lacking spots; submersed leaves flat along the margin; floating leaves 7-29 veined.
6 Submersed leaves with petioles 1-13 cm long.
7 Larger submersed leaves acute at the apex with a sharp awl-like tip; fruit gray-green to olive-green, with well-developed lateral ridges..... ***P. illinoensis***
7 Larger submersed leaves acute at the apex but lacking a sharp awl-like tip; fruit red to reddish-brown, with muricate lateral ridges..... ***P. nodosus***
6 Submersed leaves sessile.
8 Fruit reddish-brown, with obsolete or rounded keel; submersed leaves with (3-) 5-9 veins..... ***P. gramineus***
8 Fruit gray-green or olive-green, with well-developed keel; submersed leaves with 7-19 veins ..... ***P. illinoensis***

Key C

1 Fruit with a prominent keel 0.2-1.2 mm broad; floating leaves often present; lacunae prominent in submersed leaves.
2 Submersed leaves 3-13 veined; stipules of submersed leaves not adnate to the leaf base; floating leaves rounded at apex..... ***P. epihydrus***
2 Submersed leaves 1-3 (-7) veined; stipules of at least some submersed leaves adnate to the leaf base; floating leaves acute at apex ..... ***P. tenneseensis***
1 Fruit with a keel < 0.2 mm broad; floating leaves absent or present; lacunae present in some species, but generally not prominent.
3 Floating leaves present, at least in some plants of the population.
4 Petiole junction with leaf distinctly pale in color; floating leaves ovate, oblong-ovate, cordate at base, rarely tapering..... ***P. natans***
4 Petiole junction with leaf lacking pale color; floating leaves elliptical, ovate-elliptical, or oblong-ellliptical.
5 Floating leaves 7-12 mm wide, tapering at both ends; fruit apparently not produced..... ***P. floridanus***
5 Floating leaves 10-20 (-30) mm wide, obtuse, round or tapering at the base; fruit often produced..... ***P. oakesianus***
3 Floating leaves absent from all plants in the population.
6 Rhizomes obvious; peduncle 5-25 cm long; leaves thread-like, 0.1-0.5 mm wide..... ***P. confervoides***
6 Rhizomes absent or not apparent; peduncle 0.3-7 cm long, often curved; leaves usually not thread-like, 0.1-5 mm wide.
7 Nodal glands absent.
8 Leaves 15-35 veined, > 2 mm wide; stem conspicuously flattened; peduncles terminal, usually straight..... ***P. zosteriformis***
8 Leaves 3-5 veined, usually < 2 mm wide; stem terete; peduncles usually axillary, recurved.
9 Leaves acute, 3 (-5) veined, 0.3-1.5 (-2.3) mm wide; fruits 1-keeled, 1.4-2.3 (-2.7) mm long..... ***P. foliosus*** *var.* ***foliosus***
9 Leaves usually bristle-tipped, occasionally apiculate to blunt, 3 veined, 1-2.2 (-4) mm wide; fruits 3-keeled, 2.3-4 mm long ..... ***P. hillii***
7 Nodal glands present.
10 Stipules fibrous, often whitish..... ***P. strictifolius***
10 Stipules not fibrous, usually delicate, green, brown, or white.
11 Leaf apex bristle-tipped (rarely apiculate); peduncles recurved, axillary or axillary and terminal, 0.5-6.6 cm long..... ***P. hillii***
11 Leaf apex blunt, acute, or apiculate, but not bristle-tipped; peduncles straight, terminal, 0.5-6.6 cm long.
12 Mature fruit obovate, sides concave, beak mostly forward; peduncle filiform to cylindrical, usually 1-3 per plant; inflorescence usually interrupted; leaves with up to 2 rows of lacunae along midrib, apex acute, rarely apiculate; stipules mostly connate ..... ***P. pusillus*** *var.* ***pusillus***
12 Mature fruit mostly widest at middle, or ovate, sides rounded, beak mostly central; peduncle cylindrical, usually > 3 per plant; inflorescence continuous; leaves with 1-5 rows of lacunae along midrib, apex acute to obtuse; stipules mostly convolute..... ***P. pusillus*** *var.* ***tenuissimus***

Potamogeton amplifolius Tuckerman, Bigleaf Pondweed, Muskie-weed. Ponds, lakes, sluggish streams. June-September. NL (Newfoundland) west to BC, south to e. NC, nw. GA (Jones & Coile 1988), n. AL, OK, and CA. [= RAB, C, F, FNA, G, K, Pa, S, W, WV, Z]

Potamogeton bicupulatus Fernald. Quiet waters. July-September. ME west to WI, south to VA (Augusta County) and se. TN. [= FNA, F, K, Pa, Z; = *P. diversifolius* Rafinesque var. *trichophyllus* Morong – C, GW]

Potamogeton confervoides Reichenbach, Alga Pondweed, Conferva Pondweed, Tuckerman's Pondweed. Acidic blackwater pools and streams. April-September. NL (Newfoundland) west to ON, south to NJ and PA; disjunct in sc. NC and nc. SC (fall-line sandhills). [= RAB, C, F, FNA, G, K, Pa, Z]

* ***Potamogeton crispus*** Linnaeus, Curled Pondweed, Curly Pondweed. Ponds; native of Europe. May-September. ME, MN, s. SK and s. BC, south to NC, Panhandle FL, TX, AZ, and CA. [= RAB, C, F, FNA, G, GW, K, Pa, W, WH, WV, Z]

Potamogeton diversifolius Rafinesque, Common Snailseed Pondweed. Pools, ponds, and lakes. June-September. MA and NY west to MN, MT, and OR, south to c. peninsular FL, TX, and CA. [= RAB, FNA, G, K, Pa, S, W, WH, WV, Z; = *P. diversifolius* var. *diversifolius* – C, GW; > *P. diversifolius* – F; > *P. capillaceus* Poiret var. *capillaceus* – F; > *P. capillaceus* Poiret var. *atripes* Fernald – F]

Potamogeton epihydrus Rafinesque, Ribbonleaf Pondweed. Ponds. June-September. NL (Newfoundland) west to AK, south to GA, w. Panhandle FL, s. MS (Sorrie & Leonard 1999), LA, CO, and CA. [= RAB, C, FNA, K, Pa, S, W, WH, WV; > *P. epihydrus* var. *epihydrus* – F, G; > *P. epihydrus* var. *nuttallii* (Chamisso & Schlechtendal) Fernald – F, G; < *P. epihydrus* – Z (also see *P. tennesseensis*)]

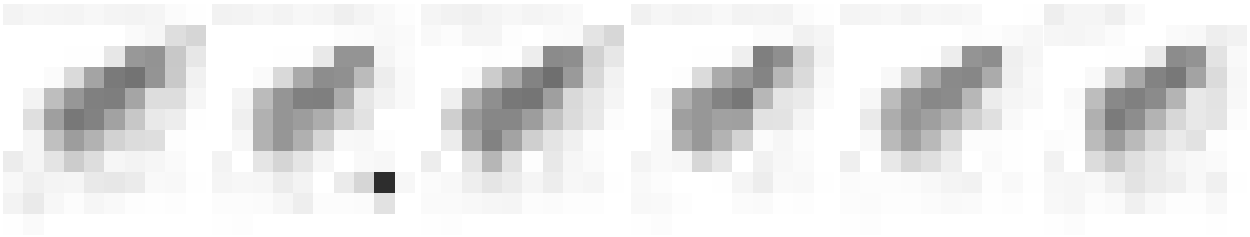
Potamogeton floridanus Small, Florida Pondweed. Blackwater rvers. Apparently endemic to blackwater rivers of the Panhandle of FL. Considering the under-collection of *Potamogeton*, it should be sought elsewhere. [= FNA, S, WH; < *P. natans* – Z]

Potamogeton foliosus Rafinesque *var*. ***foliosus***, Leafy Pondweed. Shallow ponds and streams. May-October. NL (Newfoundland) west to AK, south to SC, Panhandle FL, TX, and Mexico. [= C; < *P. foliosus* – RAB, G, GW, Pa, S, W, WH, Z; > *P. foliosus* var. *foliosus* – F, WV; > *P. foliosus* var. *macellus* Fernald – F, WV; = *P. foliosus* ssp. *foliosus* – FNA, K; > *P. curtissii* Morong – S; > *P. foliosus* – S]

Potamogeton gramineus Linnaeus, Variable Pondweed. Estuarine waters. Greenland and AK, south to sc. PA (Rhoads & Klein 1993; Rhoads & Block 2007), NJ, WV (Kartesz 1999), n. VA, MI, WI, CO, UT, and CA. Reported for VA (Fairfax County); specimen identification needing confirmation. [= C, FNA, G, K, Pa, WV, Z; > *P. gramineus* var. *maximus* Morong – F]

Potamogeton hillii Morong, Hill's Pondweed. Spring-fed oxbow pond. VT, MA, ON, and WI south to PA, VA, and OH. [= C, FNA, G, K, Pa, Z; > *P. hillii* – F; > *P. porteri* Fernald – F]

Potamogeton illinoensis Morong, Illinois Pondweed. Calcareous waters of streams, lakes, and ponds. May-September. QC west to NT and s. BC, south to s. FL, TX, Mexico, and CA. [= RAB, C, F, FNA, G, GW, K, Pa, W, WH, WV, Z; > *P. angustifolius* Berchtold & K. Presl – S; > *P. heterophyllus* Schreber – S; > *P. lucens* Linnaeus – S, misapplied]



Potamogeton natans Linnaeus, Floating Pondweed. Lakes and slow streams. June-September. NL (Newfoundland) west to AK, south to e. WV, w. NC, KS, NM, AZ, and CA. [= RAB, C, F, FNA, G, K, Pa, S, W; < *P. natans* – Z (also see *P. floridanus*)]

Potamogeton nodosus Poiret, Longleaf Pondweed, American Pondweed. Ponds, streams. May-September. ME and QC west to BC, south to Panhandle FL, TX, Mexico, and CA. [= RAB, C, F, FNA, G, GW, K, Pa, W, WV, Z; *? P. fluitans* Roth – S; *P. oblongifolium* Forster, proposed for nomenclatural rejection (Reveal et al. 2003)]

Potamogeton oakesianus J.W. Robbins, Oakes PondweedLakes and streams. NL (Newfoundland) west to MN, south to VA, n. WV, and n. IL; apparently disjunct in MT, and BC, and possibly in s. AL (Sorrie, pers. comm.). [= C, F, FNA, G, K, Pa, W, Z]

Potamogeton perfoliatus Linnaeus, Perfoliate Pondweed, Redhead Grass. Ponds. June-October. NL (Newfoundland), NL (Labrador) west to MI, south to ne. NC, and n. OH; apparently disjunct in w. FL, c. peninsular FL, s. AL, and se. LA, and in SD. [= FNA, G, K, S, Z; > *P. perfoliatus* var. *bupleuroides* (Fernald) Farwell – RAB, F, GW, WH; > *P. bupleuroides* Fernald; < *P. perfoliatus* – Pa]

Potamogeton pulcher Tuckerman, Spotted Pondweed, Heartleaf Pondweed. Ponds, pools, ditches, streams. June-September. NS west to WI, south to n. peninsular FL and e. TX. [= RAB, C, F, FNA, G, GW, K, Pa, S, W, WH, WV, Z; = *P. rotundifolium* Forster, proposed for nomenclatural rejection (Reveal et al. 2003)]

Potamogeton pusillus Linnaeus *var*. ***pusillus***. Acid and alkaline waters. May-September. NS west to AK, south to FL and Mexico. [< *P. berchtoldii* Fieber – RAB; > *P. pusillus* var. *pusillus* – F; > *P. pusillus* var. *minor* (Bivona-Bernardi) Fernald & Schubert – F; = *P. pusillus* ssp. *pusillus* – FNA, K; < *P. pusillus* var. *pusillus* – C; < *P. pusillus* – G, GW, Pa, S, WH, Z; = *P. pusillus* – WV]

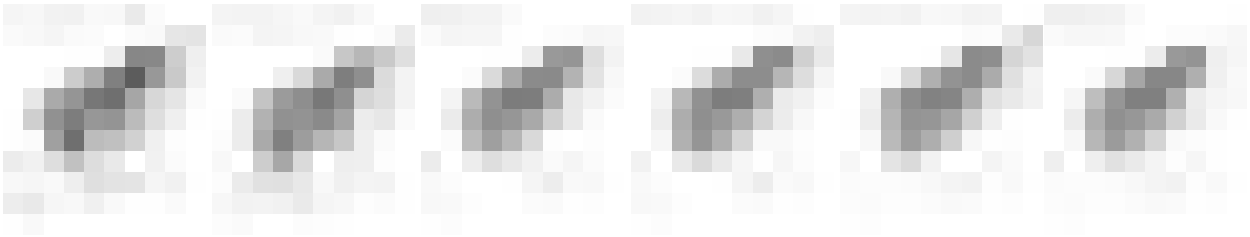
Potamogeton pusillus Linnaeus *var*. ***tenuissimus*** F.K. Mertens & W.D.J. Koch, Slender Pondweed. Millponds, other quiet waters. May-September. NL (Newfoundland) west to AK, south to Panhandle FL, TX, NM, and CA. Reported from SC by Gaddy & Rayner (1980). [= W; < *P. berchtoldii* Fieber – RAB; < *P. pusillus* var. *pusillus* – C; > *P. berchtoldii* var. *acuminatus* Fieber – F; > *P. berchtoldii* var. *berchtoldii* – F; > *P. berchtoldii* var. *lacunatus* (Hagström) Fernald – F; > *P. berchtoldii* var. *polyphyllus* (Morong) Fernald – F; > *P. berchtoldii* var. *tenuissimus* (Mertens & Koch) Fernald – F; < *P. pusillus* – G, GW, Pa, S, WH, Z; = *P. pusillus* ssp. *tenuissimus* (Mertens & Koch) R.R. Haynes & C.B. Hellquist – FNA, K; = *P. berchtoldi* – WV]

Potamogeton richardsonii (Bennett) Rydberg, Richardson Pondweed. Slow-moving, calcareous waters. NL (Labrador) west to AK, south to DE, MD, PA, n. OH, n. IN, n. IL, IA, NE, NM, AZ, and CA. [= C, F, FNA, G, K, Z; < *P. perfoliatus* – Pa]

Potamogeton robbinsii Oakes, Fern Pondweed. Muddy waters. August-September. NS and PE west to Keewatin and AK, south to n. VA, n. IL, s. MN, CO, UT, and CA; disjunct in s. AL. [= C, F, FNA, G, K, Pa, Z]

Potamogeton spirillus Tuckerman, Northern Snailseed Pondweed. Quiet waters. July-November. NL (Newfoundland) west to MB, south to e. VA, n. OH, n. IA, and se. NE. [= C, F, FNA, G, K, Pa, WV, Z]

Potamogeton strictifolius A. Bennett, Straightleaf Pondweed. Calcareous waters. July-September. NL (Newfoundland) west to YT, south to w. VA, n. IL, WY, and n. UT. [= C, FNA, G, K, Pa, W, Z; > *P. strictifolius* var. *strictifolius* – F; > *P. strictifolius* var. *rutiloides* Fernald – F; > *P. longiligulatus* Fernald – F]



Potamogeton tennesseensis Fernald, Tennessee Pondweed. Quiet or flowing water. Late May-September. PA and OH south to w. VA, and se. TN. [= F, FNA, K, Pa, W, WV; < *P. epihydrus* – Z]

Potamogeton zosteriformis Fernald, Flatstem Pondweed. Quiet waters. July-September. NL (Newfoundland) west to AK, south to n. VA, ne. WV, n. IL, KS, UT, and CA. [= C, F, FNA, G, K, Pa, WV, Z]

Stuckenia C. Börner 1912 (Sago-pondweed)

A genus of about 10 species, nearly cosmopolitan. This genus should be called *Stuckenia*, which has priority over *Coleogeton*. Lindqvist et al. (2006) provide molecular support for recognition of *Stuckenia* as a genus. References: Haynes & Hellquist in FNA (2000); Les & Haynes (1996)=Z; Haynes, Les, & Král (1998)=Y; Wiegleb & Kaplan (1998)=X; Lindqvist et al. (2006).

Stuckenia pectinata (Linnaeus) C. Börner, Sago-pondweed. Calcareous or brackish waters of ponds, lakes, estuaries, sounds. June-September. The species is irregularly cosmopolitan. [= FNA, K, Y; = *Potamogeton pectinatus* Linnaeus – RAB, C, F, G, GW, Pa, S, W, WH, WV, X; = *Coleogeton pectinatus* (Linnaeus) D.H. Les & R.R. Haynes – Z]

Zannichellia Linnaeus 1753 (Horned Pondweed)

A genus of about 5 species, aquatic herbs, nearly cosmopolitan. References: Haynes & Hellquist in FNA (2000); Haynes & Holm-Nielsen (1987)=Z.

Identification notes: *Zannichellia* is sometimes confused with other aquatics, such as *Ruppia* and narrow-leaved *Potamogeton*. *Potamogeton* has at least some leaves alternate; *Zannichellia* and *Ruppia* are opposite-leaved. *Zannichellia* lacks the abruptly broadened sheath of *Najas*. Also, the seeds are flattened in *Zannichellia*, and toothed down one side; *Najas* has a cylindric or elliptic fruit. *Zannichellia* has longer leaves (3-10 cm long) than *Najas* (< 4 cm long).

Zannichellia palustris Linnaeus, Horned Pondweed. Fresh or brackish water. February-October. The species occurs throughout much of the world. [= RAB, C, FNA, G, GW, K, Pa, S, W, WV, Z; > *Z. palustris* var. *major* (Hartman) W.D.J. Koch – F; > *Z. palustris* var. *palustris* – F]

41. RUPPIACEAE Horaninow ex Hutchinson 1934 (Wigeon-grass Family) [in ALISMATALES]

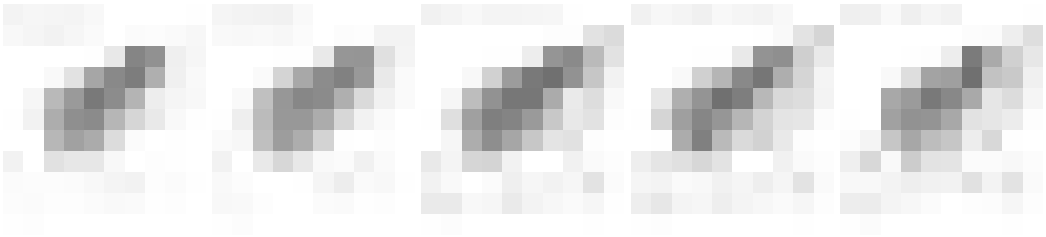
A family of a single genus and 1-10 species. References: Haynes (1978)=Z; Haynes in FNA (2000); Haynes, Holm-Nielsen, & Les in Kubitzki (1998b).

Ruppia Linnaeus (Wigeon-grass)

A genus of 1-10 species, nearly cosmopolitan. References: Haynes (1978)=Z; Haynes in FNA (2000); Haynes, Holm-Nielsen, & Les in Kubitzki (1998b).

Identification notes: Separable from superficially similar species of *Potamogeton* by the stipules adnate their entire length (vs. separate at least at the tip in *Potamogeton*).

Ruppia maritima Linnaeus, Wigeon-grass, Ditch-grass. Brackish estuaries, rivers, marsh pools. July-October. Nearly cosmopolitan. [= RAB, C, FNA, GW, K, S, Z; > *R. maritima* var. *maritima* – F, G; > *R. maritima* var. *longipes* Hagström – F; > *R. maritima* var. *rostrata* Agardh – F, G]



42. CYMODOCEACEAE N. Taylor 1909 (Manatee-grass Family) [in ALISMATALES]

A family of about 5 genera and 16 species, estuarine aquatics, of tropical and subtropical (rarely temperate) waters. References: Kuo & McComb in Kubitzki (1998b); Haynes in FNA (2000); Green & Short (2003).

1 Leaves flat above the sheath; leaf tips 3-toothed; female plants with flowers with 1 pistil ..... ***Halodule***
1 Leaves terete or subterete above the sheath; leaf tips acicular; female plants with flowers with 1-2 pistils ..... ***Syringodium***

Halodule Endlicher 1841 (Shoal-grass)

A genus of about 6 species, of tropical and subtropical regions of both hemispheres. References: Haynes in FNA (2000); McRoy & Helfferich (1977); Kuo & McComb in Kubitzki (1998b); Green & Short (2003)=Z.

Halodule wrightii Ascherson, Shoal-grass. Submerged in estuarine waters up to about 2 m deep, especially in Core and Pamlico sounds (North Carolina). E. NC (reported with unknown documentation from SC, not known from GA); FL west to TX, and south along shores of the Gulf of México and Caribbean; also on the Pacific coast of Panama and Nicaragua. Haynes in FNA (2000) concludes that *H. beaudettei* is not taxonomically distinct from *H. wrightii* (the older name). Seagrasses (an informal group including species such as *Halodule wrightii*, *Zostera marina*, and *Ruppia maritima* in our area) are very important components of estuarine ecosystems, providing a large proportion of the primary productivity in such systems and providing shelter and nursery grounds for fish, shrimp, and other marine life. An estimated 80,000 hectares of seagrass beds are found in Pamlico and Core sounds, NC, most of that area having *Halodule* as the co-dominant or dominant species (Ferguson, Rivera, & Wood 1989). There is concern about the destruction of seagrass beds by pollution, dredging of waterways, and mechanical disturbance by fishing boats (Koch & Orth 2003; Green & Short 2003). [= FNA, S, WH3, Z; > *H. beaudettei* (den Hartog) den Hartog – RAB, GW, K]

Syringodium F.T. Kützing in R.F. Hohenacker 1860 (Manatee-grass)

A genus of 2 species, seagrasses, of the Caribbean and Indo-West Pacific. References: Haynes in FNA (2000); Kuo & McComb in Kubitzki (1998b); Green & Short (2003)=Z.

Syringodium filiforme F.T. Kützing in R.F. Hohenacker, Manatee-grass. Estuarine waters. Panhandle FL, peninsular FL, westward along the Gulf Coast, and in the West Indies. *Syringodium* is occasionally cast ashore in Georgia and the Carolinas following hurricanes, but there is no evidence that it grows in our area. [= FNA, WH3, Z; = *Cymodocea filiformis* (F.T. Kützing in R.F. Hohenacker) Correll – GW, K; = *Cymodocea manatorum* Ascherson – S]

44. NARTHECIACEAE E.M. Fries 1846 (Bog-asphodel Family) [in DIOSCOREALES]

As circumscribed here (excluding Tofieldiaceae), a family of about 5 genera and 40 species, of e. Asia, e. North America, n. Europe, and the Guyana Shield of n. South America. Reveal & Zomlefer (1998) place the Nartheciaceae in the monotypic order

Nartheciales. Thye molecular phylogenetics of the family has recently been corroborated by Fuse, Lee, & Tamura (2012).
References: Zomlefer (1997b, 1999); Fuse, Lee, & Tamura (2012); Reveal & Zomlefer (1998); Tamura in Kubitzki (1998a).

Aletris Linnaeus 1753 (Colic-root, Stargrass)

As circumscribed here (excluding *Metanarthecium*), a genus of about 30 species, of e. North America and e. Asia. References: Weigant (2002)=X; Ward (1978)=Y; Zomlefer (1997b)=Z; Tamura in Kubitzki (1998a); Sullivan in FNA (2002a).

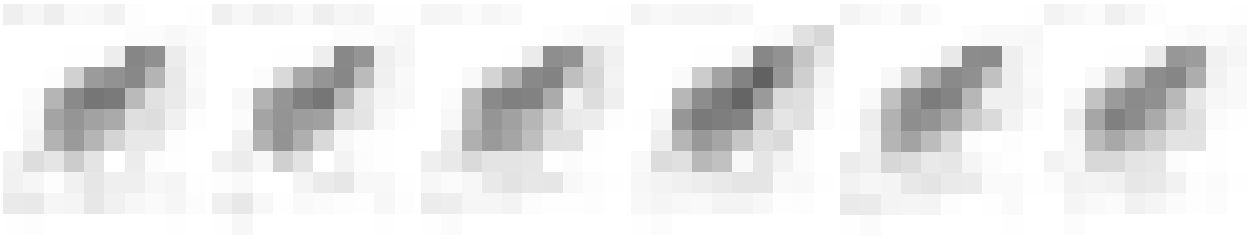
1 Perianth white to creamy-white (rarely pinkish).
  2 Perianth 6-10 mm long, cylindric at anthesis, 2-3× as long as broad, the perianth lobes narrowly deltoid (longer than broad); fruiting perianth markedly constricted above the middle ..... ***A. farinosa***
  2 Perianth 4-6 mm long, campanulate at anthesis, ca. 1× as long as broad, the perianth lobes broadly deltoid (about as long as broad); fruiting perianth somewhat narrowed above the base ..... ***A. obovata***
1 Perianth golden yellow (often faded in dried specimens).
  3 Perianth short-cylindric or campanulate at anthesis, 1-2× as long as broad, the perianth lobes not spreading; [flowering May-July] ..... ***A. aurea***
  3 Perianth long-cylindric at anthesis, 2.5-4× as long as broad, the perianth lobes spreading somewhat; [flowering March-May] ..... ***A. lutea***

Aletris aurea Walter, Golden Colic-root. Pine savannas, seepage bogs, pine flatwoods. Mid May-July; August. S. MD south to ne. FL, Panhandle FL, west to e. TX and se. OK. Flowering several weeks later than *A. farinosa* when growing together. [= RAB, C, F, FNA, G, GW, K, S, WH, X, Y, Z]

Aletris farinosa Linnaeus, Northern White Colic-root, Mealy Colic-root, Stargrass. Pine savannas, pine flatwoods, seepage bogs, upland woodlands, roadbanks. Late April-early June; July-August. S. ME, s. ON, and se. MN south to s. GA, FL (Wunderlin 1998), LA, and TX, the only species of the genus not restricted (or nearly so) to the Coastal Plain. [= RAB, C, F, FNA, G, GW, K, Pa, S, W, WH, X, Z]

Aletris lutea Small, Yellow Colic-root. Pine savannas. E. GA (in immediate proximity to the SC border) south to s. FL, and west to e. LA (Weigant 2002); disjunct in w. LA (Sorrie & LeBlond 2008) and recently verified in se. NC (R. Thornhill, pers. Comm. 2012) (another specimen collected in se. NC has recently been annotated as *A. lutea*, but it appears to be *A. farinosa*). The report by F of *A. lutea* Small as far north as se. VA is probably in errror. [= FNA, GW, K, S, WH, X, Y, Z]

Aletris obovata Nash ex Small, Southern White Colic-root. Pine savannas. May-early June; August. Se. SC south to c. peninsular FL, west to e. Panhandle FL. Reported for MS (Kartesz 1999), but the report rejected (likely based on a misidentified specimen). [= RAB, FNA, GW, K, S, WH, X, Y, Z]



Lophiola Ker-Gawler 1814 (Golden Crest)

A monotypic genus (as here interpreted to include *L. americana* and *L. septentrionalis*), of temperate e. North America. *Lophiola* is quite unlike any other genus, and its familial position has been problematic. Often previously placed in the Haemodoraceae (as in RAB, C, G, GW), *Lophiola* clearly belongs to the Nartheciaceae, as shown by studies of anatomy, pollen ultrastructure, chemistry, and DNA (Edwards, Churchill, & Weiss 1970; Simpson & Dickison 1981; Simpson 1983; Zavada 1983; Zavadu, Xu, & Edwards 1983; Ambrose 1985; Fuse, Lee, & Tamura 2012). References: Zomlefer (1997b)=Z; Tamura in Kubitzki (1998a); Robertson in FNA (2002a).

Lophiola aurea Ker-Gawler, Golden Crest. Wet savannas, bogs, marshes, ditches adjacent to these natural habitats. Late May-June; August-September. FL Panhandle and sw. GA west to e. LA; se. NC; n. DE (at least formerly) and s. NJ; disjunct in NS. Only a few populations remain in NC. [= C, FNA, K, S, Z; > *L. americana* (Pursh) Wood – RAB, F (the NJ-DE material), G, GW; > *L. septentrionalis* Fernald – F (the Nova Scotian material)]

Narthecium Hudson 1762 (Asphodel)

A genus of about 8 species, many narrow disjuncts, collectively with a very fragmented distribution in the temperate Northern Hemisphere. References: Small (1924)=Z; Zomlefer (1997b)=Y; Utech in FNA (2002a); Tamura in Kubitzki (1998a); Schumacher (1947)=X; Sorrie & Weakley (in prep.)=Q.

1 Tepals 4-6 mm long; capsule 10-14 mm long; pedicels stout, about as long as the subtending bracts; [Coastal Plain seeps and savannas] ..... ***N. americanum***
1 Tepals 6-9 mm long; capsule 8-10 mm long; pedicels slender, distinctly longer than the subtending bracts; [Mountain bogs] ..... ***N. montanum***

Narthecium americanum Ker-Gawler, Yellow Asphodel. Wet seepages or savannas. June-July; August-September. S. NJ and DE (where believed extirpated); disjunct in c. SC (where apparently extirpated, though still worth seeking in mucky seepages of the Sandhills of SC and NC). [= C, F, G, Q, X; < *Narthecium americanum* – RAB, FNA, GW, K, W, Y (also see *N. montanum*); = *Abama americana* (Ker-Gawler) Morong – S, Z]

Narthecium montanum (Small) C.H. Grey, Appalachian Yellow Asphodel. Bogs (apparently extinct). With the drainage of the bogs of East Flat Rock, Henderson County, this species was apparently extirpated. It is still possible that it will be relocated, in bogs in Henderson or Transylvania counties, NC. Small (1924, 1933) considered the NC mountain population a distinct species, based on its longer, more slender pedicels, larger sepals, petals, and stamens, and smaller capsules. Schumacher (1947), in the most thorough worldwide assessment of *Narthecium*, agreed, and Sorrie & Weakley (in prep.) concur, based on an herbarium analysis of the characters of all taxa in the genus. The morphological distinctions (and geographic disjunction) between *N. montanum* and *N. americanum* are as great or greater as those between most species recognized worldwide in the genus. [= F, Q, X; < *Narthecium americanum* – RAB, FNA, GW, K, W, Y; = *Abama montana* Small – S, Z]

45. BURMANNIACEAE Blume 1827 (Burmannia Family) [in DIOSCOREALES]

A family of about 13-15 genera and 130 species, pantropical and warm-temperate. References: Wood (1983a)=Z; Lewis in FNA (2002a); Maas-van de Kamer in Kubitzki (1998a).

1 Floral tube terete; ovary 1-locular.....***Apteria***
1 Floral tube 3-angled or 3-winged; ovary 3-locular..... ***Burmannia***

Apteria Nuttall (Nodding Nixie)

A monotypic genus, the single species distributed from s. North America south to c. South America. References: Lewis in FNA (2002a); Maas-van de Kamer in Kubitzki (1998a).

Apteria aphylla (Nuttall) Barnhart ex Small, Nodding Nixie. Wet hammocks, bay swamps, other acid swamps, mesic forests. E. GA west to e. TX, south to c. South America, and in the West Indies. [= FNA, GW, K, S, WH3]

Burmannia Linnaeus (Burmannia)

A genus of about 63 species, autotrophic or mycotrophic herbs, pantropical (to warm temperate). References: Lewis in FNA (2002a); Maas-van de Kamer in Kubitzki (1998a).

Identification notes: Both species of *Burmannia* are very small and easy to overlook; they occasionally occur together.

1 Floral tube 3-winged, violet; flowers in a spicate cyme (solitary in depauperate individuals).....***B. biflora***
1 Floral tube obtusely 3-angled, greenish to creamy white; flowers in a capitate cluster (solitary in depauperate individuals).....***B. capitata***

Burmannia biflora Linnaeus, Violet Burmannia. Savannas, bogs, shores of Coastal Plain depression ponds. August-November. Se. VA south to FL, west to e. TX. [= RAB, C, F, FNA, G, GW, K, S, WH3]

Burmannia capitata (J.F. Gmelin) von Martius, White Burmannia. Savannas, bogs, shores of Coastal Plain depression ponds. July-November. E. NC south to s. FL, west to e. TX and se. OK; West Indies, Central America, and South America. [= RAB, FNA, GW, K, S, WH3]

46. DIOSCOREACEAE R. Brown 1810 (Yam Family) [in DIOSCOREALES]

A family of about 3-20 genera and 600-880 species, of tropical and warm temperate regions. References: Raz in FNA (2002a); Huber in Kubitzki (1998a).

Dioscorea Linnaeus 1753 (Yam)

A genus of about 575-850 species, vines, of tropical and warm temperate regions of the Old World and New World. Huber in Kubitzki (1998a) advocates the division of the large and unwieldy *Dioscorea* into separate genera. *Dioscorea* (broadly defined) has a wide variety of economic uses, especially in the tropics, where it is most diverse. Various species are cultivated for their edible tubers (yams, not to be mistaken for sweet potatoes, *Ipomoea batatas*, often referred to colloquially as "yams" in the

southern United States), especially in Africa. Oral contraceptives were developed from extracts of *Dioscorea*. Many other uses are described in Al-Shehbaz & Schubert (1989). References: Raz in FNA (2002a); Al-Shehbaz & Schubert (1989)=Y; Ward (1977c)=Z; Huber in Kubitzki (1998a).

Identification notes: *Smilax* section *Nemexia* are sometimes confused with our native *Dioscorea* (key lead 1a) because of a superficial similarity. They can be readily distinguished even in vegetative condition by *Smilax* section *Nemexia* having 3 (-5) main veins, the 3 central rejoining at the leaf apex (vs. *Dioscorea* with 7-13 main veins), and secondary veins in a complex reticulate pattern (vs. *Dioscorea* with secondary veins forming simpler and largely perpendicular cross-connections between the primary veins).

1 Leaves cordate-ovate, the sides of the leaves continuously convex; aerial tubers never present; perennial from rhizomes < 1.5 cm in diameter; [native species, usually of forests and woodlands]; [section *Macropoda*].
  2 Staminate inflorescences usually of 1 large and 1-2 smaller secondary panicles in each axil (of upper stem leaves); filaments inwardly curved, ca. 0.4 mm long; anther lobes connate; tepals oblong; [of SC south]..... ***D. floridana***
  2 Staminate inflorescence a single panicle in each axil (of median or upper leaves); filaments straight, ca. 0.2 mm long; anther lobes separate; tepals ovate; [widespread in our area] ..... ***D. villosa***
1 Leaves halberd-shaped or sagittate, the sides with a concave portion (*D. polystachya*) or continuously convex (*D. alata*, *D. bulbifera*); aerial tubers often present in the leaf axils; perennial from large, vertically-oriented tubers; [non-native species, usually in disturbed areas, especially in bottomlands]; [section *Enantiophyllum*].
  3 Stems with 2-4 wings or angles..... ***D. alata***
  3 Stems terete.
    4 Leaf margins sagittate, the sides continuously convex..... ***D. bulbifera***
    4 Leaf margins halberd-shaped, the sides with a concave portion..... ***D. polystachya***

* ***Dioscorea alata*** Linnaeus, White Yam, Great Yam. Disturbed areas, in moist soils; native of se. Asia. Reported for Lowndes County, GA (Carter, Baker, & Morris 2009). [= FNA, K, WH, Y, Z]

* ***Dioscorea bulbifera*** Linnaeus, Air Yam. Disturbed forests, thickets, and banks; native of Africa and Asia. Reported for Camden County, GA (Carter, Baker, & Morris 2009). [= FNA, K, WH] {add synonymy}

Dioscorea floridana Bartlett, Florida Wild Yam. Mesic to dry forests, swampy forests. June-July; August-November. SC south to n. FL, on the Coastal Plain. *D. floridana* is "the most distinctive of North American species" (Al-Shehbaz & Schubert 1989). [= FNA, K, S, WH, Y, Z; = *D. villosa* Linnaeus var. *floridana* (Bartlett) H.E. Ahles – RAB; = ***Merione sp. 1***]

* ***Dioscorea polystachya*** Turczaninow, Cinnamon Vine, Chinese Yam. Thickets, disturbed areas, bottomland forests; native of China. June-August. [= FNA; = *D. batatas* Decaisne – RAB, C, F, G, Pa, W, WH, Z; = *D. oppositifolia* Linnaeus – K, Y, misapplied]

Dioscorea villosa Linnaeus, Wild Yam. Moist forests and woodlands. April-June; September-November. NJ, NY, s. ON, WI, MN, and IA south to n. FL and LA. Various specific and infraspecific taxa are here combined. Ward (1977c) states that "a recent study at Duke University by Shu-fun Au, unfinished due to the death of its author, tentatively recognized *D. hirticaulis* and *D. floridana* but combined all other entities without distinction under *D. villosa*." Further study is needed. Al-Shehbaz & Schubert (1989) indicate that the lectotype of *D. villosa* has pubescent stems; nomenclatural changes are apparently needed, if varietal status of the 2 varieties of *D. villosa* proves warranted. [= FNA, K, WH; > *D. villosa* var. *villosa* – RAB, C; > *Dioscorea villosa* Linnaeus var. *hirticaulis* (Bartlett) H.E. Ahles – RAB, C, Y; > *D. hirticaulis* Bartlett – F, G, S, Z ; > *D. villosa* – F, G, Pa, S, W, Z; = ***Merione sp. 2***; > *D. quaternata* – C, F, G, K, Pa, S, Y, Z; > *D. glauca* Muhlenberg ex Bartlett – S]

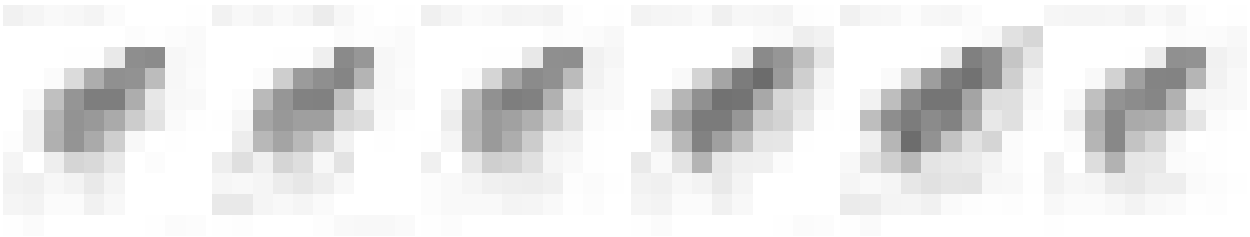
49. STEMONACEAE Engler 1887 (Stemona Family) [in PANDANALES]

A family of 3-4 genera and 30-35 species, herbs and shrubs, of Asia, Australia, and se. North America. References: Whetstone in FNA (2002a); Rogers (1982)=Z; Kubitzki in Kubitzki (1998a).

Croomia Torrey 1840 (Croomia)

A genus of 3 species, 2 in China and Japan and 1 in se. North America. Sometimes segregated into the Croomiaceae. References: Whetstone in FNA (2002a); Rogers (1982)=Z; Kubitzki in Kubitzki (1998a).

Croomia pauciflora (Nuttall) Torrey, Croomia. Moist bluff forests, often with beech and basswood. April-May. Wc. GA and n. AL south to Panhandle FL (Gadsden & Liberty counties; Wunderlin & Hansen 2008), and allegedly se. GA (Whetstone in FNA 2002, Jones & Coile 1988) and s. LA. [= FNA, K, S, WH, Z]



53a. TRILLIACEAE Lindley 1846 (Trillium Family) [in LILIALES]

A family of 5 genera and about 80 species, perennial herbs, of temperate Northern Hemisphere. References: Farmer & Schilling (2002).

Trillium Linnaeus 1753 (Trillium, Toadshade, Wake-robin)

A genus of about 50 species, of e. North America, w. North America, and e. Asia (especially se. North America). The genus *Trillium* in our area is difficult and complex. *Trillium* is now usually separated from the Liliaceae (along with Eurasian genera such as *Paris)* into the Trilliaceae (Zomlefer 1996, Kato et al. 1995, Kawano & Kato 1995, and others) or less drastically as part of the Melanthiaceae (Chase et al. 2000; Tamura et al. 2004). The traditonal division of the genus into two well-marked subgenera, subgenus *Trillium*, the pedicellate trilliums, and subgenus *Phyllantherum*, the sessile-flowered trilliums, has been partly supported by molecular and morphological phylogenetic studies (Kawano & Kato 1995, Kato et al. 1995). These studies support the monophyly of subgenus *Phyllantherum*, but suggest that subgenus *Trillium* consists of several groups which are only rather distantly related (Kawano & Kato 1995, Kazempour Osaloo et al. 1999; Farmer & Schilling 2002). References: Patrick (1986)=Z; Patrick (2007)=V; Freeman (1975)=Y; Case & Case 1997=X; Patrick in Wofford (1989); Case in FNA (2002a); Mitchell (1990); Kato et al. (1995); Kawano & Kato (1995); Tamura in Kubitzki (1998a); Zomlefer (1996); Farmer & Schilling (2002). Key adapted from Patrick (1986, 2007), unpublished keys of J.D. Freeman and S. Farmer, and other sources.

Identification notes: Teratological forms are frequent in some species, as, for instance, leaves, sepals, and stamens in 2's or 4's, petals sepaloid, or sepals petaloid, and so forth. What are called “leaves” in *Trillium* are actually interpreted as bracts by some. Most species are slow-growing perennials; seedlings, juveniles, and depauperate or "tired" plants are one-leaved ("monilliums"), recognizable by the similar color, texture and venation of the single leaf to the three leaves of mature plants. In some species, such as *T. undulatum* and taxa of the *T. pusillum* complex, individual plants remain in the single-leaf stage for long periods of time, and populations may consist largely of juvenile plants.

1 Leaves mottled with 2-3 different shades of green (very rarely the mottling not apparent); flower sessile; [subgenus *Phyllantherum*] .....**Key A**
1 Leaves solid green; flower on a pedicel (the pedicel sometimes very short or essentially absent in some varieties of *T. pusillum*); [subgenus *Trillium*].
  2 Petals relatively thick in texture, straight-margined, maroon or white, rarely yellow or green (if white, turning brown with age); stigmas thicker at base, tapering gradually toward tip, distinct; ovary purple-black, maroon, pink, or white, 6-angled; [*Erectum* group] .....**Key B**
  2 Petals relatively delicate in texture, wavy-margined, white to deep pink (if white, generally fading to pink with age); stigmas thin, uniform in thickness from base to apex, somewhat fused at the base into a short style; ovary greenish-white to white, 3- or 6-angled or-lobed ....**Key C**

Key A – trilliums with sessile flowers and mottled leaves (subgenus *Phyllantherum*)

1 Scape more-or-less decumbent in a gentle S-shape, the leaves lying on the ground, or nearly so; flower fragrance putrid; [*T. sessile* group].
  2 Anther dehiscence extrorse (toward the outside of the flower); stamens about 0.25× as long as the petals; upper stem puberulent; petals 4-10 cm long; filaments 2-5 mm long.....***T. decumbens***
  2 Anther dehiscence introrse (toward the inside of the flower); stamens about 0.5× as long as the petals; upper stem glabrous; petals 2.5-5.5 cm long; filaments 1-2 mm long.....***T. reliquum***
1 Scape erect, straight, the leaves borne well above the ground (the leaf tips sometimes nearly touching the ground); flower fragrance various.
  3 Sepals abruptly deflexed between and below the leaves, distinctly descending below the approximately horizontal plane of the leaves; filaments about as long as incurved anthers; [*T. recurvatum* group].
    4 Anther connectives slightly incurved; filaments short, < ½ the anther length; [endemic to Kershaw and Richland counties in the inner Coastal Plain of SC].....***T. oostingii***
    4 Anther connectives strongly incurved; filaments long, > ½ the anther length; [primarily west of the Blue Ridge and south into the Gulf Coastal Plain, very rarely disjunct to the Mountains or upper Piedmont].
      5 Leaves sessile or subsessile, borne in a descending or drooping manner (similar to the sepals); petals usually 4-7× as long as wide, strongly clawed .....***T. lancifolium***
      5 Leaves distinctly petiolate, borne in an ascending manner (strongly contrasting in position with the strongly deflexed sepals); petals usually ca. 2× as long as wide, attenuate to weakly clawed.....***T. recurvatum***
  3 Sepals erect, ascending, or spreading, usually borne at or above the approximately horizontal plane of the leaves; filaments much shorter than the upright anthers.
    6 Petals spreading to horizontal, with 1-2 spiral twists (looking something like an airplane propellor); anther dehiscence extrorse (toward the outside of the flower); [*T. sessile* group].....***T. stamineum***
    6 Petals erect to slightly spreading, not spirally twisted; anther dehiscence introrse (toward the inside of the flower), or latrorse (toward the side).
      7 Petals broadly spatulate, clawed, broadly rounded (though sometimes with an apiculus) at the tip; petals pale lemon-yellow (the claws greenish or maroon); flower fragrance clove-like; [of the Savannah River drainage, from sw. NC southeastward along the GA-SC border]; [*T. sessile* group].....***T. discolor***
      7 Petals lanceolate, elliptic, obovate, or oblanceolate, but not broadly spatulate and distinctly clawed, generally acute at the tip; petals maroon-red, purplish-brown, yellow, or green; flower fragrance various; [collectively widespread in our area].
        8 Stigmas > 1.5× as long as the ovary; stamens about 0.5× as long as the petals; anther connectives prominently prolonged into a beak 1.0-5.0 mm long (beyond the anther sacs); [*T. sessile* group].....***T. sessile***
        8 Stigmas as long as the ovary or shorter; stamens < 0.5× as long as the petals; anthers blunt, the connectives extended < 1.0 mm beyond the anther sacs.
          9 Ovary ellipsoid; leaves acute, the margins of the outer 1/3 more or less straight; leaf blade mottled with 3 or more shades of green, the palest shade forming a very conspicuous pale silvery-green streak along the midvein; [of the Coastal Plain and fall-line area of GA, AL, and FL Panhandle]; [*T. sessile* group].
            10 Stem 2.5-3× as long as the leaves; petals oblanceolate-obovate, usually 1.5-3× as long as wide; flower fragrance similar to overripe bananas .....***T. decipiens***

10 Stem 1-2× as long as the leaves (though sometimes elongating late in the season); petals narrowly elliptic to oblanceolate-obovate, usually 3-5× as long as wide; flower fragrance yeasty (reminiscent of stale beer).....***T. underwoodii***

9 Ovary ovoid; leaves acute to acuminate, the margins of the outer 1/3 convex; leaf blade mottled with 2-3 shades of green, paler shades sometimes prominent along the midvein, but not as above; [collectively widespread in our area]; [*T. maculatum* group].

11 Petals < 4× as long as wide, elliptic-oblanceolate to oblanceolate; [of inland provinces, rarely in the Coastal Plain].

12 Flower fragrance fruity-spicy, like green apples or *Calycanthus* (rarely musky); petals maroon, bronze, green, yellow; portions of ovary and stamens purplish during anthesis.....***T. cuneatum***

12 Flower fragrance lemon-like; petals greenish-yellow darkening to yellow; ovary and stamens greenish-white during anthesis.....***T. luteum***

11 Petals > 4.5× as long as wide, narrowly oblanceolate-spatulate to linear-oblanceolate; [of the Coastal Plain, rarely farther inland].

13 Ovary 3-angled at base of stigmas (rarely hexagonal); petals 7-17 mm wide, narrowly spatulate (appearing clawed); outer whorl of stamens broader, anther dehiscence introrse; flower fragrance faintly spicy-fragrant, banana-like; [of AL, n. FL, GA, and e. SC].....***T. maculatum***

13 Ovary 6-angled; petals 3-8 mm wide, linear-oblanceolate, narrowly elliptic, to linear-lanceolate (weakly or not clawed); flower fragrance putrid, like rotting meat; [of MS and LA].

14 Petals 3-5 mm wide; anther dehiscence introrse; anther connective extending 1-1.5 mm beyond the anther sacs.....***T. foetidissimum***

14 Petals 4-8 mm wide; anther dehiscence latrorse; anther connective scarcely extending beyond the anther sacs.....***T. ludovicianum***

Key B – trilliums with unmottled leaves and pedicellate flowers, of the *Erectum* Group

1 Flowers held below the leaves (the pedicel declined below a horizontal plane).

2 Stamens far exceeding the pistil, filaments as long as the ovary or longer, at least partly maroon, the anther sacs yellow to maroon; ovary small, globose, 3-12 mm long, dark purplish black; flower fragrance pungent, rose-like; pedicel long, 3-13 cm long; petals strongly overlapping, usually maroon (rarely white or whitish).....***T. vaseyi***

2 Stamens at most 1.5× longer than the pistil, filaments shorter than the ovary, white (less commonly purplish), the anther sacs lavender to vivid purple (or albino); ovary white to pink or dull red, large, ovoid, 10-17 mm long; flower fragrance various; pedicel short to long, 1.5-12 cm long; petals not strongly overlapping, usually white (rarely maroon).

3 Pedicels short, 1.5-4 cm long.

4 Anthers 7.5 mm long or less, about as long as the filaments or shorter; petals narrowly elliptic to obovate, often scarcely larger than the sepals, delicate, occasionally margined in pink or green; [of damp forests of n. VA and northward].....***T. cernuum***

4 Anthers 7.0 mm long or more, longer than the filaments; petals ovate to elliptic, much broader than the sepals; [of mesic forests of n. NC southward].....***T. rugelii***

3 Pedicels long, 4-12 cm long.

5 Stamens about as long as the ovary or slightly longer; filaments short, ca. 1/3 the length of the anthers or shorter; filaments ½ as long as the ovary or shorter; pollen creamy to pale yellow; filaments and anthers white, the anthers at least in part somewhat appressed against the ovary.....***T. flexipes***

5 Stamens far exceeding ovary height; filaments ca. ½ the length of the anthers; pollen creamy, yellow, or pale grayish purple; anthers and filaments also variable in color, mostly white, occasionally purplish; anthers mostly longer than the ovary and not appressed against it.....***T. species 2***

1 Flowers held at or above the level of the leaves (the pedicel nearly horizontal, inclined above the horizontal, or erect).

6 Ovary flask-shaped, broadest near the base, usually white to pinkish (sometimes darker); petals usually white to creamy white (maroon forma occasional)

7 Stamens about as long as the ovary or slightly longer; filaments short, ca. 1/3 the length of the anthers or shorter; filaments ½ as long as the ovary or shorter; pollen creamy to pale yellow; filaments and anthers white, the anthers at least in part somewhat appressed against the ovary.....***T. flexipes***

7 Stamens far exceeding ovary height; filaments ca. ½ the length of the anthers; pollen creamy, yellow, or pale grayish purple; anthers and filaments also variable in color, mostly white, occasionally purplish; anthers mostly longer than the ovary and not appressed against it.....***T. species 2***

6 Ovary globose, widest near the middle, black to purplish black; petals white, maroon, yellowish, or otherwise.

8 Petals lanceolate to narrowly ovate or elliptic, spreading from base in the same plane as the sepals, rarely > 2× as broad as the sepals; sepals 0.5-0.8× as long as the pedicel, weakly sulcate-tipped (keeled and upturned near apex); flower fragrance unpleasant, musty.....***T. erectum***

8 Petals ovate, overlapping in some instances and forming a cup-shaped base, variably recurved apically, > 2× as broad as the sepals; sepals < 0.5 as long as the pedicel, sulcate-tipped; fragrance pleasant, sweet to fungal.

9 Sepals 0.4-0.7× as long as the pedicel; leaves broadly elliptic; stamens 1.2-1.8× pistil height; flowers generally large, petals much longer than the sepals; sepals green; petals usually white (rarely maroon); flower fragrance sweet, like green apples.....***T. simile***

9 Sepals 0.2-0.4× as long as the pedicel; leaves broadly obovate; stamens 0.9-1.6× pistil height; flowers relatively small, petals only slightly longer than the sepals; sepals suffused with purple; petals usually maroon (rarely white); flower fragrance fungal, like fresh mushrooms.....***T. sulcatum***

Key C – trilliums with unmottled leaves and pedicellate flowers, of various affinities

1 Petals white with triangular red blaze (rarely entirely white or pinkish); anther sacs lavender to white, dehiscence extrorse; fruit a red berry; leaves long-acuminate; [of acidic sites in the Mountains, generally strongly associated with either *Pinus, Tsuga, Picea, Rhododendron*, or other heaths].....***T. undulatum***

1 Petals white to deep pink, lacking a red blaze; anther sacs yellow, dehiscence introrse; fruit a white to greenish-white, fleshy, irregularly dehiscent capsule; leaves obtuse to acute (or somewhat acuminate in *T. grandiflorum*); [of less distinctly acidic sites, collectively widespread in our area].

2 Pedicel declined below the leaves (rarely erect); sepals arcuate-recurved; anthers irregularly twisted outward; pollen egg-yolk yellow.....

.....***T. catesbaei***

2 Pedicel inclined above leaves to strictly erect; sepals not arcuate-recurved; anthers erect, regular; pollen light yellow.
3 Sepals narrower than the petals, acute; anthers white to greenish-white between the anther sacs; leaves obtuse, acute, or acuminate; pedicel somewhat angled from the vertical.
4 Ovary obscurely 3-lobed; leaves < 5 cm long, blue-green, obtuse.....***T. nivale***
4 Ovary sharply 6-angled (-winged); leaves > 5 cm long, green, acute to acuminate.
5 Petals obovate, tightly rolled at base, abruptly flared near the apex; leaves broadly elliptic, acuminate; style minute, < 1.0 mm long .....***T. grandiflorum***
5 Petals elliptic, loose, gradually separating; leaves ovate, acute; style conspicuous, > 1.5 mm long.....***T. persistens***
3 Sepals about as broad as the petals or broader, obtuse; leaves obtuse; anthers purplish-green between anther sacs; pedicel erect through fruiting; [*Trillium pusillum* complex].
6 Leaves with stomates on the upper surface, appearing farinose; [of n. GA] .....***T. pusillum*** *var.* ***2 "georgianum"***
6 Leaves without stomates on the upper surface, appearing glabrous.
7 Pedicels < 10 (-12) mm long.
8 Pedicels (0-) 0.5-1 mm long; leaves (1.5-) 2.0-2.4 (-2.9) × as long as broad; leaves (14-) 15-20 (-22.5) mm wide; filaments (4.5-) 4.6-5.8 (-8) mm long; [of upland woods of Mountains of w. VA and e. WV].....***T. pusillum*** *var.* ***monticulum***
8 Pedicels (0.5-) 1-6.5 (-11) mm long; leaves (2.1-) 2.5-3.8 (-6) × as long as broad; leaves (6-) 10-17 (-25) mm wide; filaments (2.5-) 3-5 (6.5) mm long; [of wetland woods].
9 Anthers (3.2-) 4.5-6 (-7) mm long; stamens (5.7-) 8.4-10.9 (-12.5) mm long; stigmas (1-) 2.1-3 (-5) mm long; leaves elliptic; [of the outer Coastal Plain of e. MD, e. VA, and ne. NC] .....***T. pusillum*** *var.* ***5 "palustris"***
9 Anthers (2.5-) 2.7-4.8 (-6.8) mm long; stamens (5.7-) 6-9.2 (-13.2) mm long; stigmas (1-) 1.2-2.5 (-4.7) mm long; leaves ovate; [of the upper Coastal Plain and Piedmont of ne. NC, se. VA, and Mountains of sw. VA].
10 Pedicels (0.5-) 1-2.1 (-7) mm long; stamens (6-) 7.5-9.2 (-11) mm long; stigmas (1-) 2-2.5 (-4.7) mm long; [of upper Coastal Plain of e.VA].....***T. pusillum*** *var.* ***virginianum***
10 Pedicels (1.2-) 1.8-6.6 (-11) mm long; stamens (5.7-) 6-7.6 (-13.2) mm long; stigmas (1-) 1.2-2 (-2.5) mm long; [of Piedmont to edge of upper Coastal Plain of ne. NC].....***T. pusillum*** *var.* ***4 "carolinianum"***
7 Pedicels 10-56 mm long.
11 Leaves ascending; sepals ca. 1.4× as long as the petals; [of sphagnum bogs in the s. SC sandhills].....***T. pusillum*** *var.* ***3 "telmacola"***
11 Leaves horizontal to declining; sepals 0.9-1.1× as long as the petals.
12 Leaves narrower, (1.9-) 3-4.1 (-5.6)× as long as wide; pedicels (23-) 25-33 (-56) mm long; [of calcareous savannas and swamps].....***T. pusillum*** *var.* ***pusillum***
12 Leaves broader, (2-) 2.7-3.4 (-5.5)× as long as wide; pedicels (7-) 13-30 (-45) mm long.
13 Leaves ovate, acute; sepals (14-) 22-30 (-41) long, (4-) 6-11 (-17) mm wide, (2-) 3-4.3 (-5.6)× as long as wide; [generally of upland rocky slopes].....***T. pusillum*** *var.* ***ozarkanum***
13 Leaves elliptic, rounded; sepals (13-) 18-25 (-30) long, (4-) 6-8 (-12) mm wide, (1.8-) 2.7-3.1 (-4)× as long as wide; [generally of swamps and floodplains] .....***T. pusillum*** *var.* ***1 "alabamicum"***

Trillium catesbaei Elliott, Catesby's Trillium, Bashful Trillium, Rosy Wake-robin. Bottomland forests, mesic slopes, cove forests. Late March-early June; July-August. Nc. NC south to sw. GA and se. AL, north in the interior to n. AL and se. TN, centered in the Piedmont from NC to GA, but extending into the Mountains and Coastal Plain. This species is morphologically and genetically complex and may include several semi-crypti taxa. Petals white to pink. [= RAB, FNA, K, S, V, W, X, Z]

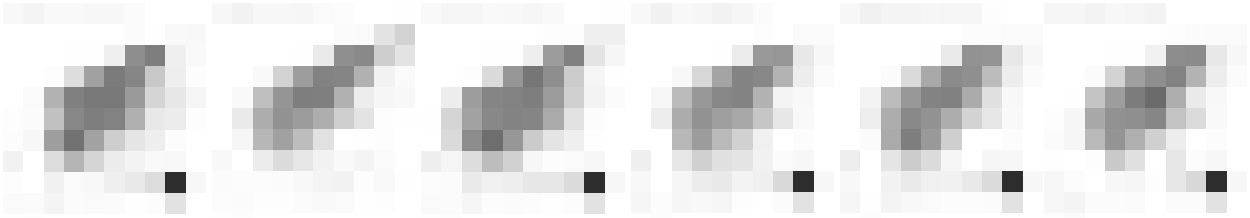
Trillium cernuum Linnaeus, Northern Nodding Trillium. Moist rich woods, seepage edges, damp forests with *Fraxinus nigra* and *Ulmus americana*. Late April-May. NL (Newfoundland), Hudson Bay area, and se. SK south to n. VA, ne. WV, n. IN, n. IL, n. IA, and SD. Petals white, pink, maroon, or green. [= FNA, K, W, WV, X, Z; < *T. cernuum* – RAB, F, S (apparently also including *T. rugelii*); > *T. cernuum* var. *cernuum* – C, G, Pa; >< *T. cernuum* var. *macranthum* A.J. Eames & Wiegand – C, G, Pa]

Trillium cuneatum Rafinesque, Sweet Betsy, Purple Toadshade, Large Toadshade, Wedge-petal Trillium, Bloody Butcher. In rich soils of cove forests, moist slopes, and bottomlands, usually over mafic or calcareous rocks, locally abundant. Mid March-April; late May-June. Centered in the Southern Appalachians (but is more abundant in adjacent physiographic provinces), extending north to the Highland Rim of KY, west to the Interior Low Plateau of TN, south to the Coastal Plain of MS and AL, and east to the Piedmont of GA, SC, and NC. Petals maroon, yellow, green, or various intermediate shades. [= C, FNA, K, Pa, V, W, X, Y, Z; = *T. cuneatum* var. *cuneatum* – RAB; > *T. cuneatum* – F; >< *T. viride* Beck – F, misapplied with respect to NC material; < *T. viride* var. *luteum* (Muhlenberg) Gleason – G, misapplied (also see *T. luteum*); > *T. hugeri* Small – S; >< *T. underwoodii* – S, misapplied]

Trillium decipiens J.D. Freeman, Chattahoochee Trillium, Deceptive Trillium. Moist forests. Late January-early April. FL Panhandle (Jackson and Walton counties) and sc. AL east to ec. GA, and in Abbeville Co. SC (L.L. Gaddy, pers. comm. 2009). It is similar to *T. underwoodii*. [= FNA, K, V, WH, X, Y, Z]

Trillium decumbens Harbison, Decumbent Trillium. Moist forests. Mid-March-April. Se. TN (Chester et al. 1993) south and west to nw. GA and nc. AL, and disjunct in Houston County, in central GA Coastal Plain; it should be sought in extreme sw. NC, an extremely "under-botanized" area. [= FNA, K, S, X, Y, Z]

Trillium discolor Wray ex Hooker, Pale Yellow Trillium, Pale Trillium, Small Yellow Toadshade. Rich cove and bluff forests, restricted to the Savannah River drainage; rare. Late March-early May; June-July. Endemic to the Savannah River drainage of nw. SC, ne. GA, and sw. NC, occurring in the Blue Ridge and Piedmont. In NC it is restricted to a few sites along the Whitewater and Thompson Rivers. Petals pale yellow, with maroon or greenish claws. [= RAB, FNA, K, S, V, W, X, Y, Z]



Trillium erectum Linnaeus, Red Trillium, Purple Trillium, Stinking Willie, Stinking Benjamin, Wake-robin. Wooded slopes, usually at middle to high elevations. April-early June; July-August. NB, QC, and MI south to w. NC, nw. SC, n. GA, e. TN, IN, and se. WI. Petals maroon, white, yellow, green, or various intermediate shades. [= C, K, V, W, X, Z; < *T. erectum* var. *erectum* – RAB, WV (also see *T. sulcatum*); < *T. erectum* – F, G, S (also see *T. sulcatum*); > *T. erectum* var. *erectum* – FNA, Pa; > *T. erectum* var. *album* (Michaux) Pursh – FNA, Pa]

Trillium flexipes Rafinesque, Bent White Trillium. Moist coves over mafic or calcareous rocks. April. E. PA, s. ON and s. MN south to w. NC, nw. GA, n. AL, n. MS, mostly west of the Blue Ridge, but scattered in the Blue Ridge of NC, and disjunct east of the Blue Ridge in DE, PA, and MD. Petals white or maroon. [= C, F, FNA, K, Pa, V, W, X, Z; < *T. erectum* var. *vaseyi* – RAB; = *T. gleasoni* Fernald – G; = *T. declinatum* (A. Gray) Gleason – S, misapplied; = *T. erectum* var. *declinatum* – WV]

Trillium foetidissimum J.D. Freeman, Stinking Wake-robin. Bluffs, ravines, bottomlands. Late February-early April. MS west to LA. [= FNA, K, X, Y, Z; < *T. ludovicianum* Harbison – S]

Trillium grandiflorum (Michaux) Salisbury, Large-flowered Trillium, White Trillium, Great White Trillium. Rich coves and mesic slopes, also less typically on ridges over "rich" rock types. April-May; July-August. S. QC, s. ON, MI, and MN, south to NJ, c. NC, nw. SC, n. GA, n. AL, s. IL, and IA. Petals white to pink. [= RAB, C, F, FNA, G, K, Pa, S, V, W, WV, X, Z]

Trillium lancifolium Rafinesque, Lanceleaf Trillium, Narrowleaf Trillium. Rich forests over marble, limestone, and other calcareous substrates, floodplain forests. Late March-April. Se. TN south through w. GA and AL to Panhandle FL and se. AL. Petals purple, green, or greenish-purple. Material previously referred to this species from Kershaw County, SC represents the newly described *T. oostingii*. [= FNA, K, V, WH, Y, X, Z; = *T. lanceolatum* (S. Watson) Boykin ex Small – RAB, S]

Trillium ludovicianum Harbison, Louisiana Wake-robin. Floodplains, streambanks, ravine forests. Early March-April. MS west to LA. Reports of this species for AL are based on specimens of *Trillium species 3*. [= FNA, K, X, Y, Z; < *T. ludovicianum* – S]

Trillium luteum (Muhlenberg) Harbison, Yellow Trillium, Yellow Toadshade, Wax Trillium, Lemon-scented Trillium. Moist coves over mafic or calcareous rocks, locally abundant in the vicinity of the Great Smokies. Mid March-April; late May-June. Nearly endemic to the Southern Appalachians: w. NC, e. TN, nw. GA, and se. KY, allegedly disjunct in c. AL (planted and naturalized in Frederick County, VA); spread from cultivation elsewhere (as in MD and PA). Petals yellow. [= C, F, FNA, K, Pa, V, W, X, Y, Z; = *T. cuneatum* var. *luteum* (Muhlenberg) H.E. Ahles – RAB; < *T. viride* Beck var. *luteum* (Muhlenberg) Gleason – G (also see *T. cuneatum*); < *T. sessile* – S, misapplied]

Trillium maculatum Rafinesque, Mottled Trillium, Spotted Trillium. Rich forests and floodplains, over calcareous materials such as coquina limestone ("marl") or on shell middens. Early February-mid April. S. SC south to n. FL, west to sc. AL. Petals maroon or yellow. [= FNA, K, V, WH, X, Y, Z; < *T. viride* – RAB, misapplied; < *T. sessile* – S, misapplied]

Trillium nivale Riddell, Snow Trillium, Dwarf White Trillium. Rocky, calcareous forests. Early March-early April. MA, sw. PA, MI, WI, s. MN, and e. SD south to n. VA, KY, s. IN, s. IL, s. MO, and se. NE. Petals white to pink. [= C, F, FNA, G, K, Pa, WV, X, Z]

Trillium oostingii Gaddy, Wateree River Trillium. Rich bottomland forests. Somewhat similar to *T. lancifolium* and *T. recurvatum*. So far as is known, endemic to Kershaw and Richland counties, SC, along the Wateree River. With clawed, bicolored petals (the claw maroon and the blade green) and green sepals reflexed somewhat (in the same plane as the drooping leaves). See Gaddy (2008) for additional information. [previously misidentified as *T. lancifolium*]

Trillium persistens Duncan, Persistent Trillium. Acidic forests with hemlocks and heaths. April. Endemic to a short stretch of the Tallulah-Tugaloo river system in nw. SC and ne. GA. Petals white to pink. [= FNA, K, V, W, X, Z]

Trillium pusillum Michaux *var.* ***monticulum*** Bodkin & Reveal. Dry to dry-mesic forests and woodlands, moist forests along small mountain streams. Endemic to nw. VA, e. WV, and w. MD. NC. Var. *monticulum* Bodkin & Reveal has been controversial; see Cabe (1995) and Cabe & Werth (1995) for additional discussion of variation within *T. pusillum* in Virginia and elsewhere. Petals white to pink. [< *T. pusillum* – Z; < *T. pusillum* var. *virginianum* – C, K; < *T. pusillum* var. *pusillum* – FNA; = *T. pusillum* var. *monticola* Bodkin & Reveal – X, orthographic error; = *T. monticola* in prep.]

Trillium pusillum Michaux *var.* ***ozarkanum*** (Palmer & Steyermark) Steyermark. Dry to dry-mesic slopes, in NC under *Quercus coccinea* and *Kalmia latifolia*. Centered in the Ozarks of sw. MO, nw. AR, and e. OK; disjunct eastward at scattered localities in sc. KY, nc. TN, sw. NC, and s. MS. Petals white to pink. [= K, X; < *T. pusillum* – RAB, G, S, Z; < *T. pusillum* var. *pusillum* – FNA; **= *T. ozarkanum*** Palmer & Steyermark]

Trillium pusillum Michaux *var.* ***pusillum***, Carolina Least Trillium, Carolina Dwarf Trillium. Ecotones of calcareous savannas and swamp forests in the lower Coastal Plain. Late March-May; June-July. Endemic to the outer Coastal Plain of e. NC and e. SC. *T. pusillum* is somewhat reminiscent of a tiny *T. grandiflorum*. The *T. pusillum* complex has a wide but very fragmented range, involving most of the Southeastern states. In addition to the taxa treated here, the complex includes *T. texanum* Buckley (of e. TX). The *Trillium pusillum* complex is currently undergoing study by Susan Farmer (Univ. of Tennessee); preliminary analysis shows that the published varieties are "good" and that the recognition of additional taxa is warranted. Petals white to pink. [= X; < *T. pusillum* var. *pusillum* – C, F, FNA, K; < *T. pusillum* – RAB, G, S, Z; **= *T. pusillum*** (sensu stricto)]

Trillium pusillum Michaux *var.* ***virginianum*** Fernald, Virginia Least Trillium, Virginia Dwarf Trillium. Bottomland forests along small streams in the upper Coastal Plain, swamps and bottomland forests, also mesic beech islands in swamp forests. Late March-May; June-July. Var. *virginianum* occurs in the Coastal Plain of se. VA. Petals white to pink. [= F, FNA, X ; < *T. pusillum* – RAB, G, S, Z; < *T. pusillum* var. *virginianum* – C, K (also see var. *monticulum*); **= *T. virginianum*** (Fernald) C.F. Reed]

Trillium pusillum Michaux *var.* ***1***, Alabama Least Trillium. Swamps and floodplains. C. TN south to n. AL. Petals white to pink. Under study by Susan Farmer. [< *T. pusillum* var. *pusillum* – C, F, FNA, K; < *T. pusillum* – G, S, Z; = *T. pusillum* var. *alabamicum* – X (nomen nudum); = *T. alabamicum* in prep.]

Trillium pusillum Michaux *var.* ***2***, Georgia Least Trillium. Hardwood flatwoods. Endemic to n. GA. Apparently most closely related to *Trillium texanum*. Petals white to pink. Under study by Susan Farmer. [< *T. pusillum* – V; = *T. georgianum* in prep.]

Trillium pusillum Michaux *var.* ***3***, Aiken Least Trillium. Seepage bogs. Endemic to sc. SC. Petals white to pink. Under study by Susan Farmer. [< *T. pusillum*; = *T. telmacola* in prep.]

Trillium pusillum Michaux *var.* ***4***, Carolina Least Trillium. Swampy forests, bottomland forests along small streams in the upper Coastal Plain. E. NC (upper Coastal Plain and adjacent Piedmont) , moist mafic areas in Grayson Co. VA. The Grayson County site is within a kilometer of the Alleghany County, NC border, and the plant may be found to also occur in nw. NC. Petals white to pink. Under study by Susan Farmer. [< *T. pusillum*; = *T. carolinianum* in prep.]

Trillium pusillum Michaux *var.* ***5***, Dismal Swamp Least Trillium. Swampy forests. E. MD south to ne. NC. Petals white to pink. Under study by Susan Farmer. [< *T. pusillum*; = *T. palustris* in prep.]

Trillium recurvatum Beck, Prairie Trillium, Prairie Wake-robin. Rich soils of cove over calcareous rock. W. OH west to s. MI, s. WI, and e. IA, south to c. TN, c. AL, c. MS, n. LA, and e. TX; disjunct in the Cumberland Plateau of e. TN, e. KY, and the Blue Ridge and w. Piedmont of NC. The two known NC occurrences (Catawba and Madison counties) appear to be native. Petals maroon or yellow. [= C, F, FNA, G, K, Pa, S, X, Y, Z]

Trillium reliquum J.D. Freeman, Relict Trillium. Rich forests on bluffs and ravine slopes. Mid March-late April. Known from two disjunct areas, along the Savannah River in the vicinity of Augusta, on the border of SC (Aiken County) and GA (Richmond counties), and along the Chattahootchee River in sw. GA (Clay and Early counties). [= FNA, K, V, X, Y, Z]

Trillium rugelii Rendle, Southern Nodding Trillium. Rich woodlands and forests over mafic or calcareous rocks. April-early May. W. NC and e. TN south to c. GA, and c. AL. Petals white or maroon. [= FNA, K, V, W, X, Z; < *T. cernuum* – RAB, F, S; < *T. cernuum* var. *macranthum* A.J. Eames & Wiegand – C, G]

Trillium sessile Linnaeus, Sessile Trillium, Sessile Toadshade, Toad Trillium. Rich forests, in NC limited to very rich soils of natural levees and lower slopes along the Roanoke River. March-April. Primarily a species of the northern Midwest, *T. sessile* ranges from MD, w. PA, w. NY, s. MI, n. IL and n. MO, south to e. VA, ne. NC, c. TN, n. AL, and n. AR. The

easternmost occurrences are disjunct populations east of the Blue Ridge, in MD, VA, and along the Roanoke River in ne. NC. Petals maroon or green. [= C, F, FNA, G, K, Pa, W, WV, X, Y, Z]

Trillium simile Gleason, Sweet White Trillium. Very rich soils of slopes and coves over mafic or calcareous rocks, often also in or near seepage. Late March-early May; June-July. A Southern Appalachian endemic: Blue Ridge of w. NC, nw. SC, e. TN, and n. GA. Petals white or very rarely maroon. [= FNA, K, S, V, W, X, Z; < *T. erectum* var. *vaseyi* – RAB]

Trillium species 2, Amicalola Trillium. Rich forests. Under study by Tom Patrick, Tom Govus, and Susan Farmer. Also recently found in SC. [= "Amicalola Trillium" – V]

Trillium species 3, Lookout Mountain Trillium. Rich forests. Endemic to the Lookout Mountain region of nw. GA, se. TN, and ne. AL. Resembles *T. ludovicianum*. Under study by Susan Farmer. [< *T. ludovicianum* – V; "*T. freemanii*"] {not yet keyed}

Trillium species 4. Endemic to Hamblen and Greene counties, TN. Similar to *T. oostingii* (D. Estes, pers. comm. 2012). {not yet keyed}

Trillium stamineum Harbison, Twisted Trillium. Floodplains, slopes, especially over limestone. Late March-mid May. C. TN (Chester et al. 1993) south to c. AL and e. MS. [= FNA, K, S, X, Y, Z]

Trillium sulcatum T. Patrick, Southern Red Trillium, Barksdale's Trillium. Coves and moist slopes. April-May. Primarily a species of the sedimentary rock Appalachians, *T. sulcatum* ranges from s. WV, sw. VA, and e. KY south to nw. NC (where it enters the Blue Ridge), w. TN, nw. GA, and ne. AL. This species seems quite distinctive for its small, generally maroon flowers (with strongly sulcate sepals purplish as well), borne on very long pedicels. Petals maroon or white. [= C, FNA, K, V, W, X, Z; < *T. erectum* var. *erectum* – RAB, WV; < *T. erectum* – F, G, S]

Trillium underwoodii Small, Underwood's Trillium. Moist forests. Late February-mid April. N. FL north to wc. GA and c. and s. AL. The only erect trillium with the stems typically < 2× as long as the leaves (though sometimes elongating later in the season). [= FNA, K, S, V, WH, X, Y, Z]

Trillium undulatum Willdenow, Painted Trillium, Striped Wake-robin. Acidic soils of ridges, slopes, and bog margins, mostly at high elevations and often associated with *Rhododendron*, *Tsuga*, *Pinus*, or *Picea*. Late April-May; late July-August. NB, e. QC, s. ON, and MI, south to w. NC, nw. SC, n. GA, e. TN, and ne. OH. Of all our species, this is the species best adapted to acidic soils. The leaves are distintly petiolate, often ca. 1 cm long, and the leaves have a blue-green cast; populations often have a large number of "monilliums" – 1-leaved juvenile plants. Petals white with a red blaze. [= RAB, C, F, FNA, G, K, Pa, S, V, W, WV, X, Z]

Trillium vaseyi Harbison, Sweet Trillium, Vasey's Trillium, Sweet Beth. Cove forests, other rich forests. Late April-early June. This species is a Southern Appalachian endemic: w. NC and e. TN south to nw. SC, n. GA, and ne. AL, but exteniding south into the Coastal Plain of GA and AL. Perhaps the largest trillium species, with the stems to 7 dm tall. Petals maroon or white. [= FNA, K, S, V, W, X, Z; < *T. erectum* var. *vaseyi* (Harbison) H.E. Ahles – RAB (also see *T. simile* and *T. flexipes*)]

53b. XEROPHYLLACEAE Takhtajan 1994 (Beargrass Family) [in LILIALES]

A family of a single genus and 2 species, perennial herbs, of e. and nw. North America. References: Dahlgren, Clifford, & Yeo (1985); Zomlefer (1997a)=Z; Zomlefer (1996, 2003); Tamura in Kubitzki (1998a); Zomlefer et al. (2001).

Xerophyllum Michaux 1803 (Turkeybeard, Beargrass)

A genus of 2 species, rather woody herbs of temperate North America. The other species in the genus is the western beargrass, *X. tenax* (Pursh) Nuttall, widely distributed in the western Cordillera. References: Zomlefer (1997)=Z; Utech in FNA (2002a); Tamura in Kubitzki (1998a).

Xerophyllum asphodeloides (Linnaeus) Nuttall, Turkeybeard, Beargrass, Mountain-asphodel. Dry ridges and slopes in the mountains, primarily in dry, strongly acidic sites which burn periodically, such as pine/heath woodlands and forests, heath balds, and xeric oak forests, most of the populations in the Blue Ridge Escarpment, often associated with *Pinus rigida* or *P. pungens*, disjunct to similar sites on quartzite monadnocks of the upper Piedmont, in the Coastal Plain in acidic pinelands. May-June; July-August. In two disjunct areas; the Coastal Plain of s. NJ and DE, and the Southern Appalachians from w. VA and e. WV south to e. TN, w. NC, nw. SC, and ne. GA. Sterile plants resemble tussocks of a bunchgrass, but the leaf bases are white and flattened and are obviously not those of a grass. The leaves remain green throughout the winter. [= RAB, C, F, FNA, G, K, W, WV, Z]

53c. HELONIADACEAE J. Agardh 1858 (Swamp-pink Family) [in LILIALES]

A family of 3 genera and 15 species, perennial herbs, of e. North America and e. Asia. References: Dahlgren, Clifford, & Yeo (1985); Zomlefer (1997a)=Z; Zomlefer (1996, 2003); Tamura in Kubitzki (1998a); Zomlefer et al. (2001).

1 Flowers white to cream; plants dioecious (individual flowers either male or female).....***Chamaelirium***
1 Flowers pink; plants hermaphroditic (individual flowers bisexual) .....***Helonias***

Chamaelirium Willdenow 1808 (Devil's-bit)

A monotypic genus, an herb of temperate e. North America. Perhaps better placed in the segregate family Chionographidaceae. References: Zomlefer (1997a)=Z; Tamura in Kubitzki (1998a); Utech in FNA (2002a).

Chamaelirium luteum (Linnaeus) A. Gray, Devil's-bit. Moist slopes, bottomlands, wet savannas. March-May; September-November. MA west to ON, OH, s. IN, and AR, south to FL and LA. The ecological amplitude and morphologic variability of this species is surprising; it needs additional, more careful, study. *C. obovale* Small (or other previously unnamed entities) may warrant recognition at some level. [= RAB, C, F, FNA, G, GW, K, Pa, W, WH, Z; > *C. luteum* – S; > *C. obovale* Small – S]

Helonias Linnaeus 1753 (Swamp Pink)

A monotypic genus, an herb of temperate e. North America. Although *Helonias* has traditionally been considered a monotypic genus, Takahashi & Kawano (1989) have suggested that the closely related *Heloniopsis* and *Ypsilandra* (both of e. Asia) may be congeneric. References: Zomlefer (1997a)=Z; Utech in FNA (2002a); Tamura in Kubitzki (1998a).

Helonias bullata Linnaeus, Swamp Pink. Bogs, usually under dense shrubs in peaty soils, in the VA Coastal Plain in acidic sandy seepage swamps. April-May; June-July. S. NY and NJ to e. VA on the Coastal Plain, and from w. VA through w. NC to nw. SC and ne. GA (Jones & Coile 1988) in the Blue Ridge Mountains. The flowering scape elongates markedly in fruit, reaching 1 m in height. [= RAB, C, F, FNA, GW, G, K, S, W, Z]

53d. MELANTHIACEAE Batsch 1802 (Bunchflower Family) [in LILIALES]

A family of about 8 genera and 80 species, mostly temperate and northern hemisphere, but extending into South America (Peru). References: Dahlgren, Clifford, & Yeo (1985); Zomlefer (1997a)=Z; Zomlefer (1996, 2003); Tamura in Kubitzki (1998a); Tamura et al. (2004); Zomlefer et al. (2001).

1 Leaves 3, whorled at the summit of the stem; flowers 1 per plant, solitary and terminal.....**[**see ***TRILLIACEAE*****]**
1 Leaves many, not whorled at the summit of the stem; flowers many per plant, in spikes, racemes, or panicles.
  2 Leaves 1-2 mm wide, linear, stiff, sclerified .....**[**see ***XEROPHYLLACEAE*****]**
  2 Leaves 3-150 mm wide, linear, obovate, or oblanceolate, not notably stiff.
    3 Main (basal) leaves obovate or oblanceolate, the main secondary veins diverging individually (at angles of < 10°) from the midvein in the lower half of the expanded blade and rejoining at the apex; flowers pink, white or cream .....**[**see ***HELONIADACEAE*****]**
    3 Main (basal) leaves linear, elliptic, or obovate, the main veins parallel, all diverging at the base of the leaf and rejoining at the apex; flowers white, cream, yellowish, greenish, or brownish.
      4 Inflorescence a spike or raceme.
        5 Inflorescence a spike.....***Schoenocaulon***
        5 Inflorescence a raceme.
          6 Basal leaves 4-many, (4-) 7-10 (-23) mm wide; basal leaves enclosed by a basal purple (bladeless) sheath 3-8 cm long; capsule suborbicular, 5-7 mm long, 5-7 mm wide; bulb broadly ovoid; [widespread in our area, inclusding Coastal Plain pine savannas].....***Amianthium muscitoxicum***
          6 Basal leaves 1-3, 2-6 (-10) mm wide; basal leaves not enclosed by a basal sheath (all basal leaves with blades); capsule conical, 7-9 mm long, 3-4 mm wide; bulb cylindrical; [of Coastal Plain pine savannas and similar habitats].....***Stenanthium densum***
      4 Inflorescence a panicle.
        7 Inflorescence axes scurfy-pubescent; seeds winged; leaves **either** linear **or** broader, < 14 cm wide .....***Veratrum***

7 Inflorescence axes glabrous; seeds not winged (though sometimes angled); leaves linear, < 2 cm wide.
8 Leaves strongly keeled, (5-) 10-20 mm wide; plant colonial, from thick, hard, horizontal, short-creeping rhizomes covered with fibrous old leaf bases; inner tepals (petals) 7-17 mm long, distinctly clawed, acute-acuminate at the tip, bearing 2 glands well above the base ..... ***Zigadenus***
8 Leaves slightly or not at all keeled, 2-12 mm wide; plant solitary, from a bulbous or semibulbous base; inner tepals (petals) 3-6 or 7-12 mm long, clawed or not, bearing either a single (sometimes obscure to essentially invisible) gland near the base or a bilobed gland well above the base.
9 Inner tepals (petals) 7-12 mm long, clawed, with a single bilobed gland borne well above the base; [of calcareous habitats in the Mountains] ..... ***Anticlea***
9 Inner tepals 3-10 mm long, not clawed, with a single, unlobed gland borne near the base (this often difficult or impossible to see, consisting only of a greenish line at the very base of the tepal); [of acid habitats of the Mountains, Piedmont, and Coastal Plain] ..... ***Stenanthium***

Amianthium A. Gray 1837 (Fly-poison)

A monotypic genus, an herb of temperate e. North America. Zomlefer et al. (2001) confirm that *Amianthium* should be treated as a monotypic genus. *Amianthium* has a chromosome number of 2n=32 (Zomlefer & Smith 2002). Like other members of the family, it produces very toxic alkaloids. References: Zomlefer (1997a)=Z; Zomlefer & Judd (2002)=Y; Utech in FNA (2002a); Tamura in Kubitzki (1998a).

Amianthium muscitoxicum (Walter) A. Gray, Fly-poison. Mesic forests, pine savannas, meadows, from 5 to at least 1600m in elevation. May-July; July-September. S. NY, PA, MO, and OK, south to Panhandle FL, MS, and AR. [= FNA, K, Y; = *A. muscaetoxicum* – RAB, C, F, G, GW, Pa, W, WH, orthographic variant; = *Chrosperma muscaetoxicum* (Walter) Kuntze – S; = *Zigadenus muscitoxicus* (Walter) Regel – Z]

Anticlea Kunth 1843 (Death-camas)

A genus of about 15 species, of North America south to Guatemala, and e. Asia. *Anticlea* has a chromosome number of 2n=32 (Zomlefer & Smith 2002). References: Zomlefer (1997a)=Z; Zomlefer & Judd (2002)=Y; Zomlefer et al. (2001); Schwartz in FNA (2002a).

Anticlea glauca Kunth, White Death-camas. Limestone and dolostone woodlands, glades, cliffs, and outcrops. July-August; September-October. *A. glauca* is the more eastern component of a complex variously treated as two species or a single variable species, with or without recognized varieties or subspecies. *A. elegans* (in the broadest sense) ranges from QC and NY west to AK, south to n. OH, n. IN, n. IL, MO, IA, NM, AZ, and n. Mexico; disjunct in the mountains of w. VA, e. WV, and w. NC. Two taxa have often been recognized, at the specific, subspecific, or varietal level. The more eastern taxon (epithet "*glauca*" – see synonymy below) ranges from NB west to ND, south to w. NC, TN, and MO, and is distinguished by glaucous foliage, paniculate inflorescence, and tepals often purplish or brownish basally. The more western taxon (epithet "*elegans*"), occurring east to the MN and MO, has the foliage greener, the inflorescence often only racemose, and the tepals yellow. [< *Anticlea elegans* (Pursh) Rydberg – Y; = *Zigadenus elegans* Pursh ssp. *glaucus* (Nuttall) Hultén – K; = *Zigadenus glaucus* Nuttall – RAB, F, Pa, W, Z; = *Zigadenus elegans* var. *glaucus* (Nuttall) Preece – C; < *Zigadenus elegans* – FNA; = *Zygadenus glaucus* – G; < *Anticlea chlorantha* (Richardson) Rydberg – S, misapplied; = *A. elegans* ssp. *glauca* (Nuttall) A. Haines; = *A. elegans* var. *glauca* (Nuttall) Zomlefer & Judd]

Schoenocaulon A. Gray 1837 (Feathershank)

A genus of about 24 species of s. North America, Central America, and n. South America. *Schoenocaulon* has a chromosome number of 2n=16 (Zomlefer & Smith 2002). References: Zomlefer et al. (2006)=Z; Zomlefer (1997a); Tamura in Kubitzki (1998a); Frame in FNA (2002a).

Schoenocaulon dubium (Michaux) Small, Florida Feathershank. Dry pine savannas, sandhills, scrub. S. GA and n. peninsular FL south to s. peninsular FL. [= FNA, K, S, WH, Z]

Stenanthium (A. Gray) Kunth 1843 (Featherbells, Featherfleece)

A genus of about 4 species, herbs of e. North America. *Stenanthium*, as redefined by Zomlefer & Judd (2002), has a chromosome number of 2n=20, excludes a w. North American and an e. Asian species previously included, and includes some taxa formerly placed in *Zigadenus* (Zomlefer & Smith 2002). References: Zomlefer & Judd (2002)=Y; Zomlefer (1997a)=Z; Wofford

(2006); Utech in FNA (2002a); Schwartz in FNA (2002a); Tamura in Kubitzki (1998a). Key adapted in part from F, the taxa and key needing further evaluation and (probably) alteration.

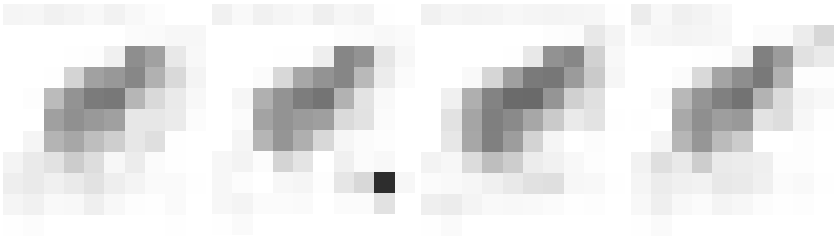
1 Tepals obovate, the tip rounded-obtuse.
  2 Inflorescence a raceme; flowers all bisexual; plants 3-10 dm tall; flowering April-early June; [of the Coastal Plain (in our area)] ..... ***S. densum***
  2 Inflorescence a panicle of racemes; lower flowers of the inflorescence branches bisexual and fertile, the upper staminate or appearing bisexual, but the pistils nonfunctional (not producing fruits); plants 4-20 dm tall; flowering July-August; [of the Mountains of NC and VA and Coastal Plain of GA westward to LA] ..... ***S. leimanthoides***
1 Tepals lanceolate, the tip acute-acuminate.
  3 Inflorescence a diffuse panicle up to 3 dm wide, the terminal racemose portion reduced or absent; flowers on mid-portion of lateral branches with pedicels 1.6-4 mm long, spaced 8-15 mm apart; uppermost non-bracteal stem leaf 4-14 cm above ground level; flowering mid September-mid October; [of sandstone rockhouses of the Cumberland Plateau] ..... ***S. diffusum***
  3 Inflorescence branched but not diffuse, typically up to 1.5 dm wide, the terminal racemose portion present and up to 3 dm long; flowers on mid-portion of lateral branches with pedicels 0.3-1.1 mm long, generally spaced 3-7 mm apart; uppermost non-bracteal stem leaf 22-66 cm above ground level; flowering May-late August; [of various wet to dry habitats, widespread in our area] ..... ***S. gramineum***

Stenanthium densum (Desrousseaux) Zomlefer & Judd, Crow-poison. Pine savannas, pine flatwoods. April-early June; late May-July. Se. VA south to c. peninsular FL and west to se. TX, on the Coastal Plain. See *Z. leimanthoides* for discussion of the taxonomy of the 2 species. See generic key for separation of the superficially similar and often mistaken *S. densum* and *Amianthium muscitoxicum*. [= Y; = *Zigadenus densus* (Desrousseaux) Fernald – RAB, C, GW, K, Z; < *Zigadenus densus* (Desrousseaux) Fernald – FNA, WH (also including *S. leimanthoides*); = *Zygadenus densus* – G (an orthographic variant); = *Tracyanthus angustifolius* (Michaux) Small – S]

Stenanthium diffusum Wofford, Rockhouse Featherbells. Sandstone rockhouses. Mid-September-mid-October. Endemic to the Cumberland Plateau of ne. TN (known from Fentress, Morgan, Pickett, Scott counties). See Wofford (2006).

Stenanthium gramineum (Ker-Gawler) Morong, Featherbells. Moist to dry forests and woodlands, grassy balds, serpentine barrens, wet meadows and acidic fens, to at least 1700 m in elevation. July-early September; August-October. PA west to IL and MO, south to ne. NC, Panhandle FL, and TX. Varieties or species have sometimes been delineated within *S. gramineum*, but the characters are variable and overlapping, and the putative taxa have broadly overlapping distributions. [= C, FNA, G, Pa, RAB, W, WH, Z; > *S. gramineum* var. *gramineum*– F, K, WV; > *Stenanthium gramineum* (Ker-Gawler) Morong var. *micranthum* Fernald – F, K; > *Stenanthium gramineum* (Ker-Gawler) Morong var. *robustum* (S. Watson) Fernald – F, K, WV; > *S. gramineum* – S; > *S. robustum* S. Watson – S]

Stenanthium leimanthoides (A. Gray) Zomlefer & Judd, Pinebarrens Death-camas. High elevation rock outcrops, shrub balds, seepage areas at high elevations, in the Coastal Plain in sandhill bogs and wet pine savannas. July-August; September-October. As currently interpreted, with a peculiar and disjunct range, occurring on the Coastal Plain of se. NY (Long Island), NJ, and DE, in the mountains from WV and VA south through w. NC to (allegedly) AL, and on the Gulf Coastal Plain, from s. GA to LA. Unpublished studies involving (primarily) Gulf Coast populations of *S. leimanthoides* have questioned its distinctness from *S. densum*. Our plants seem very distinct in many ways. Perhaps inflorescence characters do not reliably distinguish the two taxa and so-called *S. leimanthoides* of the Gulf Coast is a paniculate form of *Z. densus* (the real distinguishing characters not at present clear). *S. leimanthoides* in the east follows much the same phytogeographic patterns as *Kalmia buxifolia* and *Xerophyllum asphodeloides*; the 3 species occurring together in the Pine Barrens of the s. NJ Coastal Plain and at 1900 m elevation on the summit of Grandfather Mountain, Avery County, NC! [= Y; = *Zigadenus leimanthoides* A. Gray – RAB, C, F, GW, K, W, WV, Z; < *Zigadenus densus* (Desrousseaux) Fernald – FNA, WH; = *Zygadenus leimanthoides* – G (an orthographic variant); = *Oceanoros leimanthoides* (A. Gray) Small – S]



Veratrum Linnaeus 1753 (White-hellebore)

A genus of about 30-55 species, herbs of temperate Northern Hemisphere. *Veratrum* is here interpreted broadly, including *Melanthium*, following the molecular phylogeny work of Zomlefer et al. (2003). A proposal to conserve the name *Veratrum* against *Melanthium* has been made but not yet ruled on (Zomlefer, Judd, & Gandhi 2010). References: Zomlefer (1997)=Z; Zomlefer (2012)=Y; McNeal & Shaw in FNA (2002a); Bodkin & Utech in FNA (2002a); Tamura in Kubitzki (1998a); Zomlefer et al. (2003).

1 Leaves all linear, 1-2 (-3) cm wide; tepals greenish white to creamy white (sometimes fading brownish); [section *Fuscoveratrum*] ..... ***V. virginicum***
1 Leaves (at least the basal) oblanceolate to obovate or elliptic, 3-15 cm wide (the upper leaves sometimes linear); tepals yellowish green, green, or maroon.
  2 Leaves strongly plicate, 6-15 cm wide; tepals pubescent, 8-13 mm long, 3-5 mm wide, with a conspicuous pair of glands near the base of the tepal blade (these sometimes more or less fused); filament free from the tepals; [section *Veratrum*] ..... ***V. viride***

2 Leaves not at all to slightly plicate, 3-14 cm wide; tepals glabrous, 4-9 mm long, 1-3 mm wide (3-5 mm wide in *V. latifolium*), with either conspicuous (*V. latifolium*) or diffuse (*V. parviflorum* and *V. woodii*) glands; filament fused to the basal claw of the tepal; [section *Fuscoveratrum*].
3 Tepals 3-5 mm wide, the blade of the tepal abruptly narrowed to a claw, the blade nearly as wide as long, with undulate margins, and 2 conspicuous succulent glands; leaves 1-7 cm wide ..... ***V. hybridum***
3 Tepals 1-3 mm wide, the blade gradually narrowed to the base, the blade much longer than wide, with entire margins, and with diffuse glandular areas; leaves 3-12.5 cm wide.
4 Tepals pale to olive green, 4-7 mm long; ovaries glabrous; leaves 4.5-14 cm wide; [common, of the Mountains in our area] ..... ***V. parviflorum***
4 Tepals dark maroon, 6-9 mm long; ovaries densely pubescent; leaves 3-10 cm wide; [rare disjunct in our area] ..... ***V. woodii***

Veratrum hybridum (Walter) Zimmerman ex Zomlefer, Crisped Bunchflower. Moist to dry forests. July-August; September-October. An Appalachian endemic: CT south to NC, SC, and n. GA. See Ward 2010 and Zomlefer 2012 for discussion of the nomenclatural issues. [= Y; = *Veratrum latifolium* (Desrousseaux) Zomlefer – Pa, Z; = *Melanthium hybridum* Walter – RAB, C, F, G, W, WV; = *Melanthium latifolium* Desrousseaux – FNA, K, S]

Veratrum parviflorum Michaux, Mountain Bunchflower. Moist to rather dry forests, up to at least 1700 meters. July-early September; August-October. A Southern Appalachian endemic: e. and sc. WV and KY south to VA, w. NC, e. TN, n. GA, and n. AL. [= RAB, C, G, W, S, Z; = *Melanthium parviflorum* (Michaux) S. Watson – F, FNA, K, WV]

Veratrum virginicum (Linnaeus) Aiton, Bog Bunchflower, Virginia Bunchflower. Savannas, bogs, seepage bogs, wet forests. June-August; August-October. S. NY, PA, OH, IN, IL, and IA south to c. peninsular FL and e. TX. This species is superficially quite similar to *Zigadenus glaberrimus*, which, in addition to characters given in the family key, has the stem glabrous (vs. pubescent in *M. virginicum*). [= Pa, WH, Z; = *Melanthium virginicum* Linnaeus – RAB, C, F, FNA, G, GW, K, W, WV; > *Melanthium dispersum* Small – S; > *Melanthium virginicum* – S]

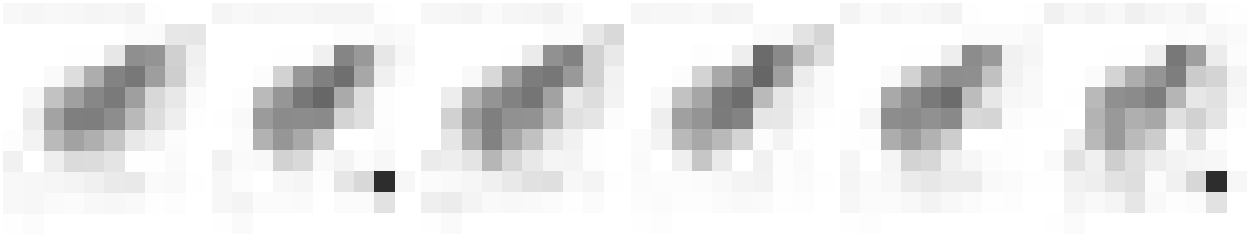
Veratrum viride Aiton, White-hellebore, Indian Poke, Green Hellebore, Cornhusk Lily. Seeps, streambanks, wet boulderfields. June-August; July-September. QC and ON south in the mountains to NC, TN, and ne. GA. The closely related *V. eschscholtzii* A. Gray, sometimes treated as *V. viride* ssp. *eschscholtzii* (A. Gray) A. & D. Löve or *V. viride* var. *eschscholtzii* (A. Gray) Breitung, is western, ranging from AK to OR. This plant is strongly poisonous; an insecticide was formerly manufactured from the roots. [= RAB, C, F, G, GW, Pa, S, W, WV, Z; < *V. viride* – K; = *V. viride* var. *viride* – FNA; = *V. viride* ssp. *viride*]

Veratrum woodii J.W. Robbins ex Wood, Ozark Bunchflower, Wood's False-hellebore. Circumneutral soil of woodlands over mafic rocks (such as amphibolite) or other calcareous substrates, hammocks. July; September. Primarily Ozarkian, but extending in scattered populations eastward as far as FL Panhandle (Gadsden and Liberty counties), sw. GA, nw. GA, sc. TN, nw. SC (Pickens County), and sw. NC (Polk County). [= C, F, G, Z; = *Melanthium woodii* (J.W. Robbins ex Wood) Bodkin – FNA, K; > *V. intermedium* Chapman – S]

Zigadenus Michaux 1803 (Death-camas)

As redefined, a monotypic genus of se. North America. A molecular systematics study by Zomlefer et al. (2001) gives strong support to a treatment recognizing *Zigadenus* as monotypic (*Zigadenus glaberrimus*), *Anticlea* (including for our area the former *Zigadenus elegans* ssp. *glaucus*), *Stenanthium* (including for our area *Stenanthium* spp. and the former *Zigadenus densus* and *Z. leimanthoides*). *Zigadenus* (as redefined) has a tentatively reported chromosome number of 2n=52 (Zomlefer & Smith 2002). References: Zomlefer (1997)=Z; Tamura in Kubitzki (1998a); Zomlefer et al. (2001); Schwartz in FNA (2002a). [also see *Anticlea*, *Stenanthium*]

Zigadenus glaberrimus Michaux, Large Death-camas, Snakeroot. Sandhill seepage bogs, pine savannas, pocosin edges. Late June-early September; August-November. Se. VA south to Panhandle FL, west to se. TX, on the Coastal Plain. [= RAB, C, F, FNA, GW, K, WH, Z; = *Zygadenus glaberrimus* – G, S (orthographic variant)]



55. ALSTROEMERIACEAE Dumortier 1829 (Peruvian-lily Family) [in LILIALES]

A family of 5 genera and about 170 species, perennial herbs, of Central and South America. References: Holmes in FNA (2002a).

Alstroemeria (Peruvian-lily, Alstroemeria)

A genus of about 60 species, perennials, of South America. References: Holmes in FNA (2002a).

* ***Alstroemeria pulchella*** Linnaeus f., Peruvian-lily, Parrot-lily. Disturbed areas, roadsides near plantings; native of Brazil. Naturalized in GA, FL, AL, MS, LA, and TX (Holmes in FNA 2002; Singhurst, Keith, & Holmes 2005). [= FNA, WH3]

56. COLCHICACEAE A.P. de Candolle 1805 (Meadow Saffron Family) [in LILIALES]

As here circumscribed, a family of about 15 genera and about 250 species, nearly cosmopolitan. References: Vinnersten & Manning (2007); Dahlgren, Clifford, & Yeo (1985); Nordenstam in Kubitzki (1998a).

1 Plant acaulescent, from a tunicated bulb; [tribe *Colchiceae*] ..... ***Colchicum***
1 Plant with leafy stem, from a rhizome or tuber.
  2 Tepals red or orange, reflexed; leaves attenuate into a tendril-like tip; [alien]; [tribe *Colchiceae*] ..... ***Gloriosa***
  2 Tepals yellow, not reflexed; leaves acute to obtuse; [native]; [tribe *Uvularieae*] ..... ***Uvularia***

Colchicum Linnaeus 1753 (Meadow Saffron)

A genus of about 100 species, of s. Europe, n. Africa, and w. and c. Asia, here circumscribed to include *Androcymbium*, following Vinnersten & Manning (2007). References: Vinnersten & Manning (2007); Nordenstam in Kubitzki (1998a).

* ***Colchicum autumnale*** Linnaeus, Meadow Saffron, Autumn-crocus. Planted as an ornamental, at least long-persistent; native of s. Europe. September-October. [= C, F, G, K]

Gloriosa Linnaeus 1753 (Flamelily)

A genus of about 5 species, perennials, native of Africa and Asia.

* ***Gloriosa superba*** Linnaeus, Flamelily, Glory-lily. Disturbed areas; native of tropical Africa. [= FNA, K, WH3]

Uvularia Linnaeus 1753 (Bellwort, Merrybells)

A genus of about 5 species, of temperate eastern North America. References: Wilbur (1963b)=Z; Uttal (1991)=Y; Utech & Kawano in FNA (2002a); Nordenstam in Kubitzki (1998a).

1 Leaves perfoliate, the margins scarious but smooth; upper stems terete in cross-section, hollow; [section *Uvularia*].
  2 Tepals glabrous within; leaves puberulent beneath (or rarely glabrate); leaves below the fork (0-) 1 (-2) ..... ***U. grandiflora***
  2 Tepals conspicuously granular-papillose within; leaves glabrous and often glaucous beneath; leaves below the fork 2-4..... ***U. perfoliata***
1 Leaves sessile, the margins scarious and minutely papillose-denticulate; upper stems angled in cross-section, solid; [section *Oakesiella*].
  3 Undivided portion of the style 0.5-1× as long as the style branches; upper stem and lower leaf surfaces puberulent to glabrous, light green; rhizome very short, with clustered, thickened roots ..... ***U. puberula***
  3 Undivided portion of the style 3-5× as long as the style branches; upper stem and lower leaf surfaces glabrous, usually also glaucous; rhizome elongate, with scattered, fibrous roots.
    4 Pedicel bearing a sessile, leaf-like bract 5-17 mm below the flower; capsule sessile at base, conspicuously beaked at apex ..... ***U. floridana***
    4 Pedicel bractless; capsule on a stalk 2-4 (-6) mm long, not beaked..... ***U. sessilifolia***

Uvularia floridana Chapman, Florida Bellwort. Alluvial forests, moist ravines. Mid March-early April. C. SC south to ne. FL, and Panhandle FL, west to c. MS, rare and local throughout its range. [= RAB, FNA, GW, K, WH3, Z; = *Oakesiella floridana* (Chapman) Small – S]

Uvularia grandiflora J.E. Smith, Large-flowered Bellwort. Cove forests and other moist, rich, forested sites. Mid April-mid May; July-August. S. QC west to ND, south to w. NC, w. SC, n. GA, c. AL, MS, c. AR, and e. OK. [= RAB, C, F, FNA, G, K, Pa, S, W, WV, Z]

Uvularia perfoliata Linnaeus, Perfoliate Bellwort. Moist to fairly dry hardwood forests. April-early May; June-August. S. NH, s. ON, and c. OH, south to Panhandle FL and LA. [= RAB, C, F, FNA, G, K, Pa, S, W, WH3, WV, Z]

Uvularia puberula Michaux, Carolina Bellwort, Appalachian Bellwort, Coastal Bellwort. Dry to moist upland, acidic forests, up to at least 1500m. Early April-Early May; August-October. Sometimes interpreted as having two varieties, the montane and Piedmont plants as var. *puberula* (leaves broader, rounded to slightly clasping at the base, firm in texture, obviously reticulate on the lower surface, the stem puberulent in lines on the ridges) and var. *nitida* (Britton) Fernald (leaves narrower, more cuneate, thin in texture, the reticulation of cross veins less evident, the stems glabrous); see Wilbur (1963b) and Uttal (1991). S. PA to GA in the Mountains and (more rarely) Piedmont, and from Long Island NY south to GA in the Coastal Plain and Sandhills. While Wilbur (1963b) chose not to recognize varieties, Uttal (1991) supports varietal recognition. The differences seem minor and variable, and poorly correlated with geography. [= FNA, K, W, Z; > *Uvularia puberula* Michaux var.

puberula –C, Y; > *Uvularia puberula* Michaux var. *nitida* (Britton) Fernald – C, Y; = *U. pudica* (Walter) Fernald – RAB, Pa, WV, nomen dubium; > *U. pudica* var. *pudica* – F, G; > *U. pudica* var. *nitida* (Britton) Fernald – F, G; = *Oakesiella puberula* (Michaux) Small – S; = *Uvularia caroliniana* (J.F. Gmelin) Wilbur]

Uvularia sessilifolia Linnaeus, Straw-lily, Wild-oats. Moist hardwood forests, on slopes and mainly in bottomlands. Late March-early May; August-October. NS west to ND, south to Panhandle FL and n. LA. [= RAB, C, F, FNA, K, Pa, W, WH3, WV, Z; = *Oakesiella sessilifolia* (Linnaeus) S. Watson – S]

59. SMILACACEAE Ventenat 1799 (Greenbriar Family) [in LILIALES]

A family of 3-12 genera and about 375 species, widespread in tropical, subtropical, and temperate regions. References: Holmes in FNA (2002a); Judd (1998); Conran in Kubitzki (1998a).

Smilax Linnaeus 1753 (Greenbriar, Carrionflower, Smilax)

A genus of about 300 species, woody vines and herbs, subcosmopolitan in temperate and tropical regions. Our deciduous species are a monophyletic group within *Smilax*, with a classic eastern North American - eastern Asian disjunction, and are treated as section *Nemexia* or subgenus *Luiste* (Wilbur 2004, Fu et al. 2005). *Smilax* berries and shoots provide important food sources for many wildlife species, including black bears (*Ursus americanus*). References: Mangaly (1968)=Z; Judd (1998)=Y; Holmes in FNA (2002a); Wilbur (2004); Fu et al. (2005); Duncan (1967); Godfrey (1988). Key for the woody species based in part on Godfrey (1988).

Identification notes: The carrionflowers or deciduous smilaxes (lead 1a) are sometimes mistaken for *Dioscorea* because of a superficial similarity. They can be readily distinguished even in vegetative condition by *Smilax* section *Nemexia* having 3 (-5) main veins, the 3 central rejoining at the leaf apex (vs. *Dioscorea* with 7-13 main veins), and secondary veins in a complex reticulate pattern (vs. *Dioscorea* with secondary veins forming simpler and largely perpendicular cross-connections between the primary veins).

1 Stem herbaceous, lacking prickles; ovules 2 per carpel; peduncles usually > 4 cm long; [section *Nemexia*].
- 2 Plants erect, 0.2-1.0 m tall, even when well-developed with < 20 leaves [note that immature or depauperate individuals (nonflowering) of *S. pseudochina*, *S. herbacea*, *S. lasioneura*, and *S. pulverulenta* often have this aspect]; tendrils absent or rudimentary; peduncles usually few (usually 1-4), the lowest often from bract axils.
  - 3 Leaves glabrous and glaucous beneath, thick in texture, base cordate, tip acute or acuminate; lowest peduncle from a leaf axil (very rarely from bract axils), upper peduncles from leaf axils; leaves 5-7, clustered together near the summit of the stem ..... ***S. biltmoreana***
  - 3 Leaves pubescent and green (or glaucous) beneath, usually thin in texture, base cordate, truncate, or rounded, tip acuminate, acute, or obtuse; lowest peduncles from axils of bracts below the lowest leaves, upper peduncles also often from bracts (the uppermost often from leaf axils); leaves either clustered together near the summit of the stem or well distributed.
    - 4 Leaves relatively many, (7-) 10-13 (-20), often well distributed in the upper half of the stem, notably reduced in size from lower to upper, mostly with the base cordate and the tip acuminate; berry 3-5 seeded..... ***S. ecirrata***
    - 4 Leaves few, usually 4-8, usually clustered together near the summit of the stem (rarely well distributed), about the same size, mostly with the base ovate (to subcordate), the tip acute to obtuse; berry 2-3 seeded..... ***S. hugeri***
- 2 Plants vine-like, climbing or sprawling, to 3 m tall, when well-developed with > 30 leaves [note that immature, nonflowering individuals may be much shorter and have fewer leaves]; tendrils present and numerous; peduncles usually many, from leaf axils.
  - 5 Leaf bases hastate, the leaf margins straight or concave in outline; longest fruiting pedicels < 2× as long as the fruit; anthers equaling or longer than the filaments; perianth 1.5-2.5 mm long; leaves glabrous and glaucous beneath..... ***S. pseudochina***
  - 5 Leaf bases cordate, the leaf margins convex in outline; longest fruiting pedicels 2× or more as long as the fruit; anthers shorter than the filaments; perianth 3.5-6 mm long; leaves either puberulent beneath (at least along the veins), or glabrous and glaucous beneath.
    - 6 Leaves glabrous and glaucous on the lower surface; fruit dark blue and glaucous; peduncles 5-8× as long as the subtending petioles... ..... ***S. herbacea***
    - 6 Leaves puberulent on the lower surface, at least on the veins; fruit dark blue and glaucous or black and not glaucous; peduncles 1-10× as long as the subtending petioles.
      - 7 Leaves bright green and shiny beneath; fruit black, not glaucous; peduncles 1-2 (-3)× as long as the subtending petioles..... ..... ***S. pulverulenta***
      - 7 Leaves pale green and dull below; fruit dark blue, glaucous; peduncles (3-) 5-10× as long as the subtending petioles .... ***S. lasioneura***

1 Stem woody, usually with prickles; ovules 1 per carpel; peduncles usually < 3 cm long; [section *China*].
- 8 Stems and petioles tomentose, lacking prickles; leaves densely tomentose beneath; berries red; plant trailing or ascending, rarely > 0.5 m tall (with determinate growth)..... ***S. pumila***
- 8 Stems and petioles stellate-scurfy or glabrous, generally with prickles; leaves glabrous or papillate beneath; berries red, black, or dark blue; plant climbing, ascending, or trailing, mature plants generally well over 0.5 m tall (with indeterminate growth).
  - 9 Lower surfaces of leaves strongly glaucous..... ***S. glauca***
  - 9 Lower surfaces of leaves green (rarely very slightly glaucous).
    - 10 Prickles of the stem abundant, thin and needle-like, shiny brown or black..... ***S. hispida***
    - 10 Prickles of the stem fewer, broad-based and awl-like or catclaw-like, green, brown, or black.

11 Midvein (as seen on the lower surface) much more pronounced than the principal lateral veins, which are scarcely raised; leaves evergreen, thick, coriaceous ..... ***S. laurifolia***
11 Midvein (as seen on the lower surface) little if any more pronounced than the principal lateral veins; leaves evergreen or deciduous, thin, subcoriaceous.
12 Leaves mostly lanceolate, the base cuneate, the tip acute to acuminate; berries dull red ..... ***S. smallii***
12 Leaves mostly ovate, oblong, pandurate, or hastate, the base cordate, truncate, rounded, or cuneate, the tip rounded to acute; berries various in color.
13 Margin of the leaf blade prominently thickened with a marginal vein (this appearing as a thickening, a visible vein, or an apparent revolute margin); berries with 1-3 seeds.
14 Inflorescence peduncle (stalk of the umbel) as long as or shorter than the subtending leaf petiole; stems and prickles glabrous; leaves evergreen; berries usually with 2-3 seeds; [generally of xeric or less commonly mesic sands] ..... ***S. auriculata***
14 Inflorescence peduncle (stalk of the umbel) > 1.5× as long as the subtending leaf petiole; stems (especially the lower) and prickles brownish stellate-scurfy; leaves semi-evergreen to evergreen; berries usually with 1 seed; [of a wide variety of habitats] ..... ***S. bona-nox***
13 Margin of the leaf blade thin, sometimes revolute; berries with (1-) 2-4 seeds.
15 Berries blue-black; perianth green; leaves semi-evergreen to evergreen, margins of mature leaves generally not revolute, the margins of the leaves and the petioles often with minute, flattish, tooth-like projections; berries with (1-) 2-3 seeds; [a wide variety of upland and wetland habitats] ..... ***S. rotundifolia***
15 Berries bright red; perianth brownish-yellow; leaves deciduous, margins of mature leaves usually revolute, the margins of the leaves and the petioles lacking minute, flattish, toothlike projections; berries with 2-4 seeds; [swamp forests, bogs, often where submersed for at least part of the year] ..... ***S. walteri***

Smilax auriculata Walter, Dune Greenbriar. Dunes on barrier islands, dry sandy openings in maritime forests or sandhills (northward, as in the Carolinas, limited to sites near the near the coast). May-July; October-November (and persisting). E. NC (Dare County) south to s. FL and west to LA; Bahama Islands. [= RAB, FNA, GW, K, S, WH, Y]

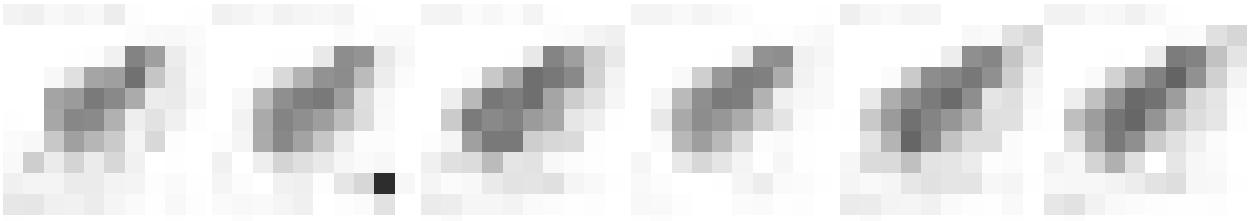
Smilax biltmoreana (Small) J.B.S. Norton ex Pennell, Biltmore Carrionflower. Dry forests (such as dry pine ridges and chestnut oak forests) and moist forests. April-May; August-October. The species is apparently limited to NC, SC, and GA, primarily in the Blue Ridge Escarpment region, with disjunct occurrences in Panhandle FL, s. AL, and sc. KY. [= FNA, K, W, Y, Z; = *Smilax ecirrata* (Engelmann ex Kunth) S. Watson var. *biltmoreana* (Small) H.E. Ahles – RAB; < *S. ecirrhata* – G, WH; = *Nemexia biltmoreana* Small – S]

Smilax bona-nox Linnaeus, Catbriar, Tramp's-trouble. In a wide variety of upland and wetland habitats. Late April-May; September-November. MD and MO south to s. FL and TX, also in Mexico. [= RAB, C, FNA, G, GW, K, S, W, WH, Y; > *S. bona-nox* var. *hastata* (Willdenow) Alphonse de Candolle – F; > *S. bona-nox* var. *bona-nox* – F; > *S. bona-nox* var. *exauriculata* Fernald – F; > *S. bona-nox* var. *hederifolia* (Beyrich) Fernald – F; > *S. bona-nox* var. *littorale* Coker]

Smilax ecirrata (Engelmann ex Kunth) S. Watson. Forests. Mid May-early June; August-September. N. OH, MI, WI, and s. MN south to w. VA, TN, s. IL, MO, and e. OK. [= K, Y, Z; = *S. ecirrhata* – C, F, FNA, WV, orthographic variant; < *S. ecirrhata* – G, orthographic variant; = *Nemexia ecirrhata* (Engelmann ex Kunth) Small – S, orthographic variant]

Smilax glauca Walter, Whiteleaf Greenbriar, Wild Sarsaparilla. In a wide variety of upland and wetland habitats. Late April-early June; September-November (and persisting). NJ, c. PA, OH, IN, MO, and KA, south to c. peninsular FL and TX, and also in Mexico. [= RAB, C, FNA, GW, Pa, S, W, Y; > *S. glauca* var. *glauca* – F, G, K, WV; > *S. glauca* var. *leurophylla* Blake – F, G, K, WV]

Smilax herbacea Linnaeus, Common Carrionflower. Moist deciduous forests. May-June; August-October. Centered in the Appalachian Mountains, from QC and ME west to OH, south to AL, GA, and TN. Young, non-flowering plants closely resemble *S. biltmoreana*. [= F, FNA, K, Pa, W, WV, Y, Z; = *S. herbacea* var. *herbacea* – RAB, C, G; = *Nemexia herbacea* (Linnaeus) Small – S]



Smilax hispida Rafinesque, Bristly Greenbriar, Hellfetter. Moist to wet forests. CT, NY, MN, and NE south to s. FL and TX. Wilbur (2003) discusses the complicated nomenclatural problems involving this plant and concludes that *S. hispida* Raf. is the correct name. [= RAB, C, G, Pa, S, WV; = *S. tamnoides* Linnaeus – FNA, GW, K, W, WH, Y, misapplied; > *S. tamnoides* var. *hispida* (Muhlenberg) Fernald – F; > *S. tamnoides* var. *tamnoides* – F; > *S. hispida* var. *australis* Small – S; > *S. hispida* var. *hispida* – S]

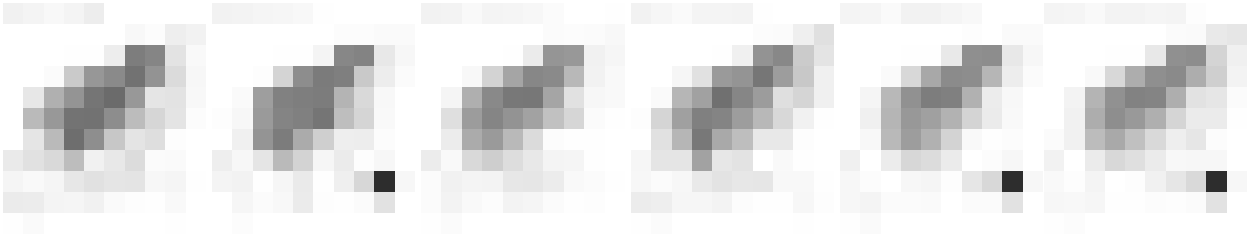
Smilax hugeri (Small) J.B.S. Norton ex Pennell, Huger's Carrionflower. Moist deciduous forests. March-April; August-October. S. NC and e. TN south through SC, GA, and AL to Panhandle FL. [= FNA, K, W, Y, Z; = *S. ecirrata* (Engelmann ex Kunth) S. Watson var. *hugeri* (Small) H.E. Ahles – RAB; = *Nemexia hugeri* Small – S; < *S. ecirrhata* – WH]

Smilax lasioneura Hooker, Midwestern Carrionflower. Moist deciduous forests, hammocks, bluff forests, pine-oak hickory submesic forests, perhaps only or primarily over mafic rocks. April-May; August-September. ON and MT south to w. VA (?), w. NC, Panhandle FL, OK, and CO. Material from VA is ambiguous. [= F, FNA, K; = *S. herbacea* var. *lasioneura* (Hooker) Alphonse de Candolle – C, G; = *Nemexia lasioneuron* (Hooker) Rydberg – S; = *S. lasioneuron* – WH, Y, orthographic variant]

Smilax laurifolia Linnaeus, Blaspheme-vine, Bamboo-vine. Pocosins, swamp forests, mountain bogs in sw. NC. July-August; September-October of the second year (and persisting). Primarily a Southeastern Coastal Plain species: NJ south to s. FL, west to w. TN, AR, and e. TX, and also in the Bahama Islands and Cuba. [= RAB, C, F, FNA, G, GW, K, S, W, WH, Y]

Smilax leptanthera Pennell. Moist forests. See Pennell (1916) for additional information. Treated as valid and rare by GAHP. [= *Nemexia leptanthera* (Pennell) Small – S; < *S. pseudochina*] {investigate}

Smilax pseudochina Linnaeus, Coastal Carrionflower. Pocosins, swamp forests, edges of pine savannas. May; August-October. An Atlantic Coastal Plain endemic: NJ, se. PA, and DE south to e. GA. [= C, FNA, K, Pa, Y; = *S. tamnifolia* Michaux – RAB, G; = *S. pseudo-china* – F, W, Z, orthographic variant; > *Nemexia tamnifolia* (Michaux) Small – S; > *Nemexia leptanthera* (Pennell) Small – S]



Smilax pulverulenta Michaux. Moist deciduous forests. May-June; August-October. Se. NY, se. and sc. PA, IN, MO, and e. KS south to NC, TN, and AR. [= F, FNA, K, Pa, W, WV, Y, Z; = *S. herbacea* var. *pulverulenta* (Michaux) A. Gray – RAB, C, G; = *Nemexia pulverulenta* (Michaux) Small – S]

Smilax pumila Walter, Sarsaparilla-vine, Dwarf Smilax. Mesic to dryish hammocks and bluffs, northward primarily in maritime-influenced mainland forest, with *Magnolia grandiflora* and *Tilia americana* var. *caroliniana*. October-November; January-April (and persisting). Ne. SC (within a few hundred meters of Brunswick County, NC) to c. peninsular FL and west to TX. It occurs on Colkins Neck, along the NC-SC border, in maritime-influenced forests with southern affinities, now largely destroyed by golf-course development. This unusual *Smilax* is sometimes cultivated as an ornamental ground-cover. [= RAB, FNA, K, S, WH, Y]

Smilax rotundifolia Linnaeus, Common Greenbriar, Bullbriar, Horsebriar. In a wide variety of upland and wetland habitats. April-May; September-November (and persisting). NS and s. ON south to n. FL and e. TX. [= RAB, C, F, FNA, G, GW, K, Pa, S, W, WH, WV, Y; > *S. rotundifolia* var. *quadrangularis* (Muhlenberg ex Willdenow) Wood]

Smilax smallii Morong, Jackson-briar. Bottomland forests. June-July; April-June of the next year. Ne. NC (se. VA?) to c. peninsular FL, west to s. AR and e. TX, primarily on the Coastal Plain. Unless the name *S. smallii* is conserved, it must be replaced by the older *S. maritima* Alph. Wood. [= RAB, FNA, G, GW, K, W, WH, Y; = *S. lanceolata* Linnaeus – S, misapplied; = ***S. maritima*** Alph. Wood]

Smilax walteri Pursh, Coral Greenbriar, Red-berried Swamp Smilax. Swamp forests, bogs, often where submersed for at least part of the year. Late April-May; September-November (and persisting). NJ south to c. peninsular FL and west to TN, AR, and TX. In its relatively narrow leaves, *S. walteri* can resemble *S. smallii*; *S. walteri* has a thicker-textured leaf, and is almost always rounded at the base rather than cuneate. [= RAB, C, F, FNA, G, GW, K, S, W, WH, Y]

61. LILIACEAE A.L. de Jussieu 1789 (Lily Family) [in LILIALES]

As here interpreted narrowly, the Liliaceae constitutes about 11 genera and 550 species, of the Northern Hemisphere. There has been much recent investigation and re-interpretation of evidence regarding the upper-level taxonomy of the Liliales, with strong suggestions that the broad Liliaceae recognized by Cronquist (1981) is artificial and polyphyletic. Cronquist (1981) himself concurs, at least to a degree: "we still await a comprehensive reorganization of the lilies into several families more comparable to other recognized families of angiosperms." Dahlgren & Clifford (1982) and Dahlgren, Clifford, & Yeo (1985) synthesized an early phase in the modern revolution of monocot taxonomy. Since then, additional research, especially molecular (Duvall et al. 1993, Chase et al. 1993, Bogler & Simpson 1995, and many others), has strongly validated the general lines (and many details) of Dahlgren's arrangement. The most recent synthesis (Kubitzki 1998a) is followed as the basis for familial and generic taxonomy of the lilies and their relatives (see summary below). References: Angiosperm Phylogeny Group (1998, 2003, 2009); Tamura in Kubitzki (1998a). [also see *AGAVACEAE, ALLIACEAE, ALSTROEMERIACEAE, AMARYLLIDACEAE, ASPARAGACEAE, COLCHICACEAE, HEMEROCALLIDACEAE, HOSTACEAE, HYACINTHACEAE, HYPOXIDACEAE, MELANTHIACEAE, NARTHECIACEAE, RUSCACEAE, SMILACACEAE, THEMIDACEAE, TOFIELDIACEAE, TRILLIACEAE*]

Our "liliaceous" genera (members of orders placed in the Lilianae) are therefore divided as shown below, largely following Kubitzki (1998a) and some more recent molecular analyses.

ALISMATALES

TOFIELDIACEAE: *Harperocallis, Pleea, Tofieldia, Triantha.*

LILIALES

ALSTROEMERIACEAE: *Alstroemeria.*

COLCHICACEAE: *Colchicum, Uvularia.*
HELONIADACEAE: *Chamaelirium, Helonias*. (or to be included in MELANTHIACEAE)
LILIACEAE: *Clintonia, Erythronium, Lilium, Medeola, Prosartes, Streptopus, Tulipa*.
MELANTHIACEAE: *Amianthium, Anticlea, Schoenocaulon, Stenanthium, Veratrum, Toxicoscordion, Zigadenus.*
SMILACACEAE: *Smilax*.
TRILLIACEAE: *Trillium.* (or to be included in MELANTHIACEAE)
XEROPHYLLACEAE: *Xerophyllum.* (or to be included in MELANTHIACEAE)

ASPARAGALES
AGAVACEAE: *Camassia, Manfreda, Schoenolirion, Yucca*. (or to be included in ASPARAGACEAE)
AMARYLLIDACEAE: *Allium, Crinum, Galanthus, Habranthus, Hymenocallis, Leucojum, Lycoris, Narcissus, Nothoscordum, Sternbergia, Tristagma, Zephyranthes.* [including ALLIACEAE]
ASPARAGACEAE: *Asparagus.*
HOSTACEAE: *Hosta*. (or to be included in ASPARAGACEAE)
HYACINTHACEAE: *Hyacinthoides, Hyacinthus, Muscari, Ornithogalum.* (or to be included in ASPARAGACEAE)
HYPOXIDACEAE: *Hypoxis.*
IRIDACEAE: *Alophia, Calydorea, Crocus, Crocosmia, Gladiolus, Herbertia, Iris, Nemastylis, Sisyrinchium.*
ORCHIDACEAE: *Aplectrum, Arethusa, Bletilla, Calopogon, Cleistesiopsis, Coeloglossum, Corallorhiza, Cypripedium, Epidendrum, Epipactis, Galearis, Goodyera, Habenaria, Hexalectris, Isotria, Liparis, Listera, Malaxis, Platanthera, Pogonia, Ponthieva, Platythelys, Pteroglossaspis, Sacoila, Spiranthes, Tipularia, Triphora, Zeuxine.*
RUSCACEAE: *Convallaria, Liriope, Maianthemum, Nolina, Polygonatum.* (or to be included in ASPARAGACEAE)
THEMIDACEAE: *Dichelostemma*. (or to be included in ASPARAGACEAE)
XANTHORRHOEACEAE: *Hemerocallis.* (or to be split, and then in HEMEROCALLIDACEAE)

DIOSCOREALES
BURMANNIACEAE: *Apteria, Burmannia.*
DIOSCOREACEAE: *Dioscorea*.
NARTHECIACEAE: *Aletris, Lophiola, Narthecium.*

PANDANALES
STEMONACEAE: *Croomia*.

1 Leaves basal; flowers on a leafless scape; tepals yellow or white.
2 Flowers in an umbel at the summit of a leafless scape; fruit a blue to black berry; [subfamily *Medeoloideae*]..... ***Clintonia***
2 Flowers solitary and scapose; tepals yellow or white; fruit a green to tan capsule; [subfamily *Lilioideae*] ..... ***Erythronium***
1 Leaves on a stem; flowers not scapose; tepals orange, red, rose, yellow, or white.
3 Leaves whorled at 1 node or more.
4 Leaves occurring at several nodes, these variously whorled and/or alternate; flowers orange, red, or yellow; fruit a green to tan capsule; [subfamily *Lilioideae*]..... ***Lilium***
4 Leaves occurring in a single whorl, with fertile plants with a second whorl of leaflike bracts subtending the flowers; flowers yellow; fruit a blue berry; [subfamily *Medeoloideae*]..... ***Medeola***
3 Leaves alternate at all nodes.
5 Leafy stem branched; fruit a red to whitish-tan berry; [subfamily *Streptopoideae*].
6 Stems brownish, wiry; inflorescence terminal..... ***Prosartes***
6 Stems green, rather succulent; inflorescence axillary ..... ***Streptopus***
5 Leafy stem unbranched; fruit a green to tan capsule; [subfamily *Lilioideae*].
7 Leaves at 7 or more nodes; flowers with tepals recurved; flowers orange, red, or yellow (rarely white)..... ***Lilium***
7 Leaves at 1-6 nodes; flowers cup-shaped, the tepals incurved-erect; flowers of various colors..... ***Tulipa***

Clintonia Rafinesque 1819

A genus of 5 species, of temperate to subarctic e. Asia and North America. References: Utech in FNA (2002a); Tamura in Kubitzki (1998a).

1 Flowers yellow; berry blue (rarely to whitish-blue); leaf margins glabrous or slightly ciliate; [mostly of high elevations]..... ***C. borealis***
1 Flowers white (often marked with purple); berry black (rarely blue); leaf margins copiously retrorsely ciliate, the cilia 2-4 mm long; [plants of middle elevations] ..... ***C. umbellulata***

Clintonia borealis (Aiton) Rafinesque, Bluebead-lily. Spruce-fir forests, northern hardwood forests, less commonly in red oak forests. Late May-June; July-September. NL (Labrador) west to MB, south to NJ, PA, and n. IN, and in the mountains to w. NC, e. TN, and n. GA (Jones & Coile 1988). [= RAB, C, F, FNA, G, K, Pa, S, W]

Clintonia umbellulata (Michaux) Morong, Speckled Wood-lily. Red oak and other oak forests, mesic to dry ridges and slopes, less commonly in northern hardwood forests, generally at lower elevations than *C. borealis*, though the two species can co-occur. Mid May-June; August-October. An Appalachian endemic: c. NY west to s. OH, south to n. GA (Jones & Coile 1988). *Clintonia alleghaniensis* Harned, differing from *C. umbellulata* in its ultramarine blue berry (vs. black) is known from a number of sites in VA, MD, and WV. It has been variously interpreted as a species, a hybrid of *C. borealis* and *C. umbellulata*, or merely an odd form of *C. umbellulata*; it needs further study. [= RAB, C, F, FNA, G, K, Pa, W; = *Xeniatrum umbellulatum* (Michaux) Small – S; > *C. alleghaniensis* Harned]

Erythronium Linnaeus 1753 (Trout Lily)

A genus of about 25 species, north temperate and subarctic, of North America and Eurasia (especially diverse in w. North America). References: Parks & Hardin (1963)=Z; Mathew (1992)=Y; Allen & Robertson in FNA (2002a); Tamura in Kubitzki (1998a).

Identification notes: Stolons are white shoots produced from the bulb. Most run horizontally, either underground or along the ground surface but beneath leaf litter. Flowering individuals often produce no stolons. The stolon characters in the key below are those of non-flowering individuals and refer to horizontal stolons only.

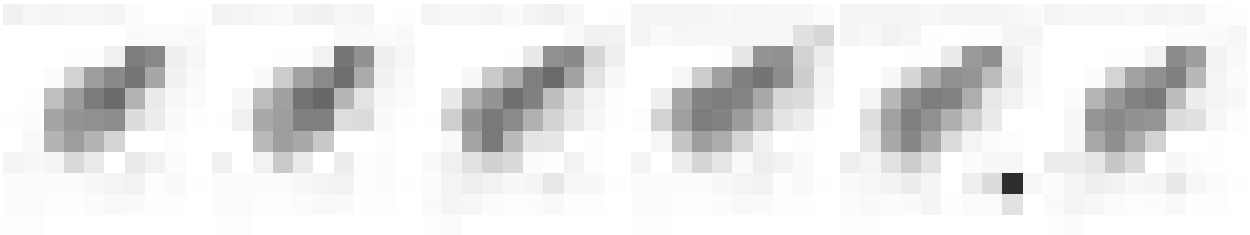
1 Perianth white (sometimes pinkish or bluish) ..... ***E. albidum***
1 Perianth yellow.
2 Petals lacking auricles at base; capsule and ovary distinctly indented (umbilicate) at apex (or rarely truncate in *E. umbilicatum* ssp. *monostolum*, or the ovary when young not yet displaying the apical indentation); mature capsules usually reclining on ground, with the apex downward; stolons 0-1 per bulb; anthers usually lavender, brown, cinnamon, or purple (sometimes yellow).
3 Horizontal stolons 1 per bulb; flecking on perianth segments slight to strong; perianth margins slightly irregular (though not auricled); stigma lobes long; pale spot on adaxial side of perianth segments always present, small to large, usually pale yellow; [at high elevations in the Southern Appalachians] ..... ***E. umbilicatum ssp. monostolum***
3 Horizontal stolons 0 per bulb; flecking on perianth segments absent to slight; perianth margins entire, smooth; stigma lobes short; pale spot on adaxial side of perianth segments usually present, small to medium, usually white; [of lower to mid elevations, widespread in our area] ..... ***E. umbilicatum ssp. umbilicatum***
2 Petals with auricles at base; capsule and ovary truncate, rounded, apiculate, or beaked at apex; mature capsules usually held well off ground, the apex oriented horizontally or ascending; stolons usually (1-) 2-5 per bulb; anthers usually yellow (rarely brown or lavender).
4 Capsule distinctly beaked at the apex; petals with well-developed auricles at the base, these encircling a filament ..... ***E. rostratum***
4 Capsule truncate, rounded, or apiculate at the apex; petals with small auricles at the base, which do not encircle a filament.
5 Capsule apiculus absent or poorly developed ..... ***E. americanum ssp. americanum***
5 Capsule apiculus well developed ..... ***E. americanum ssp. harperi***

Erythronium albidum Nuttall, White Trout Lily, Blonde Lilian. Rich, mesic forests, in very nutrient-rich alluvial soils. March-May. S. ON west to MN, south to n. VA, nw. GA, KY, sc. TN, MO, and OK. [= C, K, Pa, S, W, WV, Y; = *E. albidum* var. *albidum* – F, G]

Erythronium americanum Ker-Gawler *ssp.* ***americanum***, American Trout Lily. Moist bottomland or slope forests, especially over mafic rocks. February-April; April-May. NB west to ON and MN, south to sc. NC, c. TN, AR, and OK. It is much rarer than *E. umbilicatum* in NC. *E. americanum* is a tetraploid (2n = 48); Parks & Hardin suggest the possibility that it is an allotetraploid involving *E. rostratum* and *E. umbilicatum* as parents. *E. americanum* is larger-flowered, more graceful, and later-blooming (by 1-2 weeks) than *E. umbilicatum* ssp. *umbilicatum*, where they co-occur. [= FNA, GW, K, Y, Z; < *E. americanum* – RAB, F, G, S (also see *E. umbilicatum*); < *E. americanum* – C, Pa, W, WV]

Erythronium americanum Ker-Gawler *ssp.* ***harperi*** (W. Wolf) Parks & Hardin, Harper's Trout Lily. Moist forests. Ne. TN and nc. TN south to extreme se. TN, nw. GA, and nc. AL. [= FNA, GW, K, Y, Z; < *E. americanum* – S]

Erythronium rostratum W. Wolf, Beaked Trout Lily. Moist bottomland or slope forests. C. TN, MO, and se. KS, south to c. AL, wc. LA, and se. OK. [= FNA, GW, K, Y, Z; < *E. americanum* – S]



Erythronium umbilicatum Parks & Hardin *ssp.* ***monostolum*** Parks & Hardin, Southern Appalachian Trout Lily. High elevation coves, slopes, and grassy balds, moist forests. March-May; April-June. Ssp. *monostolum* is endemic to the high mountains of NC and TN. It approaches the VA border and should be sought, especially in the Grayson Highlands area. *E. umbilicatum* ssp. *monostolum* is a diploid (2n = 24). [= FNA, GW, K, Y, Z; < *E. americanum* – RAB, F, G, S; < *E. umbilicatum* – C, W]

Erythronium umbilicatum Parks & Hardin *ssp.* ***umbilicatum***, Dimpled Trout Lily. Moist bottomland or slope forests, or in rather dry upland habitats. February-April (May?); April-June. VA and e. WV south through NC, SC, and e. TN to c. GA, e. AL, and Panhandle FL. *E. umbilicatum* ssp. *umbilicatum* is a diploid (2n = 24). Mathew (1992) suggests the possibility that an earlier name, *E. nuttallianum* Roemer & Schultes, may apply to this taxon; the two locations mentioned on the type, Pennsylvania and Albany, NY, are outside the known range of the species, however. [= FNA, GW, K, Y, Z; < *E. americanum* – RAB, F, G, S; < *E. umbilicatum* – C, W, WH, WV]

Lilium Linnaeus 1753 (Lily)

A genus of about 110 species, of temperate northern hemisphere (especially e. Asia). Many taxonomic problems remain in this genus of showy ornamentals. References: Adams & Dress (1982)=Z; Skinner & Sorrie (2002)=X; Wherry (1946)=Y; Skinner in FNA (2002a); Henry (1946); Tamura in Kubitzki (1998a).

1 Dark bulblets produced in many leaf axils; [exotic] ..... ***L. lancifolium***
1 Dark bulblets never produced; [native (except *L. longiflorum* and *L. philippinense*), though some species also cultivated].
2 Flowers white; leaves narrowly linear or lanceolate; [exotic].
3 Leaves lanceolate; plants < 1 m tall; perianth parts 13-18 cm long, glabrous at the base (internally) ..... ***L. longiflorum***
3 Leaves linear; plants 1-3 m tall; perianth parts 18-25 cm long, papillose at the base (internally) ..... ***L. philippinense***
2 Flowers orange or yellow; leaves lanceolate, oblanceolate, or obovate; [native].
4 Flowers erect, facing upward; tepals clawed.

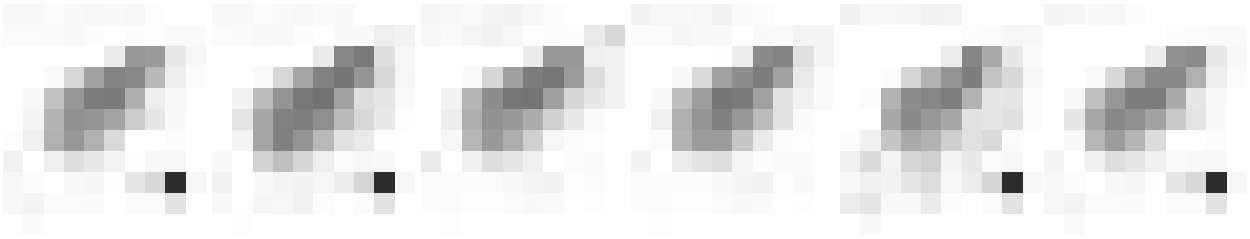
5 Leaves all alternate; [of the Coastal Plain] ..... ***L. catesbaei***
5 Leaves (at least some of them) whorled or verticillate; [of the Mountains] ..... ***L. philadelphicum*** *var.* ***philadelphicum***
4 Flowers nodding or declined, facing downward or to the side; tepals narrowed to the base, but not clawed.
6 Leaves oblanceolate to obovate, alternate and whorled, in many plants 50% or more of nodes bearing a single leaf; flowers 1-4 (rarely more), nodding to pendant, fragrant ..... ***L. michauxii***
6 Leaves lanceolate or narrowly elliptic, not broader distally, alternate and whorled, in most plants 10-30% of nodes bearing a single leaf; flowers 1-30+, oriented variously, not fragrant.
7 Flowers at maturity campanulate (tepals with somewhat recurved tips); style and stamens included or barely exserted.
8 Flowers 3-4 cm in diameter; pistil 3-4 cm long; tepals 3-5.5 cm long, deep red, mucronate by extension of the midrib, reflexed < 45 degrees from the flower axis, the terminal third of the tepals generally gently incurved; anthers 4-6 mm long, completely included within the perianth when viewed from the side; [high elevations in the Blue Ridge of w. NC, ne. TN, and sw. VA] ..... ***L. grayi***
8 Flowers 4.5-9 cm in diameter; pistil 4-6 cm long; tepals 6-8 cm long, yellow, orange to brick-red, acuminate, reflexed 60-120 degrees from the flower axis; anthers 5-10 mm long, exserted to fully included within the perianth when viewed from the side; [low to moderate elevations, more widespread].
9 Perianth yellow (rarely orange to red); mid-stem leaves 5-10× as long as wide ..... ***L. canadense*** *var.* ***canadense***
9 Perianth orange to red; mid-stem leaves 2-5× as long as wide ..... ***L. canadense*** *var.* ***editorum***
7 Tepals at maturity recurved fully to form a circular shape; flowers pendant to nodding; style and stamens long-exserted.
10 Style reddish, more-or-less the same color as the tepals; [west of the Blue Ridge] ..... ***L. michiganense***
10 Style pale green, strongly contrasting with tepals; [Blue Ridge and eastward and southward].
11 Leaves 7-26 cm long, oriented horizontally, with the tips downward-arching; leaf whorls 6-24; plants 1.2-2.8 m tall; inflorescences (1-) 5-22 flowered, tepals orange to reddish; [Mountains, Piedmont, and Coastal Plain] ..... ***L.superbum***
11 Leaves 2-16 cm long, ascending or more or less horizontal, but with the tips not downward-arching; leaf whorls 1-12; plants 0.6-2.0 m tall; inflorescences 1-4 (-7) flowered, tepals yellow to orange (to dusky red); [Coastal Plain].
12 Leaf whorls 1-5; petals yellow to yellow-orange; [East Gulf Coastal Plain pitcher-plant bogs and relatively open blackwater baygalls and streamheads in nw. FL and sw. AL] ..... ***L. iridollae***
12 Leaf whorls 1-12; petals orange to dusky red; [seepage bogs and margins of tree-shrub streamheads in se. VA, c. NC, and c. SC] ..... ***L. pyrophilum***

Lilium canadense Linnaeus *var*. ***canadense***, Yellow Canada Lily. Wet meadows. June-July; late July-September. Apparently ranging from NB to NC, mostly east of or in the Appalachians; the range is obscured by different interpretations of var. *canadense* and var. *editorum*, by spread from cultivation, and by collections of cultivated plants not clearly so indicated. Some of our plants are definitely var. *canadense*. [= F, WV; < *L. canadense* – RAB, C, FNA, G, GW, S; = *L. canadense* ssp. *canadense* – K, Pa, W, Z; = *L. canadense* ssp. *typicum* – Y]

Lilium canadense Linnaeus *var*. ***editorum*** Fernald, Red Canada Lily. Wet meadows, forest openings. June-July; late July-September. According to Adams & Dress (1982), who emphasize tepal color in distinguishing the infraspecific taxa, ranging from NB west to s. ON, south (mostly in and west of the Appalachians) to n. GA and n. AL. Wherry (1946) and Fernald (1950) emphasize leaf shape, and secondarily flower color, restricting var. *editorum* to a range from PA west to s. IN, south to AL. There has been considerable confusion between *L. canadense* var. *editorum* and *L. grayi*, and populations in sw. VA appear to show some intergradation between the two. [= F, WV; < *L. canadense* – RAB, C, FNA, G, GW, S; = *L. canadense* ssp. *editorum* (Fernald) Wherry – K, Pa, W, Y, Z]

Lilium catesbaei Walter, Pine Lily, Catesby's Lily, Leopard Lily. Pine savannas, sandhill seeps. Mid June-mid September; September-November. Se. NC south to FL and west to LA, on the Coastal Plain. [= GW, S, WH; > *L. catesbaei* var. *catesbaei* – RAB; > *L. catesbaei* var. *longii* Fernald – RAB, C, F, G; > *L. catesbaei* ssp. *catesbaei* – K; > *L. catesbaei* ssp. *asperellum* Wherry – K, misspelling; > *L. catesbaei* ssp. *asprellum* – Y; > *L. catesbaei* ssp. *longii* (Fernald) Wherry – Y; > *L. catesbaei* ssp. *typicum* – Y]

Lilium grayi S. Watson, Gray's Lily, Roan Lily. Bogs, seepages, grassy balds, moist forests, and wet meadows, at medium to high elevations. June-July; August-September. A Southern Appalachian endemic: sw. VA, nw. NC, and ne. TN. Clearly related to *L. canadense* (especially through the somewhat intermediate *L. canadense* var. *editorum*), *L. grayi* appears to be adapted for pollination by Ruby-throated Hummingbirds (Adams & Dress 1982). See *L. canadense* var. *editorum* for additional comments. The two most important strongholds for this rare lily (each with thousands of individuals) are the Roan Mountain massif (Avery and Mitchell counties, NC and Carter County, TN), where it was first found, and Long Hope Valley (Watauga and Ashe counties, NC). Otherwise, it tends to occur in very small, isolated populations in bogs, wet pastures, and seeps. In addition to the characters in the key, *L. grayi* can be distinguished in sterile condition from the 2 more common species of the Mountains by leaves, which are widest near the midpoint, typically 4-6× as long as wide (vs. distinctly wider toward the apex in *L. michauxii*, and widest near the midpoint but typically 10× or more as long as wide in *L. superbum*). Certainly one of our most beautiful wild plants! [= RAB, C, F, G, K, S, W, Y, Z]



Lilium iridollae M.G. Henry, Panhandle Lily, Pot-o'-gold Lily. Bogs. Panhandle FL west to s. AL. [= FNA, GW, WH; < *L. iridollae* – K (also see *L. pyrophilum*)]

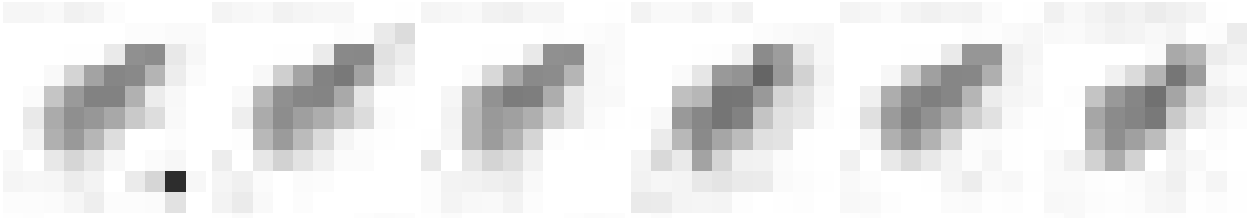
* ***Lilium lancifolium*** Thunberg, Tiger Lily. Disturbed areas, trash heaps; native of Asia. The more familiar name, *L. tigrinum*, must be rejected in favor of the older *L. lancifolium* (Ingram 1968). [= C, FNA, K, Pa; = *L. tigrinum* Ker-Gawler – F, G, WV]

* ***Lilium longiflorum*** Thunberg, Easter Lily. Disturbed areas, persistent from cultivation. [= FNA, K]

Lilium michauxii Poiret, Carolina Lily. Dry upland forests, ridges, slopes, and ridges. July-August; September-October. S. VA, e. TN, n. AL, c. MS, and e. LA south to s. SC, Panhandle FL, s. AL, s. MS, and s. LA. [= C, F, FNA, G, GW, K, W, WH, WV, X, Y, Z; < *L. michauxii* – RAB (also see *L. pyrophilum*); = *L. carolinianum* Michaux – S]

Lilium michiganense Farwell, Michigan Lily. Wet prairies and calcareous hardwood flatwoods. ON and MN south to e. TN, KY, nw. GA, AL, AR, and e. OK. [= C, F, FNA, K; < *L. superbum* – G; = *L. canadense* Linnaeus ssp. *michiganense* (Farwell) Boivin & Cody]

Lilium philadelphicum Linnaeus *var.* ***philadelphicum***, Wood Lily. Grassy balds, moist to wet meadows (especially in thin soils over rock), open woodlands. June-July; August-October. The species ranges from ME west to BC, south to NC, nw. GA (Jones & Coile 1988), KY, IL, IA, NE, and NM. Var. *philadelphicum*, distinguished by the leaves whorled at 3-6 nodes, 10-15 (-25) mm wide, the capsule 2.5-3.5 (-5) cm long, is eastern and mainly Appalachian, ranging from ME and s. ON south to NC, GA, and KY. Var. *andinum* (Nuttall) Ker-Gawler, distinguished by the leaves whorled at 1-2 nodes, 3-10 mm wide, the capsule 4-8 cm long, is western, ranging from OH, MN, and BC south to NM. [= C, F, G, K; < *L. philadelphicum* – RAB, FNA, Pa, S, W, WV; = *L. philadelphicum* ssp. *philadelphicum* – Y]



* ***Lilium philippinense*** Baker, Philippine Lily. Escaped from cultivation; native of the Philippines. July-August. This species is introduced at various locations in the Southeast, including FL and LA (Kartesz 1999), and has been documented from Richmond Co. NC (B.A. Sorrie, pers. comm.). In North America there has been confusion between this species and *L. formosanum* A. Wallace. [= FNA, K, WH]

Lilium pyrophilum M.W. Skinner & Sorrie, Sandhills Bog Lily. Peaty seepage bogs in the Sandhills and peaty swamp margins in the upper Coastal Plain. Late July-mid August. See Skinner & Sorrie (2002) for detailed information on this species. Superficially, this plant is somewhat similar to *L. michauxii*, in its one to several, nodding flowers with recurved tepals, relatively few whorls of leaves, and relatively few leaves per whorl. In addition to the character used in the key, this plant differs from *L. michauxii* in the following ways: flowers not fragrant or only slightly so (vs. flowers strongly fragrant), leaves generally widest near the middle (vs. widest toward the tip), leaves only slightly paler below and lacking a pronounced waxy sheen (vs. leaves strongly bicolored, the lower surface much paler and with a waxy sheen), and habitat in sphagnous, peaty bogs (vs. in xeric to mesic, sandy to loamy soils). [= FNA, X; < *L. michauxii* – RAB (misapplied to these plants); < *L. iridollae* M.G. Henry – K, misapplied]

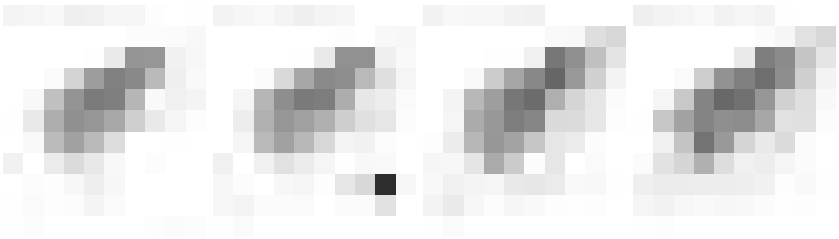
Lilium superbum Linnaeus, Turk's-cap Lily, Lily-royal. Cove forests and moist forests, moist ravines, blackwater stream swamps, Coastal plain bogs. July-August; September-October. MA and s. NY south to ne. NC, Panhandle FL, and c. MS, southward primarily in the Appalachians, but extending across the Piedmont to the Coastal Plain of VA and ne. NC, and with a similarly odd extension south of the southern terminus of the Appalachians into the Coastal Plain of GA, w. FL, AL, and MS. The plants of blackwater swamps of se. VA and ne. NC are very narrow-leaved and yellow-tepaled; this form, atypical in habitat, range, and morphology has been referred to speculatively as "*Lilium* species 1." Further study is needed to determine whether it is a distinct taxon (species, or variety of *L. superbum*) or only a form. [= C, F, FNA, GW, K, Pa, RAB, S, W, WH, WV, X, Y, Z; < *L. superbum* – G (also see *L. michiganense*)]

Medeola Linnaeus 1753 (Indian Cucumber-root)

A monotypic genus, an herb of eastern North America. References: Utech in FNA (2002a); Tamura in Kubitzki (1998a).

Identification notes: *Medeola* is sometimes mistaken (when sterile) for *Isotria*; *Medeola* has a wiry stem, floccose-pubescent, *Isotria* a fleshy, glabrous stem.

Medeola virginiana Linnaeus, Indian Cucumber-root. Moist forests, usually with acidic soils. Mid April-mid June; September-October. QC and ON west to MN, south to GA, Panhandle FL and LA. The tuber is white, crisp, tasting cucumber-like, usually about 5 cm long and 5 mm in diameter. Bell (1974) describes patterns of vegetative growth. Flowering plants have a second, smaller whorl of leaves; the flowers are borne on recurved pedicels beneath the top whorl of leaves. In fruit, however, the pedicels are ascending or erect, bringing the fruits above the top whorl. When the berries are ripe, the leaves of the upper whorl become scarlet at the base, presumably acting as an attractant to frugivorous animals. [= C, F, FNA, G, GW, K, Pa, RAB, S, W, WH, WV]



Prosartes D. Don 1839 (Fairybells, Mandarin)

A genus of 6 species, of temperate e. North America, w. North America, and e. Asia. Dahlgren, Clifford, & Yeo (1985) suggest that American species of *Disporum* are generically distinct from Asiatic species and should be segregated in the genus *Prosartes*, a distinction made as long ago as 1839. Asian *Disporum* species lack the distinctly reticulate venation of our plants, have strictly glabrous foliage (vs. pubescent), have spurred tepals (vs. unspurred), blue or black berries (vs. red or straw-colored), tripartite stigma (vs. not), and other differences (Jones 1951). Further study of generic limits by Shinwari et al. (1994) shows that the separation into *Prosartes* of the American species often assigned to *Disporum* is clearly warranted, based on morphological and karyological grounds. *Prosartes* is much more closely related to *Streptopus* than to (Asian) *Disporum*; (Asian) *Disporum* is more closely related to *Uvularia*. References: Johnson (1968)=Z; Shinwari et al. (1994)=Y; Jones (1951); Tamura, Utech, & Kawano (1992); Utech in FNA (2002a); Tamura in Kubitzki (1998a).

1 Fruit glabrous, ellipsoid, weakly triangular in cross-section, the surface smooth and shiny, red when ripe; tepals greenish, unspotted; leaves relatively many and small; leaf glabrous on the surface above (except for sparsely pubescent on the midrib and main veins), densely pubescent on the midrib below, sparsely pubescent on the surface below; leaf pubescence weak, often twisted or curled apically (as seen at 10-20× magnification), the leaf therefore very soft to the touch ..... ***P. lanuginosa***

1 Fruit pubescent, strongly 3-lobed (or 1- or 2-lobed by abortion), the surface textured and dull, whitish-tan when ripe; tepals whitish, spotted with purple; leaves relatively few and large; leaf sparsely pubescent on the surface and veins above and below; leaf pubescence stiff, generally straight and perpendicular to the surface (as seen at 10-20× magnification), the leaf therefore slightly rough to the touch ..... ***P. maculata***

Prosartes lanuginosa (Michaux) D. Don, Yellow Mandarin, Yellow Fairybells. Deciduous forests, especially coves. April-May; August-September. Primarily an Appalachian species: NY and s. ON south to n. GA (Jones & Coile 1988) and AL. [= FNA, K, Y; = *Disporum lanuginosum* (Michaux) Nicholson – RAB, C, F, G, Pa, S, W, WV, Z]

Prosartes maculata (Buckley) A. Gray, Spotted Mandarin, Nodding Mandarin. Nutrient-rich deciduous forests, especially cove forests. April-May; July-August. AL, n. GA, KY, MI, w. NC, OH, TN, w. VA, and s. WV; its distribution is rather fragmented, and the species is considered rare or uncommon in every state in its range. The fruits are more reminiscent of *Uvularia* than of *Prosartes lanuginosa*. [= FNA, K, Y; = *Disporum maculatum* (Buckley) Britton – RAB, C, F, G, S, W, WV, Z]

Streptopus Michaux 1803 (Twisted-stalk)

A genus of about 7 species, temperate to subarctic in Europe, e. Asia, and North America. References: Utech in FNA (2002a); Fassett (1935)=Z; Tamura in Kubitzki (1998a).

1 Leaf margins and nodes not coarsely ciliate; leaves strongly cordate-clasping; fruit ellipsoid..... ***S. amplexifolius*** *var.* ***amplexifolius***

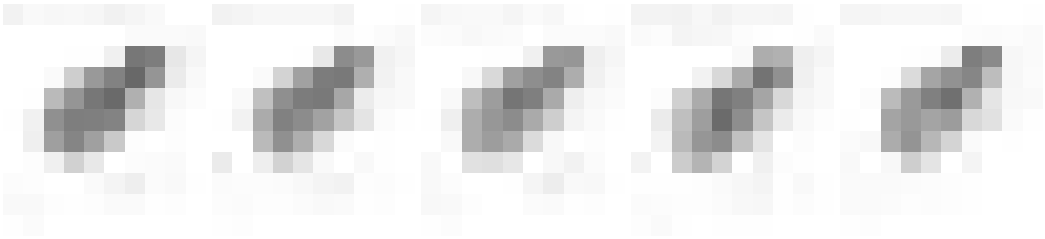
1 Leaf margins and nodes coarsely ciliate; leaves sessile to somewhat cordate-clasping (especially the lower leaves of robust individuals); fruit globose ..... ***S. lanceolatus*** *var.* ***lanceolatus***

Streptopus amplexifolius (Linnaeus) A.P. de Candolle *var.* ***amplexifolius***, White Mandarin, Pagoda-bells. Moist forests and seepages at high elevations. Late April-early June; late July-September. The species is circumboreal, the range fragmented. Fassett recognized seven varieties, the plants in our area being var. *americanus*. The species ranges from Greenland and NL (Labrador) to MN, south (in the mountains and disjunctly) to NC, and in the west from AK (and Kamchatka) south to NM and AZ, in Japan, and in the Alps in Europe. [= K; < *S. amplexifolius* – RAB, FNA, Pa, W; > *S. amplexifolius* var. *americanus* J.A. & J.H. Schultes – C, F, G, Z; < *Tortipes amplexifolius* (Linnaeus) Small – S]

Streptopus lanceolatus (Aiton) Reveal var. ***lanceolatus***, Eastern Rose Mandarin, Eastern Twisted-stalk. Moist forests at high elevations. Late April-early June; late July-September. Fassett (1935) recognized four varieties in *S. roseus*. Reveal (1993c) determined that the correct name for the species widely known as *S. roseus* is *S. lanceolatus* (Aiton) Reveal, and he transferred Fassett's varieties. Fassett (and Reveal) considered *S. lanceolatus* var. *lanceolatus* [*S. roseus* var. *perspectus* Fassett] to range from s. NL (Labrador) west to MI, south to NJ and PA, and in the mountains to w. NC, e. TN, and ne. GA (Jones & Coile 1988). *S. lanceolatus* var. *longipes* (Fernald) Reveal [*S. roseus* var. *longipes* (Fernald) Fassett] is midwestern, from s. ON and nw. PA west to MI, WI, MN, and s. MB. Var. *curvipes* (Vail) Fassett is western, ranging from AK to se. BC and nw. OR. Var. *roseus* was considered to be a Southern Appalachian endemic, differing from var. *perspectus* only in having the pedicel-peduncles entirely glabrous (vs. ciliate with few to many multicellular hairs). The number of hairs on the peduncles varies constantly, and recognition of two varieties in e. North America does not appear warranted; all of our material is then *S. lanceolatus* var. *lanceolatus* [*S. roseus* var. *roseus* (in a broader sense)], which does differ significantly from the more western varieties. [< *S. roseus* – RAB, S, W, WV; > *S. roseus* var. *roseus* – C, F, G, Pa, Z; > *S. roseus* var. *perspectus* Fassett – C, F, G, Pa, Z; < *S. lanceolatus* – FNA; > *S. lanceolatus* var. *lanceolatus* – K; > *S. lanceolatus* var. *roseus* (Michaux) Reveal – K]

Tulipa Linnaeus 1753 (Tulip)

A genus of about 150 species, of temperate Eurasia (especially w. and c. Asia). References: Tamura in Kubitzki (1998a); Straley & Utech in FNA (2002a).



* ***Tulipa sylvestris*** Linnaeus, Tulip, Dutch-lily. Very commonly cultivated; native of w. Asia. "Occasionally naturalized in moist meadows, fields and roadsides" in se. PA (Rhoads & Block 2007) and MD (Kartesz 1999). [= FNA, K, Pa]

62. ORCHIDACEAE A.L. de Jussieu 1789 (Orchid Family) [in ASPARAGALES]

A family of about 800 genera and 19,000 species, perennial (rarely annual), mycotrophic herbs and vines. Only a small minority of orchid species worldwide are terrestrial rather than epiphytic; only *Epidendrum magnoliae* in our flora shows the common epiphytic habit. References: Luer (1972) and Luer (1975)=L; Correll (1950)=X; Romero-González, Fernández-Concha, Dressler, Magrath, & Argus in FNA (Williams & Williams (1983); Brown (2003); Homoya (1993); Correll (1937); Pridgeon et al. (1999a, 1999b, 1999c).

Identification notes: Flowering plants are necessary for use of the key to genera.

1 Plant epiphytic, growing on the branches or trunks of trees in swamps ..... ***Epidendrum***
1 Plant terrestrial, growing on soil.
  2 Leaves absent at flowering, or with a solitary leaf with a purplish undersurface withering at about the time of flowering.
    3 Flowers with a spur ..... ***Tipularia***
    3 Flowers without a spur.
      4 Flowers white, the lip, sepals, and petals all predominantly white ..... ***Spiranthes***
      4 Flowers pink, greenish, yellowish, or purplish, the lip sometimes white or marked with white, the sepals and petals colored.
        5 Flower solitary; lip strongly bearded ..... ***Arethusa***
        5 Flowers in spikes or racemes; lip not bearded.
          6 Lip with 2 fleshy ridges near the base; pollinia 4; plants mycoparasitic and never with leaves ..... ***Corallorhiza***
          6 Lip with 3-7 ridges near the base or extending most of the length of the lip; pollinia 4 or 8; plants either mycoparasitic and never with leaves, or with a plicate winter leaf withering shortly before flowering.
            7 Plants with a plicate winter leaf withering shortly before flowering (the withered remnant usually detectable); pollinia 4; veins of the petals and sepals not strikingly different in color than the intervein areas; lip with 3 ridges ..... ***Aplectrum***
            7 Plants never with leaves and saprophytic; pollinia 8; veins of the petals and sepals strikingly different in color than the intervein areas; lip with 5-7 ridges ..... ***Hexalectris***
  2 Leaves present at flowering (*Cleistesiopsis* with a foliaceous bract at the summit of the stem).
    8 Leaf solitary.
      9 Leaf basal.
        10 Flower with a spur ..... ***Platanthera***
        10 Flower without a spur.
          11 Flower solitary; leaf plicate ..... ***Arethusa***
          11 Flowers in a raceme or spike.
            12 Flowers relatively large, purple, pink, to rarely white, the lip oriented upward ..... ***Calopogon***
            12 Flowers relatively small, whitish, the lip oriented downward ..... ***Spiranthes***
      9 Leaf cauline.
        13 Flower solitary (-4), pink (rarely nearly white); [subfamily *Vanilloideae*; tribe *Pogonieae*].
          14 Sepals brown to purple, linear or narrowly oblanceolate, 3-6.5 cm long, about 5 mm wide; leaf coriaceous ..... ***Cleistesiopsis***
          14 Sepals pink (rarely white), elliptic or oblanceolate, 1.3-2.7 cm long, 3-11 mm wide; leaf herbaceous ..... ***Pogonia***
        13 Flowers in spikes or racemes, 5-many, reddish, yellowish, or greenish.
          15 Flower without a spur; petals, sepals, and lip 1-3 mm long ..... ***Malaxis***
          15 Flower with a spur; petals, sepals, and lip 3-25 mm long ..... ***Platanthera***
    8 Leaves 2-many.
      16 Lip inflated, pouch-like or slipper-like, 2-6 cm long ..... ***Cypripedium***
      16 Lip not inflated, or if so, then 0.3-1.1 cm long.
        17 Leaves basal (sometimes with bladeless sheaths upward on the stem).
          18 Leaves plicate.
            19 Lip oriented upward; flowers pink to white ..... ***Calopogon***
            19 Lip oriented downward; flowers greenish, purplish-brown, or yellowish.
              20 Leaves ovate to elliptic, 2-5× as long as wide; plant 1-3 dm tall ..... ***Liparis***
              20 Leaves linear-lanceolate, > 10× as long as wide; plant 3-14 dm tall ..... ***Pteroglossaspis***
          18 Leaves smooth, often creased at the midrib, but not plicate.
            21 Lip with a spur.

22 Flowers bicolored, the lip white, the sepals and petals pink; leaves 2 ..... ***Galearis***
22 Flowers not bicolored, the lip, petals, and sepals similarly colored; leaves 2-5.
23 Lip deeply divided into 3 linear segments; leaves 3-5 ..... ***Habenaria***
23 Lip entire; leaves 2 ..... ***Platanthera***
21 Lip without a spur.
24 Leaf blades more-or-less horizontally oriented, flat against the ground or 1-2 cm above it.
25 Lip oriented upward ..... ***Ponthieva***
25 Lip oriented downward.
26 Leaves variegated with white; lip saccate ..... ***Goodyera***
26 Leaves green, not variegated; lip not saccate ..... ***Spiranthes***
24 Leaf blades ascending.
27 Leaves linear to lanceolate, 2-4 ..... ***Spiranthes***
27 Leaves elliptic to ovate, 2.
28 Lip broadest near its apex ..... ***Liparis***
28 Lip broadest near its base, tapering to the apex ..... ***Malaxis***
17 Leaves cauline.
29 Leaves plicate; lip saccate ..... ***Epipactis***
29 Leaves smooth, often creased at the midrib, but not plicate; lip not saccate.
30 Leaves whorled, terminating the stem ..... ***Isotria***
30 Leaves alternate or opposite, not terminating the stem.
31 Leaves 2, opposite, near the middle of the stem ..... ***Listera***
31 Leaves (2-) 3-many, alternate, variously distributed on the stem.
32 Lip without a spur; leaves 0.8-8.0 cm long.
33 Leaves ovate, 0.8-2.0 cm long ..... ***Triphora***
33 Leaves linear or narrowly lanceolate, 1-8 cm long ..... ***Zeuxine***
32 Lip with a spur; leaves linear, lanceolate, or narrowly elliptic, 5-40 cm long (at least the larger > 5 cm long, except in *Platythelys*, with lanceolate to ovate leaves 1.5-6.5 cm long).
34 Leaves 1.5-6.5 cm long, with inflated tubular sheaths; plants from creeping rhizomes ..... ***Platythelys***
34 Leaves 5-40 cm long, sessile; plants from fleshy or fusiform roots.
35 Lip divided into 3 linear divisions, the divisions not further divided, fringed, or eroded ..... ***Habenaria***
35 Lip not divided into 3 divisions, or divided into 3 divisions but the divisions not linear.
36 Spur saccate, 2-3 mm long, the orifice minute ..... ***Coeloglossum***
36 Spur elongate and slender, 4-50 mm long, the orifice larger ..... ***Platanthera***

Aplectrum Torrey 1818 (Puttyroot, Adam-and-Eve)

A genus of 2 species, 1 in e. North America and 1 in Japan (Sheviak & Catling in FNA (2002a). References: Sheviak & Catling in FNA (2002a); Correll (1950)=X.

Identification notes: Like *Tipularia*, *Aplectrum* has a single, overwintering leaf, purplish on the underside, and withering prior to the appearance of the flowering stalk; they are readily separable by leaf shape, texture, and veining (see *Tipularia*).

Aplectrum hyemale (Muhlenberg ex Willdenow) Torrey, Puttyroot, Adam-and-Eve. Rich, mesic forests. May-June. QC and MN, south to SC, GA, AL, and OK. [= RAB, C, F, FNA, G, GW, K, L, Pa, S, W, X]

Arethusa Linnaeus 1753 (Dragon's-mouth, Bog-rose, Arethusa)

A monotypic genus (Sheviak & Catling in FNA 2002). References: Sheviak & Catling in FNA (2002a); Correll (1950)=X.

Identification notes: The combination of the following characters serves to separate *Arethusa* from other, vaguely similar, genera: flowers magenta, solitary and scapose, the lip descending, the other 2 petals and 3 sepals erect or ascending. *Calopogon* has a leafy stem, the inflorescence a raceme, the lip crested but oriented upward. *Pogonia* has solitary, pale pink flowers, with a descending, bearded lip, but the stem has a well-developed, flat leaf, 1-2.5 cm wide, the flower is subtended by a well-developed, leaf-like, floral bract, and the 2 lower sepals are spreading-descending. *Cleistesiopsis* has 3 brown to purplish brown sepals.

Arethusa bulbosa Linnaeus, Dragon's-mouth, Bog-rose, Arethusa. Bogs. May-June. NL (Newfoundland) and NL (Labrador) west to SK, south to NJ, DE, IN, and MN, and to NC and SC in the mountains, rare south of ME, MI, and MN. The lanceolate, plicate leaf (15-30 cm long, 2-4 mm wide) develops after flowering, the flowering plant thus consisting (aboveground) of the solitary scape only. The lip is crested with fimbriate ridges, marked with yellow and purple. [= RAB, C, F, FNA, G, GW, K, L, Pa, S, W, X]

Bletilla Reichenbach f.

A genus of 9 species, of temperate e. Asia. References: Correll (1950)=X.

* ***Bletilla striata*** (Thunberg) Reichenbach f., Urn Orchid. Lawns, roadsides; native of China. Known only from Escambia County, FL. [= FNA, K, WH] {add to genus key; add X to synonymy}

Calopogon R. Brown 1813 (Grass-pink)

A genus of 5 species (one with two varieties), endemic to e. North America. The only taxon not treated here is *C. tuberosus* var. *simpsonii* (Chapman) Magrath of s. FL. References: Goldman, Magrath, & Catling in FNA (2002a); Trapnell, Hamrick, & Giannasi (2004)=Z; Goldman, van den Berg, & Griffith (2004)=Y; Correll (1950)=X. Key adapted from Goldman, Magrath, & Catling in FNA (2002a).

Identification notes: The lip is oriented upward.

1 Petals wider toward the tip than toward the base; lip usually as wide as or wider than long; flowers strongly fragrant.....***C. multiflorus***
1 Petals equal or narrower toward the tip than toward the base; lip usually narrower than long; flowers scentless or mildly fragrant.
  2 Leaf appressed to the inflorescence during flowering; flowers < 1 cm apart; flowers not fragrant; flowers on same plant opening simultaneously ..... ***C. barbatus***
  2 Leaf not appressed to the inflorescence during flowering; flowers > 1 cm apart; flowers faintly to distinctly fragrant; flowers on same plant opening nearly simultaneously to sequentially.
    3 Lateral sepals 10-15 mm long, falcate, widely spreading.....***C. pallidus***
    3 Lateral sepals 15-28 mm long, weakly falcate to straight.
      4 Flowers of each plant opening nearly simultaneously; dilated distal portion of middle lip lobe usually much narrower than long, triangular to broadly rounded; stigma typically flat against column surface; corms elongate, forked..... ***C. oklahomensis***
      4 Flowers of each plant opening sequentially; dilated distal portion of middle lip lobe usually much wider than long, typically anvil-shaped; stigma at angle to column surface; corms globose to elongate, not forked ..... ***C. tuberosus*** *var*. ***tuberosus***

Calopogon barbatus (Walter) Ames, Bearded Grass-pink. Savannas, sandhill seeps, pitcher plant bogs. April-early May. A Southeastern Coastal Plain endemic: se. NC south to s. FL and west to e. LA. [= FNA, GW, K, L, RAB, WH, X, Y, Z; = *Limodorum parviflorum* (Lindley) Nash – S]

Calopogon multiflorus Lindley, Many-flowered Grass-pink. Moderately well-drained soils of pine savannas and pine flatwoods (often with *Serenoa repens*). March-early May. A Southeastern Coastal Plain endemic: E. NC south to s. FL, west to e. LA. [= FNA, GW, K, L, WH, X, Y, Z; = *Limodorum multiflorum* (Lindley) C. Mohr – S]

Calopogon oklahomensis D.H. Goldman, Oklahoma Grass-pink. Pine savannas, prairies. E. SC south to s. GA, west to e. TX, north in the eastern Great Plains to MN. [= FNA, Y, Z]

Calopogon pallidus Chapman, Pale Grass-pink. Savannas, sandhill seeps. May-July. A Southeastern Coastal Plain endemic: se. VA south to s. FL and west to LA. [= RAB, C, F, FNA, G, GW, K, L, WH, X, Y, Z; = *Limodorum pallidum* (Chapman) C. Mohr – S]

Calopogon tuberosus (Linnaeus) Britton, Sterns, & Poggenburg *var*. ***tuberosus***, Common Grass-pink. Savannas, sandhill seeps, floating peat mats, in the Piedmont and Mountains in bogs. April-July. Var. *tuberosus* occurs from NL west to MT, south to s. FL and e. TX, also in Cuba and the West Indies. Var. *simpsonii* (Chapman) Magrath occurs in peninsular FL, Cuba, and the West Indies. [= FNA, K, L, Pa, WH, Y, Z; = *C. pulchellus* R. Brown – F, G, RAB, X; < *C. tuberosus* – C, GW, W; = *Limodorum tuberosum* Linnaeus – S]

Cleistesiopsis Pansarin & F. Barros 2008 (Spreading Pogonia, Rosebud Orchid)

A genus of 3 species, endemic to e. North America. As traditionally circumscribed, *Cleistes* was a genus of about 55 species, primarily of tropical America. The circumscription of this genus has been uncertain (Cameron & Chase 1999; Cameron et al. 1999; Pridgeon et al. 1999c). North American "*Cleistes*" is not closely related to South American *Cleistes* (which includes the type of the genus), and two alternative treatments are possible: the North American species can be housed in a separate genus, or alternatively, *Pogonia*, *Isotria*, and N. American "*Cleistes*" could be combined into *Pogonia* (a generic disposition popular many decades ago). Pansarin & de Barros (2008) favor the former idea, and have named the new genus *Cleistesiopsis*. References: Pansarin & de Barros (2008)=Y; Catling & Gregg (1992)=Z; Brown & Pansarin (2009)=V; Gregg & Catling in FNA (2002a); Gregg (1991); Correll (1950)=X.

1 Column 21-29 mm long; lip (26-) 34-56 mm long, the basal 3/4 of the central keel of the lip with 1-3 parallel, continuous low ridges; sepals (31-) 40-56 (-65) mm long; petals 27-53 mm long; distance between median leaf and floral bract 9-20 cm; fresh flower with daffodil-like odor .....***C. divaricata***
1 Column 13-19 mm long; lip 21-33 (-38.5) mm long, the basal 3/4 of the central keel of the lip with 5-7 discontinuous and irregular ridges; sepals (24-) 30-40 (-55) mm long; petals 21-36 mm long; distance between median leaf and floral bract 3-16 cm; fresh flowers with strong vanilla scent (in *C. oricamporum*, of the Coastal Plain) or odorless (in *C. bifaria*, of the Mountain and upper Piedmont).
  2 Fresh flowers odorless; [of the Mountains and Piedmont].....***C. bifaria***
  2 Fresh flowers with strong vanilla scent; [of the Coastal Plain].....***C. oricamporum***

Cleistesiopsis bifaria (Fernald) Pansarin & F. Barros, Appalachian Small Spreading Pogonia. Moist to fairly dry meadows, dry ridgetops under pines (where seasonally moist). May-July. WV south through w. VA, e. KY, w. NC, and e. and c. TN to w. SC, n. GA and n. AL. Catling & Gregg (1992) make a convincing case for the recognition of *Cleistesiopsis bifaria* and *C. divaricata* as specifically distinct (as *Cleistes*), based on differences in morphology, range, phenology (in the sympatric portions of their ranges), and floral fragrance. [= V; < *Cleistesiopsis bifaria* – Y; < *Cleistes bifaria* (Fernald) Catling & Gregg – FNA, K, Z; < *Cleistes divaricata* – RAB, C, G, GW, L, S, W, X; < *Cleistes divaricata* var. *bifaria* Fernald – F; < *Cleistes divaricata* var. *bifara* – WV, misspelling]

Cleistesiopsis divaricata (Linnaeus) Pansarin & F. Barros, Large Spreading Pogonia. Pine savannas. May-mid June. S. NJ to sw. GA and ne. FL, in the Coastal Plain; reports from more inland (non Coastal Plain) areas are based on a taxonomic concept of *C. divaricata* including *C. bifaria*, and reports from the East Gulf Coastal Plain (west of ne. FL) are based on *C. oricamporum*. [= V, Y; = *Cleistes divaricata* (Linnaeus) Ames – FNA, K, Z; < *Cleistes divaricata* – RAB, C, G, GW, K, L, S, W, X (also see *Cleistes bifaria*); = *Cleistes divaricata* var. *divaricata* – F; = *Pogonia divaricata* (Linnaeus) R. Brown – WH3]

Cleistesiopsis oricamporum P.M. Brown, Small Coastal Plain Spreading Pogonia. Savannas, sandhill seeps. May-July. Se. NC to c. peninsular FL and west to e. LA. Catling & Gregg (1992) make a convincing case for the recognition of *Cleistesiopsis bifaria* (including *C. oricamporum*) and *C. divaricata* as specifically distinct (as *Cleistes*), based on differences in morphology, range, phenology (in the sympatric portions of their ranges), and floral fragrance. The co-occurrence of *C. divaricata* and *C. oricamporum* at such sites as the Green Swamp, Brunswick County, NC, where phenologically separated, supports their taxonomic status. Where co-occurring, *C. oricamporum* flowers on average about 10 days before *C. divaricata*. Recent studies (Smith et al. 2004) suggest the probability that montane and Coastal Plain populations of "*C. bifaria*" represent 2 different species, a suggestion formalized by Brown & Pansarin (2009). [= V; < *Cleistesiopsis bifaria* – Y; < *Cleistes bifaria* (Fernald) Catling & Gregg – FNA, K, Z; < *Cleistes divaricata* – RAB, C, G, GW, L, S, W, X; < *Cleistes divaricata* var. *bifaria* Fernald – F, WV; < *Pogonia bifaria* (Fernald) P.M. Brown & Wunderlin – WH3]

Coeloglossum Hartman 1820 (Frog Orchid, Long-bracted Orchid)

Usually regarded as a monotypic genus, of north temperate regions of the Old and New World. However, *Coeloglossum* is probably not distinct from *Dactylorhiza* Necker ex Nevski; *Coeloglossum* is the older name, but *Dactylorhiza* has been accepted for nomenclatural conservation. The taxonomic and nomenclatural outcome is uncertain. References: Sheviak & Catling in FNA (2002a); Bateman, Pridgeon, & Chase (1997)=Z; Pridgeon et al. (1997, 1999b); Correll (1950)=X.

Coeloglossum viride (Linnaeus) Hartman *var*. ***virescens*** (Muhlenberg ex Willdenow) Luer, Long-bracted Frog Orchid. Moist woods. April-June. The species is circumboreal; var. *virescens* is e. Asian and North American, in e. North America south in the Appalachians to NC. It is generally more "southern" than the typic var. *viride*, which is more completely circumboreal, widespread in n. Eurasia and far northern North America. [= K, L, W; = *Habenaria viridis* (Linnaeus) R. Brown var. *bracteata* (Muhlenberg ex Willdenow) Reichenbach ex A. Gray – RAB, C, F, G, X; < *Coeloglossum viride* (Linnaeus) Hartman – FNA, Pa; = *Coeloglossum bracteatum* (Muhlenberg ex Willdenow) Parlatore – S; < ***Dactylorhiza viridis*** (Linnaeus) R.M. Bateman, Pridgeon, & M.W. Chase – Z]

Corallorhiza Gagnebin 1755 (Coralroot)

A genus of about 15 species, distributed in north temperate regions of the Old and New World. The closest relative of *Corallorhiza* in our flora is *Aplectrum* (Freudenstein 1992). The mycotrophic nature of *Corallorhiza* is well established, but the exact means of the transfer of nutrients from the fungal hyphae to the orchid is not yet understood. References: Freudenstein (1992, 1997, 1999)=Z; Magrath & Freudenstein in FNA (2002a); Correll (1950)=X.

1 Lip with two lateral teeth or lobes; lateral sepals spreading to down-curved.
  2 Sepals 1-veined ..... ***C. trifida***
  2 Sepals 3-veined.
    3 Middle lobe of lip expanded slightly or not at all distally, the ratio of the width of the dilated part to the base of the mid-lobe < 1.5; floral bracts averaging 0.5-1.0 mm long ..... ***C. maculata*** *var*. ***maculata***
    3 Middle lobe of the lip distinctly expanded, the ratio of the width of the dilated part to the base of the midlobe greater than 1.5; floral bracts averaging 1.0-2.8 (-4.5) mm long ..... ***C. maculata*** *var*. ***occidentalis***
1 Lip without lateral teeth or lobes (though sometimes erose or minutely toothed near its apex); lateral sepals arching, upcurved, or forward-directed.
  4 Sepals and petals 5-7.5 mm long; dorsal sepal > 4.5 mm long, 3-nerved; flowering April-July.
    5 Lip with prominent, thickened, involute margins; flowering mid to late July ..... ***C. bentleyi***
    5 Lip planar; flowering April-May ..... ***C. wisteriana***
  4 Sepals and petals 3-4.5 mm long; dorsal sepal < 4.5 mm long, 1-nerved; flowering August-October.

6 Perianth closed or nearly so (cleistogamous); lip 1.7-2.2 mm wide, straight; column lacking or with only poorly developed basal ventral auricles; stigma 0.2-0.5 mm wide ..... ***C. odontorhiza*** *[cleistogamous form]*
6 Perianth open (chasmogamous); lip 2.1-3.7 mm wide, bent downward at a nearly right angle; column with 2 prominent auricles at the base on the ventral surface; stigma 0.7-1.0 mm wide..... ***C. odontorhiza*** *[chasmogamous form]*

Corallorhiza bentleyi Freudenstein. Dry-mesic to mesic forests, especially near roadsides. The species was recently named and was known (at the time of publication) from only a single population (Freudenstein 1999). This species is now known from about 15 populations in e. WV (Monroe and Pocahontas counties) and w. VA (Giles, Alleghany, and Bath counties). It is most closely related to *C. involuta* Greenman of Mexico, a component of the *C. striata* Lindley complex of w. and n. North America. [= FNA, Z]

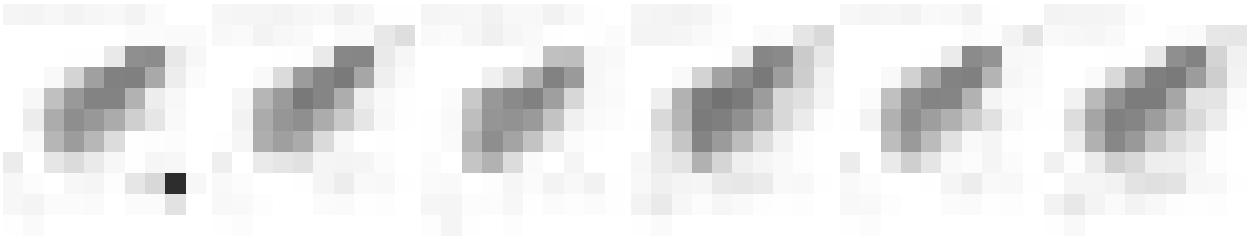
Corallorhiza maculata (Rafinesque) Rafinesque *var.* ***maculata***, Eastern Spotted Coralroot. Moist forests, northern hardwood forests. July-August. Var. *maculata* is irregularly distributed in much of North America, primarily northern, from NL (Newfoundland) QC, and MN south to PA, OH, and IN, and south in the Appalachians to ne. GA, in the west from BC south to s. CA, s. AZ, and s. NM. Var. *mexicana* (Lindley) Freudenstein is restricted to Mexico. [= FNA, Z; < *C. maculata* – C, F, G, K, L, Pa, RAB, W, WV, X; < *Corallorrhiza maculata* – S, orthographic variant]

Corallorhiza maculata (Rafinesque) Rafinesque *var.* ***occidentalis*** (Lindley) Ames, Western Spotted Coralroot. Forests. May-July. Var. *occidentalis* (Lindley) Ames has a distribution similar to var. *maculata*, except that in the east it ranges south only to PA, s. ON, and WI, with disjunct populations in e. WV (Pocahontas County; Morton et al. 2004) and VA. [= FNA, Z; < *C. maculata* – C, F, G, K, L, Pa, RAB, W, WV, X; < *Corallorrhiza maculata* – S, orthographic variant]

Corallorhiza odontorhiza (Willdenow) Poiret, Autumn Coralroot. Forests. August-October. The cleistogamous form is the more common, and is widespread in e. North America, from ME, NY, s. ON, MI, and MN south to SC, c. GA, ne. FL, c. AL, n. MS, c. AR, and e. OK. The chasmogamous form is less common, and is scattered in ne. United States and adjacent Canada, in ON, CT, PA, MI, IA, IN, DC, NC, and TN, and in Mexico (Chiapas, Distrito Federal, Guerrero, Hidalgo, Jalisco, México, Michoacán, Morelos, Oaxaca, Puebla, Sonora), Guatemala, and Nicaragua. It may be recognized as a variety (see synonymy), but does not seem to breed true. [= C, F, G, L, Pa, RAB, W, WH, WV, X; > *C. odontorhiza* var. *pringlei* (Greenman) Freudenstein – FNA, K, Z; > *C. odontorhiza* var. *odontorhiza* – FNA, K, Z; = *Corallorrhiza odontorhiza* – S, orthographic variant; > *C. pringlei* Greenman]

Corallorhiza trifida Châtelain, Early Coralroot, Pale Coralroot. Boreal forests, bogs, peaty swamps. May-July. NL (Labrador) to Alska, south to DC {specimen at NCU}, MD, WV, PA, NJ (Magrath & Freudenstein in FNA 2002, Kartesz 1999), allegedly GA (Small 1933), OH, IN, IL, SD, NM, CA. [= FNA, G, K, L, Pa, WV, Z; > *C. trifida* var. *verna* (Nuttall) Fernald – C, F; = *Corallorrhiza corallorrhiza* – S]

Corallorhiza wisteriana Conrad, Spring Coralroot. Moist forests. April-May. Widespread in e. North America, from NJ, PA, OH, IN, IL, MO, and OK south to FL, and TX, and also in the Rockies from MT and w. SD south to s. Mexico. [= C, F, FNA, G, K, L, Pa, RAB, W, WH, WV, X, Z; = *Corallorrhiza wisteriana* – S, orthographic variant]



Cypripedium Linnaeus 1753 (Lady's-slipper)

A genus of about 40-50 species, north temperate in distribution. References: Sheviak (1994)=Z; Case et al. (1998); Wallace & Case (2000)=Y; Sheviak in FNA (2002a); Pridgeon et al. (1999c); Correll (1950)=X. Key to yellow-flowered species adapted from Sheviak (1994).

1 Plant scapose, with 2 basal leaves; pouch-like lip of flower with a longitudinal fissure, pink (rarely nearly white); [section *Acaulia*] ..... ***C. acaule***
1 Plant caulescent, with (2) 3-7 leaves alternate on the stem; pouch-like lip of flower with a rounded orifice, yellow, pink, or white.
2 Pouch-like lip of flower pink and white (rarely all white); lateral petals and dorsal sepal white, not twisted, obtuse to acute; [section *Obtusipetala*]..... ***C. reginae***
2 Pouch-like lip of flower yellow or white; lateral petals and dorsal sepal brown, purplish brown, or yellow, slightly to strongly twisted, acuminate-attenuate; [section *Cypripedium*].
3 Pouch-like lip of flower white, 1.5-2.5 cm long; orifice margin acute on the apical margin; [of calcareous barrens]..... ***C. candidum***
3 Pouch-like lip of flower bright yellow, pale yellow, or creamy white, (2.0-) 2.2-6.3 cm long (if pale yellow or white, then > 4 cm long); orifice margin rounded-obtuse on the apical margin; [of various habitats].
4 Dorsal sepal 3.5-5.0 cm wide; pouch orifice 2.7-4.5 cm long; pouch-like lip 4.5-6.3 cm long, pale yellow or creamy white; plants robust, typically 5-8 dm tall..... ***C. kentuckiense***
4 Dorsal sepal 1.5-2.9 cm wide; pouch orifice 0.5-1.3 cm long; pouch-like lip (2.0-) 2.2-5.8 cm long, medium to rich yellow; plants not as robust, typically 2-5 (-6) dm tall.
5 Pouch-like lip 2.2-3.4 cm long; sepals and lateral petals usually densely and minutely spotted with dark reddish brown or purple, thus appearing uniformly dark ..... ***C. parviflorum*** *var.* ***parviflorum***
5 Pouch-like lip (2.0-) 3.0-5.8 cm long; sepals and lateral petals unmarked (greenish-yellow), or more often streaked, blotched, striped or reticulately marked with dark reddish brown or purple (but generally not extensively blotched) ..... ***C. parviflorum*** *var.* ***pubescens***

Cypripedium acaule Aiton, Pink Lady's-slipper, Moccasin-flower. Dry to mesic, acid forests and woodlands, often under pine or other conifers. April-July. NL (Newfoundland) west to n. AB, south to NC, SC, GA, TN, n. IN, and MN. [= RAB, C, F, FNA, G, K, L, Pa, W, WV, X; = *Fissipes acaulis* (Aiton) Small – S]

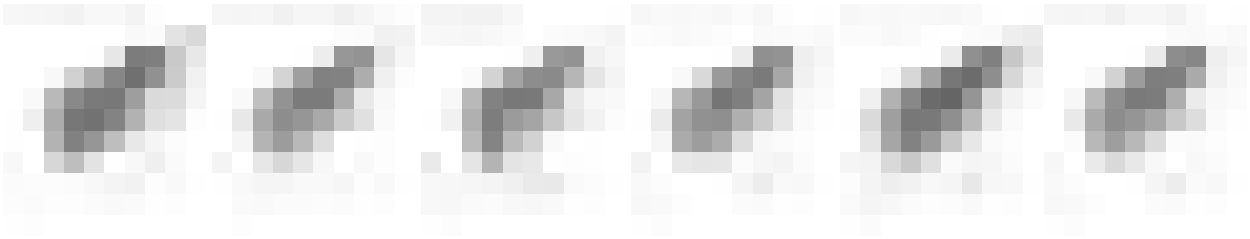
Cypripedium candidum Muhlenberg ex Willdenow, White Lady's-slipper. Calcareous barrens and bluffs. NY and NJ west to ND, south to w. VA, nw. and sc. AL, and MO. [= C, F, FNA, G, K, L, Pa, X]

Cypripedium kentuckiense C.F. Reed, Kentucky Yellow Lady's-slipper. Sandy ravine bottoms and springhead seeps along small streams. First reported for our area by Weldy et al. (1996). *C. kentuckiense* C.F. Reed is similar to *C. parviflorum* var. *pubescens* and, in addition to the site discovered in e. VA, reaches AL, e. TN (Franklin and Scott counties, Cumberland Plateau) and e. KY. Case et al. (1998) studied isozymes of *C. kentuckiense* and related *Cypripedium spp*.; the recognition of *C. kentuckiense* as a species was supported. [= C, FNA, K, Y, Z; often included in a broad concept of *C. calceolus*, *C. pubescens*, or *C. calceolus* var. *pubescens* by most earlier authors]

Cypripedium parviflorum Salisbury *var*. ***parviflorum***, Small Yellow Lady's-slipper. Mesic forests, seepy forests over amphibolite, other habitats. April-June. VT, NY, OH, IN, IL, MO and KS, south to NC, GA, AL, AR, and OK. The exact range, abundance, and habitats of this variety in our area are obscure, because of confusion with the more northern var. *makasin* (Farwell) Sheviak and small-flowered forms of var. *pubescens*. See Sheviak (1994) for a discussion of why North American plants of yellow lady's-slippers are recognized as a species distinct from the European *C. calceolus* Linnaeus. [= FNA, Pa, Y, Z; < *C. calceolus* Linnaeus var. *pubescens* – RAB, G, X; = *C. parviflorum* – K, S, WV; = *C. calceolus* var. *parviflorum* (Salisbury) Fernald – C, F, L, W]

Cypripedium parviflorum Salisbury *var*. ***pubescens*** (Willdenow) Knight, Large Yellow Lady's-slipper, Whippoorwill Shoes. Rich mesic forests. April-June. NL (Labrador) and AK south to GA, AL, MS, NM, and AZ. [= FNA, Pa, Y, Z; < *C. calceolus* Linnaeus var. *pubescens* (Willdenow) Correll – RAB, G, X (also see *C. parviflorum* var. *parviflorum*); = *C. pubescens* Willdenow – K, S, WV; = *C. calceolus* var. *pubescens* (Willdenow) Correll – C, F, L, W]

Cypripedium reginae Walter, Showy Lady's-slipper, Queen Lady's-slipper. Over circumneutral to basic rocks, or (allegedly) in mossy wet forests under *Rhododendron*. May-June. NL (Newfoundland), ON and SK south to NC (?), GA, TN, AR, and ND. The native occurrence of this species in NC is questionable; the only definite specimen from the state is from an implausible habitat for the species (highly acid humus under rhododendron). [= RAB, C, F, FNA, G, K, L, Pa, S, W, WV, X]



Epidendrum Linnaeus 1759 (Green-fly Orchid)

A genus of about 1000 species, of tropical (and rarely subtropical) America. References: Hágsater in FNA (2002a); Pridgeon et al. (2005); Correll (1950)=X.

Epidendrum magnoliae Muhlenberg, Green-fly Orchid. Epiphytic on limbs of trees, especially *Magnolia grandiflora*, *Quercus virginiana*, and *Taxodium spp*., in blackwater river swamps and mesic hardwood hammocks, usually on relatively horizontal limbs mixed with *Pleopeltis polypodioides*, also rarely in crevices of Altamaha Grit outcrops. July-October. The northernmost epiphytic orchid: se. NC south to c. peninsular FL, west to LA; also in ne. Mexico. It is locally rather common, but rarely seen as it occurs primarily in blackwater swamps, on upper limbs of *Taxodium*, *Nyssa*, and other trees, typically mixed with *Pleopeltis*. See Correll (1936) for additional discussion of this species at its northern limit. Hágsater (2000) indicates that *E. magnoliae* Muhlenberg has nomenclatural priority over *E. conopseum* R. Brown. [= FNA; = *E. conopseum* Aiton f. – RAB, L, WH, X; > *E. conopseum* var. *conopseum* – K; = *Amphiglottis conopsea* (Aiton f.) Small – S]

Epipactis Zinn 1757 (Helleborine)

A genus of about 25 species, of w. North America, Eurasia, and n. Africa (Brown & Argus in FNA 2002). References: Brown & Argus in FNA (2002a); Correll (1950)=X.

* ***Epipactis helleborine*** (Linnaeus) Crantz, Broad-leaved Helleborine. Forests; native of Europe. June-September. This species is becoming very common in the ne. United States and se. Canada. [= C, F, FNA, K, L, Pa, WV, X; = *E. latifolia* (Linnaeus) Allioni – G]

Eulophia R. Brown ex Lindley 1823

A genus of about 215 species, pantropical (Romero-González in FNA 2002). References: Romero-González in FNA (2002a); Correll (1950)=X. [also see *Pteroglossaspis*]

Eulophia alta (Linnaeus) Fawcett & Rendle, Wild Coco. Flatwoods, swamps. S. GA south through the FL peninsula into the West Indies, Mexico, Central America, and South America. [= FNA, GW, K; = *Platypus altus* (Linnaeus) Small – S] {add X to synonymy}

Galearis Rafinesque 1833 (Showy Orchis)

A genus of 3-6 species, of e. North America and e. Asia. References: Sheviak & Catling in FNA (2002a); Pridgeon et al. (1999b); Correll (1950)=X.

Galearis spectabilis (Linnaeus) Rafinesque, Showy Orchis. Rich, deciduous forests, most typically over calcareous or mafic rocks. April-July. NB and QC west to MN, south to GA and AR. [= FNA, K, L, Pa, W; = *Orchis spectabilis* Linnaeus – RAB, C, F, G, WV, X; = *Galeorchis spectabilis* (Linnaeus) Rydberg – S]

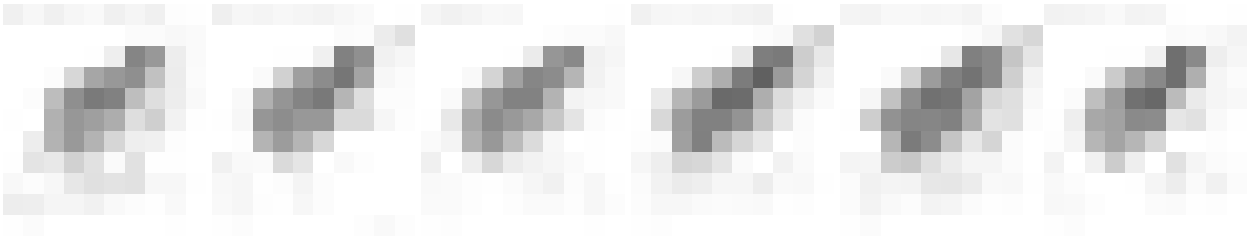
Goodyera R. Brown 1813 (Rattlesnake Orchid)

A genus of about 55-100 species, widespread in distribution but primarily Northern Hemisphere. References: Kallunki in FNA (2002a); Pridgeon et al. (1999c); Correll (1950)=X.

1 Leaves blue-green, the upper surface variegated with white, the midrib broadly whitened (1-3 mm wide), the remainder of the network of white variegations narrow (< 0.5 mm wide), generally lacking any internal variation in color, the outlines of the variegations smooth; inflorescence cylindric, not secund or one-sided ..... ***G. pubescens***
1 Leaves dark green, the upper surface variegated with pale green, the midrib only irregularly and narrowly pale green, most of the network of pale green variegations broad (0.5-1 mm wide), with a dark green center line (thus the variegations appearing double), the outlines of the variegations finely and irregularly toothed; inflorescence secund, primarily one-sided, or loosely spiraled.
  2 Lip narrowly saccate (th pouch much longer than deep), with an elongate recurved apex ..... ***G. repens***
  2 Lip deeply concave (the pouch about as deep as long), with a short spreading or recurved apex ..... ***G. tesselata***

Goodyera pubescens (Willdenow) R. Brown, Downy Rattlesnake-orchid. Dry to moist forests and woodlands. June-August. NB west to ON and MN, south to Panhandle FL, MS, and AR. One of the commonest of orchids in much of its range. [= C, F, FNA, G, K, L, Pa, RAB, W, WV, X; = *Peramium pubescens* (Willdenow) MacMillan – S]

Goodyera repens (Linnaeus) R. Brown, Lesser Rattlesnake-orchid. Moist forests, usually under conifers and rhododendrons. June-September. A circumboreal species of northern North America and Eurasia, this species reaching its southern limit in e. North America in NC and SC. [= FNA, K, L, Pa, W; > *Goodyera repens* var. *ophioides* Fernald – C, F, G, RAB, WV, X; > *Peramium ophioides* (Fernald) Rydberg – S]



Goodyera tesselata Loddiges, Checkered Rattlesnake-plantain. Mixed deciduous and pine woods. July-early September. NL (Newfoundland) and MB south to NJ, MD, PA, n. OH, MI, WI, and MN. Probably an allopolyploid, derived from *G. oblongifolia* × *repens*. [= FNA, C, F, G, K, L, Pa, X]

Habenaria Willdenow 1805 (Longspur Orchid, Habenaria)

A genus of about 600 species, tropical and subtropical in the Old World and New World. References: Batista et al. (2011)=Z; Sheviak in FNA (2002a); Pridgeon et al. (1999b); Correll (1950)=X. [also see *Coeloglossum*, *Platanthera*]

1 Lip and lateral petals toothed ..... ***H. floribunda***
1 Lip or lateral petals divided into linear segments.
  2 Spur 4-10 cm long; [terrestrial, though in moist habitats] ..... ***H. quinqueseta***
  2 Spur 0.4-1.4 cm long; [aquatic or semi-aquatic in marshes and swamps] ..... ***H. repens***

Habenaria floribunda Lindley, Mignonette Orchid. Rich, moist hardwood hammocks. Ne. FL south to s. FL; West Indies, Mexico, Central America, South America. [= WH, Z; = *H. odontopetala* Reichenbach f. – FNA, K; = *Habenella odontopetala* (Reichenbach f.) Small; ? *Habenaria strictissima* Reichenbach f. var. *odontopetala* (Reichenbach f.) L.O. Williams – X; = *Habenella floribunda* (Lindley) Szlachetko & Kras-Lapinska]

Habenaria quinqueseta (Michaux) A. Eaton, Long-horned Habenaria, Michaux's Orchid. Wet pine flatwoods, moist hardwood hammocks, Altamaha Grit outcrops, ditches. August-October. SC south to s. FL, west to se. TX. [= FNA, K, WH; = *H. quinqueseta* var. *quinqueseta* – L; < *H. quinqueseta* – GW, RAB, S, X]

Habenaria repens Nuttall, Water-spider Orchid, Floating Orchid. Blackwater swamps, pools, banks of creeks and rivers. April-November. NC south to FL and west to TX; West Indies, Mexico, Central America, and n. South America. Reported from se. VA. [= FNA, GW, K, L, RAB, S, WH, X]

Hexalectris Rafinesque 1825 (Crested Coralroot)

A genus of about 9 species, mycotrophic herbs, of s. North America, especially sw. United States and Mexico. References: Kennedy & Watson (2010)=V; Catling & Engel (1993)=Z; Catling (2004)=Y; Goldman, Coleman, Magrath, & Catling in FNA (2002a); Correll (1950)=X.

Hexalectris spicata (Walter) Barnhart, Crested Coralroot, Brunetta. Dry forests and woodlands, especially over mafic or calcareous rocks, such as diabase, gabbro, calcareous siltstone, and dolomite (though sometimes in distinctly acid situations), shell middens. April-August. MD, OH, and MO south to s. FL and w. and s. TX. The yellow and purple flowers borne on a brown stem present a very peculiar color combination. [= V; = *H. spicata* var. *spicata* – FNA, Y, Z; < *H. spicata* – RAB, C, F, G, K, L, S, W, WH, WV, X]

Isotria Rafinesque 1808 (Whorled Pogonia, Five-leaves, Fiveleaf Orchid)

A genus of 2 species, of e. North America. Cameron & Chase (1999) indicate that *Isotria* should perhaps be included in a more broadly circumscribed *Pogonia* (as was often done prior to 1922). References: Mehrhoff & Homoya in FNA (2002a); Correll (1950)=X.

Identification notes: Sterile *Isotria* is sometimes confused with *Medeola*. *Medeola* has a wiry stem, with floccose hairiness, at least toward the base. *Isotria* has a fleshier stem, lacking hairs.

1 Sepals 12-30 mm long, greenish-brown; lip 10-15 mm long; pedicel of fruit (0-) 5-10 (-15) mm long; plant glaucous, the stem whitish-green . ..... ***I. medeoloides***
1 Sepals 35-60 mm long, purple-brown; lip 20-25 mm long; pedicel of fruit (12-) 20-55 mm long; plant scarcely glaucous (if at all), the stem generally purplish ..... ***I. verticillata***

Isotria medeoloides (Pursh) Rafinesque, Small Whorled Pogonia, Little Five-leaves. Moist forests, in the mountains and upper Piedmont usually with *Pinus strobus*. May-June. Widespread (but very local) in ne. North America, from s. ME and MI south to c. and e. WV, w. VA, w. NC, e. TN, and n. GA. The reproductive biology of this species was studied by Vitt & Campbell (1997). Van Alstine et al. (1996) discuss the habitats of known occurrences in Virginia. [= C, F, FNA, G, K, L, Pa, RAB, W, X; = *I. affinis* (C.F. Austin) Rydberg – S; = *Pogonia affinis* C.F. Austin]

Isotria verticillata (Muhlenberg ex Willdenow) Rafinesque, Large Whorled Pogonia, Larger Five-leaves. Moist to dry forests. April-July. ME and MI south to Panhandle FL and e. TX. [= C, F, FNA, G, K, L, Pa, RAB, S, W, WV, X; = *Pogonia verticillata* (Muhlenberg ex Willdenow) Nuttall – WH]

Liparis L.C. Richard 1817 (Wide-lip Orchid, Twayblade)

A genus of about 250-350 species, cosmopolitan. References: Magrath in FNA (2002a); Correll (1950)=X.

1 Lip (8-) 10-12 mm long, pale purple; pedicels 11-18 mm long, equal to or longer than the capsule..... ***L. liliifolia***
1 Lip 4-5.5 mm long, yellowish-green; pedicels 3-7 mm long, shorter than the capsule ..... ***L. loeselii***

Liparis liliifolia (Linnaeus) L.C. Richard ex Ker-Gawler, Large Twayblade, Mauve Sleekwort, Russet-witch, Brown Wide-lip Orchid. Moist forests, floodplains. May-July. VT and ON west to MN, south to GA and AR; also in China. [= C, F, FNA, G, GW, K, L, Pa, RAB, S, W, WV, X]

Liparis loeselii (Linnaeus) L.C. Richard, Fen Orchid, Loesel's Twayblade, Bog Twayblade, Yellow Wide-lip Orchid. Seepages at moderate to high elevations in the mountains, mucky bay swamps (dominated by *Persea palustris* and *Magnolia virginiana*) at about sea level on the Outer Banks, and other moist, seepy habitats, especially over mafic or calcareous rocks. May-July. NS and QC west to NT and BC, south to ne. NC (Dare County), sw. NC, AL, AR, KS, NE, and WA. [= C, F, FNA, G, GW, K, L, Pa, RAB, S, W, WV, X]

Listera R. Brown 1813 (Twayblade)

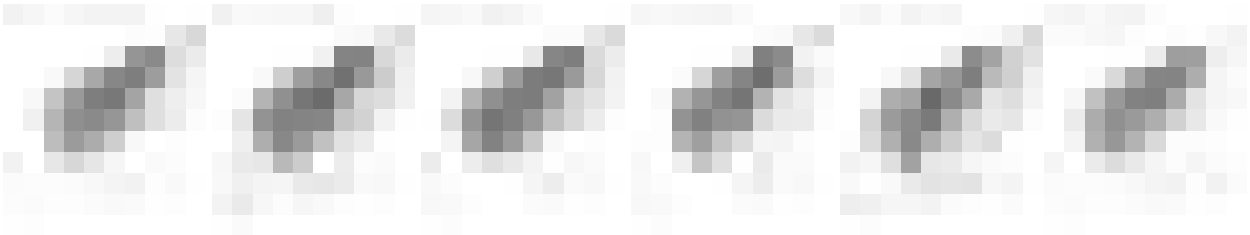
A genus of about 25 species, boreal, north temperate, and south temperate (Magrath & Coleman in FNA 2002a). Recent studies suggest that *Listera* may be best included in *Neottia* Guettard. References: Magrath & Coleman in FNA (2002a); Correll (1950)=X.

1 Lip usually cleft about one-third its length, the two lobes oblong, with rounded apices ..... ***L. smallii***
1 Lip usually cleft about two-thirds its length, the two lobes linear, with acute apices.
2 Lip 6-10 mm long, lacking prominent teeth near the base (but with 2 vertically-oriented lobes); pedicels and raceme axis glandular-puberulent; sepals and petals 1-2 mm long ..... ***L. australis***
2 Lip 3-5 mm long, with 2 prominent teeth near the base, these diverging horizontally; pedicels and raceme axis glabrous; sepals and petals 1-5-3 mm long ..... ***L. cordata*** *var.* ***cordata***

Listera australis Lindley, Southern Twayblade. Swamps, second terraces in floodplain forests, wet woods under *Rhododendron maximum*. February-July. Mainly a Southeastern Coastal Plain species, from NJ south to wc. peninsular FL (Kunzer et al. 2009) and west to e. TX, but also scattered inland of the Coastal Plain and north into VT and s. Canada. [= RAB, C, F, FNA, G, GW, K, L, Pa, W, WH, X; = *Ophrys australis* (Lindley) House – S; = ***Neottia bifolia*** (Rafinesque) Baumbach]

Listera convallarioides (Swartz) Nuttall. Attributed to NC by Correll (1950); this record of this far-northern species is almost certainly an error. [= *Neottia convallarioides* (Swartz) Richard] {rejected; not keyed}

Listera cordata (Linnaeus) R. Brown *var.* ***cordata***, Heartleaf Twayblade, Lesser Twayblade. Northern hardwood and spruce-fir forests. June-July. A widespread circumboreal species of n. Eurasia and n. North America, south to NC (at least formerly, not seen in this century). Var. *cordata* is widespread in ne. United States and widespread in Canada; var. *nephrophylla* (Rydberg) Hultén is widespread in nw. North America. [= FNA, K, L, Pa; < *L. cordata* – RAB, C, F, G, W, WV, X; = ***Neottia cordata*** (Linnaeus) Richard]



Listera smallii Wiegand, Appalachian Twayblade, Small's Twayblade, Kidneyleaf Twayblade. Shaded swamps, wet slopes, nearly always beneath *Rhododendron maximum*. June-July. A Southern and Central Appalachian endemic: s. PA south to nw. SC and ne. GA. [= RAB, C, FNA, G, GW, K, L, Pa, W, WV, X; = *Ophrys smallii* (Wiegand) House – S; = ***Neottia smallii*** (Wiegand) Szlachetko]

Malaxis Solander ex Swartz 1788 (Adder's-mouth)

A genus of about 250-300 species, nearly cosmopolitan. References: Catling (1991)=Z; Catling & Magrath in FNA (2002a); Correll (1950)=X. Key adapted from Catling (1991).

1 Leaves 2-5; lip oriented upward, erect, entire, obtuse to acuminate ..... ***M. spicata***
1 Leaf solitary; lip oriented downward, deflexed, 3-lobed (the central lobe smaller than the 2 lateral lobes).
2 Pedicels 3-5 (-5.8) mm long (even in plants with inflorescences over 80 mm long); basal lobes of the lip prominent, 0.75-1.1 mm long, usually 1.5-2 (-2.5)× as long as the apical lateral lobes and > 0.6× as long as the length from the base to the tip of the mid-lobe; inflorescences loosely flowered above, the lower flowers withering slowly ..... ***M. bayardii***
2 Pedicels (4-) 5-10 (-13) mm long (and > 5 mm long in plants with inflorescences > 45 mm long); basal lobes of the lip not prominent, 0.4-1.1 mm long, mostly < 1.5× as long as the apical lateral lobes and < 0.6× as long as the length from the base to the tip of the mid-lobe; inflorescences densely flowered above, the lower flowers soon withering ..... ***M. unifolia***

Malaxis bayardii Fernald, Appalachian Adder's-mouth. Dry, open, upland forests, shale barrens. July-September. S. NY and se. MA south through CT, RI, NJ, PA, and VA to w. and c. NC, mostly in the mountains (but somewhat disjunct on the Coastal Plain of VA). See Catling (1991) for further discussion of the distinction of *M bayardii* from *M. unifolia*. [= F, FNA, K, Pa, Z; < *M. unifolia* – C, G, GW, L, RAB, S, W, WV, X]

Malaxis brachypoda (A. Gray) Fernald, White Adder's-mouth, White Malaxis. Moist forests and bogs. NL west to AK, south to sc. PA (Rhoads & Klein 1993; Rhodes & Block 2007), n. NJ (Kartesz 2010), IL, MN, and WA; disjunct in COand CA; additionally reported by F to range south to the Mountains of TN, the documentation unknown. [= F, K1; = *M. monophyllos* (Linnaeus) Swartz var. *brachypoda* (A. Gray) Morris & Eames – C, FNA, G, L, Pa, X; < *M. monophyllos* – K2; = *M. monophyllos* (Linnaeus) Swartz ssp. *brachypoda* (A. Gray) Á. & D. Löve] {rejected; not keyed}

Malaxis spicata Swartz, Florida Adder's-mouth. Maritime swamp forests, calcareous but mucky swamps in the outer Coastal Plain, spring-fed swamps, wet hammocks. July-October. Se. VA south to FL; n. West Indies. [= RAB, C, FNA, G, GW, K, L, S, WH, X; ? *M. floridana* (Chapman) Kuntze – F]

Malaxis unifolia Michaux, Green Adder's-mouth. Bogs, moist forested slopes, in the Sandhills in longleaf-oak-hickory forests. June-August. NL (Newfoundland) and FL west to MN, IA, MO, e. OK, and e. TX; also in Mexico, Cuba, the West Indies, and Central America. [= F, FNA, K, Z; < *M. unifolia* – C, G, GW, L, Pa, RAB, S, W, WH, WV, X (also see *M. bayardii*)]

Mesadenus Schlechter 1920

A genus of 7 species, of tropical and subtropical s. North America, West Indies, Central America, and South America.
References: Ackerman in FNA (2002a); Correll (1950)=X.

Mesadenus lucayanus (Britton) Schlechter, Gray Ladies'-tresses. Shell middens, dry calcareous hammocks. Late December-March. Ne. FL (Duval County) south to s. FL; West Indies; e. Mexico and n. Central America. [=FNA, S; < *Spiranthes polyantha* Reichenbach f. – L, WH] {add to genus key; add X to synonymy}

Platanthera L.C. Richard 1817 (Fringed Orchid, Fringeless Orchid)

A genus of about 200 species, largely of the temperate northern hemisphere, extending south into tropical Central America and tropical se. Asia. The recognition of *Gymnadeniopsis* as separate from *Platanthera* is uncertain at this time; originally named by Rydberg, its recognition was acknowledged as possibly warranted by Sheviak in FNA (2002a) and embraced by Brown (2006a). Three of our species would belong to *Gymnadeniopsis*: *P. clavellata*, *P. integra*, and *P. nivea*. References: Sheviak in FNA (2002a); Correll (1950)=X; Reddoch & Reddoch (1993); Pridgeon et al. (1999b).

Identification Notes: Hybrids are frequent and are not keyed; they are generally intermediate in characters and are generally found in mixed populations of the two parents.

1 Lip entire, finely toothed, or eroded (neither fringed nor deeply divided into 3 lobes).
2 Leaves basal, 1 or 2, orbicular, (5-) 8-25 cm wide, prostrate on the ground, the stem naked or with a few bladeless bracts..... ***P. orbiculata***
2 Leaves cauline, 1-10 or more, mostly lanceolate, 1-5 cm wide, ascending, the stem with at least 1 (usually several) bladed leaves.
3 Lip 11-15 mm long; spur mostly 40-50 mm long..... ***P. integrilabia***
3 Lip 2-8 mm long; spur 4-23 mm long.
4 Flowers golden-yellow or bright-white.
5 Flowers golden-yellow; spur 4-8 mm long; lip minutely crenulate, directed downward ..... ***P. integra***
5 Flowers bright-white; spur 11-23 mm long; lip entire, directed upward..... ***P. nivea***
4 Flowers green, greenish-white, yellowish-green, yellowish-white, or dull-white.
6 Larger stem leaves usually 1, rarely 2, near the middle of the stem; raceme 2-9 cm long, 2-3.5 cm in diameter; lip without a tubercle on the upper surface near the base, also lacking lateral auricles near the base..... ***P. clavellata***
6 Larger stem leaves usually 2 (-5), near the middle of the stem or toward its base; raceme 5-20 cm long, 1.2-2 cm in diameter; lip with a tubercle on the upper surface near the base, also usually with 2 lateral auricles.
7 Most bracts of the inflorescence shorter than the flowers they subtend (the lowermost few exceeding the flowers); flowers sparsely distributed; lip orbicular, 1-1.5× as long as broad, yellowish-green..... ***P. flava*** *var.* ***flava***
7 Most bracts of the inflorescence exceeding the flowers they subtend (the uppermost few sometimes shorter than the flowers); flowers densely distributed; lip oblong, 2-3× as long as broad, green..... ***P. flava*** *var.* ***herbiola***

1 Lip either fringed, deeply divided into 3 lobes, or both.
8 Lip not deeply divided into 3 lobes, deeply fringed; flowers white, yellow, orange.
9 Flowers white; spur 15-50 mm long.
10 Spur 15-26 mm long, ca. 1× as long as the ovary; lip descending and thence curved back toward the stem, narrowed at its base to a very short isthmus (the section between the base and the fringed portion); lip fringing short and relatively coarse; [of NL (Newfoundland) west to MI and IL, south to GA]..... ***P. blephariglottis***
10 Spur 30-50 mm long, ca. 2× as long as the ovary; lip projected forward; lip narrowed to an extended isthmus; lip fringing elongate and delicate; [of e. NC south to c. peninsular FL, west to e. TX] ..... ***P. conspicua***
9 Flowers yellow to orange; spur 5-33 mm long.
11 Spur 20-33 mm long, exceeding the 12-27 mm long ovary; undivided portion of lip 8-12 mm long ..... ***P. ciliaris***
11 Spur 4-17 mm long, equal to or shorter than the ovary; undivided portion of lip 4-6 mm long.
12 Spur 8-17 mm long, about as long as the 10-19 mm long ovary; spur orifice circular ..... ***P. chapmanii***
12 Spur 4-10 mm long, shorter than the 7-13 mm long ovary; spur orifice keyhole-shaped or triangular..... ***P. cristata***
8 Lip deeply divided into 3 lobes, the lobes deeply fringed, shallowly fringed, eroded, or entire; flowers purple or greenish-white or yellowish-white.
13 Flowers greenish-white or yellowish-white; lateral lobes of lip deeply fringed (nearly or entirely to the point of junction with the central lobe of the lip).
14 Perianth greenish-white; lateral petals linear-spatulate, < 2 mm wide, blunt, entire to inconspicuously crenulate; lateral sepals deflexed..... ***P. lacera***
14 Perianth white or cream; lateral petals cuneate to broadly obovate, 4-12 mm wide, toothed; lateral sepals divergent..... ***P. leucophaea***
13 Flowers purple (or rarely white in albino forms); lateral lobes of lip entire, eroded, shallowly fringed, or deeply fringed.
15 Lobes of lip eroded or entire, few (if any) of the segments > 1 mm long ..... ***P. peramoena***
15 Lobes of lip shallowly or deeply fringed, most or all of the segments > 1 mm long.
16 Lobes of the lip fringed < 1/3 of the way to the base of the lobes; opening to nectary dumbbell-shaped (the pollen sacs close together); spur 12-20 mm long..... ***P. psycodes***
16 Lobes of lip fringed from 1/3 to nearly all the way to the base of the lobes; opening to nectary widely rounded (the pollen sacs spread widely apart); spur 20-35 mm long.

17 Lip segments moderately to deeply fringed; isthmus of the lip stout, about 2× as long as wide; spur 20-26 mm long, ca. 1.25× as long as the lip; orifice round; flowering mid June-early July..... ***P. grandiflora***
17 Lip segments deeply and compoundly lacerate; isthmus of the lip slender, about 4× as long as wide; spur 21-35 mm long, 2-2.5× as long as the lip; orifice angled at top; flowering mid July-early August ..... ***P. shriveri***

Platanthera blephariglottis (Willdenow) Lindley, Small White Fringed Orchid. Seepages, sandhill-pocosin ecotones. July-September. NL (Newfoundland) west to MI and IL, south to GA. Following Brown (2006b), it seems best to recognize the two white-fringed orchids as separate species; they are morphologixcally distinctive, and where they co-occur their blooming time is offset. [= *Platanthera blephariglottis* (Willdenow) Lindley var. *blephariglottis* – FNA, K, L, Pa; < *Habenaria blephariglottis* (Willdenow) Hooker var. *blephariglottis* – RAB, X; < *Habenaria blephariglottis* var. *blephariglottis* – F (possibly misapplied); < *Habenaria blephariglottis* – GW; = *Blephariglottis blephariglottis* (Willdenow) Rydberg – S (possibly misapplied); < *Platanthera blephariglottis* (Willdenow) Lindley – W; = ***Blephariglottis albiflora*** Raf.]

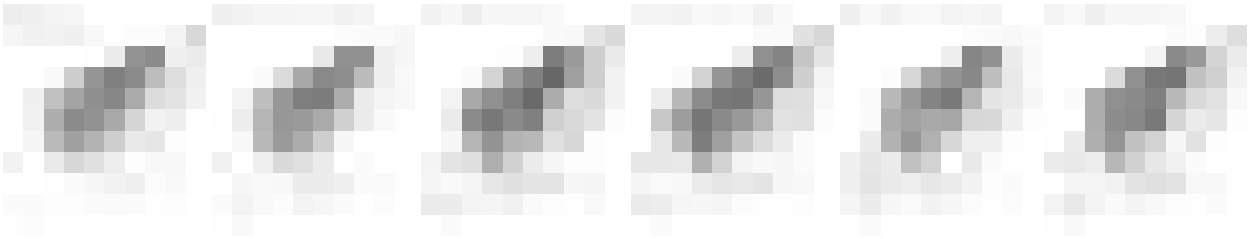
Platanthera chapmanii (Small) Luer, Chapman's Orange-fringed Orchid. Pine savannas. S. GA and n. FL; e. TX. Previously generally confused with the hybrid between *P. ciliaris* × *cristata (P. ×chapmanii*); see Folsom (1984) and Brown (2004) for details. [= FNA, K, WH; = ***Blephariglottis chapmanii*** Small – S] {synonymy incomplete}

Platanthera ciliaris (Linnaeus) Lindley, Yellow Fringed Orchid. Savannas, moist roadbanks, meadows, pastures, bogs. July-September. NH, MI, IL, MO, and OK south to c. peninsular FL and TX. *P. ciliaris* is probably our most common and least habitat-specific *Platanthera*. [= FNA, K, L, Pa, W, WH; = *Habenaria ciliaris* (Linnaeus) R. Brown – RAB, C, F, G, GW, WV, X; = ***Blephariglottis ciliaris*** (Linnaeus) Rydberg – S]

Platanthera clavellata (Michaux) Luer, Small Green Wood Orchid. Seepages, bogs, swamps, other wet places. June-September. NL (Newfoundland) and ND south to Panhandle FL and TX. [= FNA, K, L, Pa, W, WH; = *Habenaria clavellata* (Michaux) Sprengel – C, G, GW, WV, X; > *Habenaria clavellata* var. *wrightii* Olive – RAB; > *Habenaria clavellata* (Michaux) Sprengel var. *clavellata* – RAB, F; = ***Gymnadeniopsis clavellata*** (Michaux) Rydberg – S]

Platanthera conspicua (Nash) P.M. Brown, Large White Fringed Orchid. Savannas, seepages, sandhill-pocosin ecotones. July-September. NC south to c. peninsular FL, west to TX. Brown (2006b) and Sheviak in FNA (2002a) clarify the taxonomy of this complex; previous studies (such as Hardin 1961) used different characters, and interpreted the white-fringed orchid taxa differently. [= *Platanthera blephariglottis* (Willdenow) Lindley var. *conspicua* (Nash) Luer – FNA, K, L, WH; < *Habenaria blephariglottis* (Willdenow) Hooker var. *blephariglottis* – RAB, X; = *Habenaria blephariglottis* var. *conspicua* (Nash) Ames – C, F; < *Habenaria blephariglottis* – GW; = ***Blephariglottis conspicua*** (Nash) Small – S]

Platanthera cristata (Michaux) Lindley, Crested Fringed Orchid, Golden Fringed Orchid. Savannas, bogs, moist roadsides. June-September. *P. cristata* is more limited to the Coastal Plain than the related *P. ciliaris*, ranging from s. MA south to FL and west to TX, and also inland in KY, TN, AR, SC, and NC. [= FNA, K, L, Pa, W, WH; = *Habenaria cristata* (Michaux) R. Brown – RAB, C, F, G, GW, X; = ***Blephariglottis cristata*** (Michaux) Rafinesque – S]



Platanthera flava (Linnaeus) Lindley *var.* ***flava***, Southern Rein Orchid, Southern Gypsy-spike. Shaded wet places, such as swampy forests. March-September. VA, IN, IL, MO, and OK, south to c. peninsular FL and TX; remarkably disjunct in s. NS, where it occurs associated with other disjuncts from the Southeastern Coastal Plain. See Homoya (1993) for additional discussion of the two varieties of *P. flava*. [= FNA, K, L; = *Habenaria flava* (Linnaeus) R. Brown var. *flava* – RAB, C, F, G, X; < *Habenaria flava* – GW; > *Perularia scutellata* (Nuttall) Small – S; > *Perularia bidentata* (Elliott) Small – S]

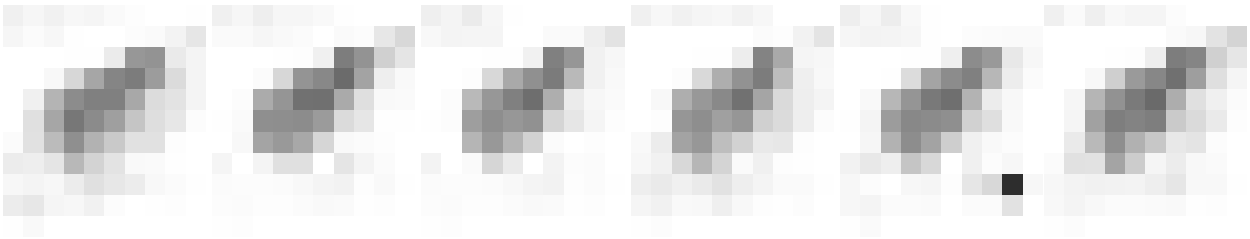
Platanthera flava (Linnaeus) Lindley *var.* ***herbiola*** (R. Brown) Luer, Tubercled Rein Orchid, Northern Gypsy-spike. Bogs, seepages. May-September. NS, QC, and MN south to NC, GA, TN, and MO. See Homoya (1993) for additional discussion of the two varieties of *P. flava*; he suggests that specific status may be warranted. [= FNA, K, L, Pa, W; = *Habenaria flava* (Linnaeus) R. Brown var. *herbiola* (R. Brown) Ames & Correll – RAB, C, F, G, WV, X; = *Perularia flava* (Linnaeus) Farwell – S, misapplied]

Platanthera grandiflora (Bigelow) Lindley, Large Purple Fringed Orchid, Plume-royal. Bogs, seepages, moist places at high elevations. June-early July. NL (Newfoundland) and ON south to NJ, OH, and MI, and south in the mountains to w. NC and ne. GA. Blooming 3-4 weeks earlier than either *P. psycodes* and *P. shriveri* when they grow in proximity. If *Orchis fimbriata* Aiton is conspecific, the correct name is *P. fimbriata* (Aiton) Lindley. [< *Platanthera grandiflora* – FNA, K, L, Pa, W; < *Habenaria psycodes* (Linnaeus) Sprengel var. *grandiflora* (Bigelow) A. Gray – RAB, C, G, X; < *Habenaria fimbriata* (Aiton) R. Brown – F, WV; < ***Blephariglottis grandiflora*** (Bigelow) Rydberg – S; = *Platanthera fimbriata* (Aiton) Lindley]

Platanthera integra (Nuttall) A. Gray ex Beck, Golden Fringeless Orchid, Yellow Fringeless Orchid. Savannas in the Coastal Plain, bogs in the Mountains and Piedmont. July-September. Essentially endemic to the Southeastern Coastal Plain, ranging from s. NJ south to FL and west to se. TX, with disjunct occurrences in TN (Eastern Highland Rim) and in bogs at low elevations of the Blue Ridge of NC. It is apparently now extirpated in the Mountains and Piedmont of NC. [= FNA, K, L, WH; = *Habenaria integra* (Nuttall) Sprengel – RAB, C, F, G, GW, X; = ***Gymnadeniopsis integra*** (Nuttall) Rydberg – S]

Platanthera integrilabia (Correll) Luer, Monkey-face Orchid, White Fringeless Orchid. Bogs, red maple-gum swamps, seeps and streambanks. July-September. Endemic to KY, e. TN, sw. VA (Lee County, documentation uncertain), w. NC, nw. SC, n. GA, n. AL, and n. MS, primarily in the Cumberland Plateau. See Zettler, Ahuja, & McInnis (1996) for a discussion of pollination. [= FNA, K, L, W; = *Habenaria blephariglottis* (Willdenow) Hooker var. *integrilabia* Correll – RAB, F, X; = *Habenaria correlliana* Cronquist – C; ? *Habenaria blephariglottis* var. *holopetala* (Lindley) A. Gray; = ***Blephariglottis integrilabia*** (Correll) Schrenk; ? ***Blephariglottis longicornis*** Rafinesque]

Platanthera lacera (Michaux) G. Don, Green Fringed Orchid, Ragged Fringed Orchid, Ragged Orchid. Swamps, bogs, seepages. June-August. Widespread in ne. North America, south to SC, GA, AL, AR, and OK. Var. *terrae-novae* (Fernald) Luer is not distinct, and is based on hybrid swarms involving *P. lacera* and *P. psycodes* (Catling 1997). [= FNA, K, Pa, W; = *Habenaria lacera* (Michaux) R. Brown – RAB, C, G, GW, WV, X; > *Habenaria lacera* var. *lacera* – F; = ***Blephariglottis lacera*** (Michaux) Farwell – S; > *Platanthera lacera* var. *lacera* – L]



Platanthera leucophaea (Nuttall) Lindley, Prairie Fringed Orchid. Damp calcareous meadows. May-July. ME west to NE, south to w. VA, nw. PA, c. OH, c. IN, IL, MO, and OK. [= FNA, K, Pa, W; = *Habenaria leucophaea* (Nuttall) A. Gray var. *leucophaea* – C; = *Habenaria leucophaea* (Nuttall) A. Gray – G, X; = ***Blephariglottis leucophaea*** (Nuttall) Farwell]

Platanthera nivea (Nuttall) Luer, Snowy Orchid, Bog-spike. Wet savannas. May-September. Essentially a Southeastern Coastal Plain endemic, *P. nivea* ranges from s. NJ and DE (at least formerly) south to FL and west to TX, disjunct in Coffee County, TN (Eastern Highland Rim). This species is even more irregular than most *Platanthera* in its flowering, whole populations sometimes not flowering for a number of years. The flowers are so white as to seem illuminated from within. This species was once locally abundant in the outer Coastal Plain of the Carolinas and farther south; Correll (1950) describes "large colonies of this species which form a blanket of white over the landscape." Also see the picture in B.W. Wells' Natural Gardens of North Carolina. [= FNA, K, L; = *Habenaria nivea* (Nuttall) Sprengel – RAB, C, F, G, GW, WH, X; = ***Gymnadeniopsis nivea*** (Nuttall) Rydberg – S]

Platanthera orbiculata (Pursh) Lindley, Large Round-leaved Orchid, Dinner-plate Orchid. Moist hardwood forests, especially over amphibolite. June-September. NL (Newfoundland) and NL (Labrador) west to AK, south to PA (and in the mountains to NC and TN), OH, IN, MN, SD, and OR. Reddoch & Reddoch (1993) have shown that *P. orbiculata* differs from *P. macrophylla* at the species level. Pollination is by night-flying moths, likely noctuids. [= FNA, Pa; = *Habenaria orbiculata* (Pursh) Lindley – RAB, WV; = *Habenaria orbiculata* var. *orbiculata* – C, F; < *Habenaria orbiculata* – G, W, X; = *Platanthera orbiculata* var. *orbiculata* – K, L; = *Lysias orbiculata* (Pursh) Rydberg – S]

Platanthera peramoena (A. Gray) A. Gray, Purple Fringeless Orchid, Purple Spire Orchid, Pride-of-the-peak. Bogs, seepages, moist forests, moist meadows. June-October. NJ, s. PA, OH, c. IL, and se. MO south to nw. SC, n. GA, n. AL, c. MS, and c. AR. See Spooner & Shelly (1983) for a review of information about this species. [= FNA, K, L, Pa, W; = *Habenaria peramoena* A. Gray – RAB, C, F, G, GW, X; = ***Blephariglottis peramoena*** (A. Gray) Rydberg – S; = *Platanthera fissa* Lindley, misapplied]

Platanthera psycodes (Linnaeus) Lindley, Small Purple Fringed Orchid, Butterfly Orchid. Northern hardwood forersts, other moist forests, seepages, bogs. June-August. NL (Newfoundland) and MB, south to n. GA, TN, and MO. [= FNA, K, L, Pa, W; = *Habenaria psycodes* (Linnaeus) Sprengel var. *psycodes* – RAB, C, G, X; = *Habenaria psycodes* – F, GW; = ***Blephariglottis psycodes*** (Linnaeus) Rydberg – S]

Platanthera shriveri P.M. Brown, Shriver's Purple Fringed Orchid, Shriver's Frilly Orchid. Seepages, northern hardwoods forests, roadbanks. Mid July-August. Sw. PA south through w. MD, e WV, and w. VA to nw. NC. See Brown, Smith, & Shriver (2008) for additional information. First reported for MD by Knapp et al. (2011). [< *Platanthera grandiflora* – FNA, K, L, W; < *Habenaria psycodes* (Linnaeus) Sprengel var. *grandiflora* (Bigelow) A. Gray – RAB, C, G, X; < *Habenaria fimbriata* (Aiton) R. Brown – F; < *Blephariglottis grandiflora* (Bigelow) Rydberg – S; = ***Blephariglottis shriveri*** (P.M. Brown) Baumbach & Löckel]

Platythelys Garay (Jug Orchid)

A genus of about 9 species, of the New World tropics and subtropics. References: Ackerman in FNA (2002a); Correll (1950)=X.

Platythelys querceticola (Lindley) Garay, Jug Orchid. Wet hammocks and swamps. Late July-September. N. FL south to s. FL, west to AL(?), MS, and LA; Mexico; West Indies; Central America; South America. [= FNA, K; = *Erythrodes querceticola* (Lindley) Ames – L, X; = *Physurus querceticola* Lindley – S; ? *P. latifolia* (Linnaeus) Garay & Ormerod – WH] {add to genus key}

Pogonia Antoine Laurent de Jussieu 1789 (Rose Pogonia, Pogonia)

A genus of 3 species, of temperate e. North America and e. Asia. Cameron & Chase (1999) indicate that molecular analyses indicate that there may be merit in the traditional broad circumscription of *Pogonia* to include *Isotria* and N. American taxa of

Cleistes; alternatively, North American "*Cleistes*" can be segregated as *Cleistesiopsis*, as done here. References: Catling & Sheviak in FNA (2002a); Correll (1950)=X.

Pogonia ophioglossoides (Linnaeus) Ker-Gawler, Rose Pogonia, Snakemouth, Beardflower, Ettercap, Addermouth. Savannas, bogs, especially in open peaty or gravelly situations. March-June. NL (Newfoundland) and MB south to s. FL and TX. [= RAB, C, FNA, G, GW, K, L, Pa, S, W, WH, WV, X; > *P. ophioglossoides* var. *ophioglossoides* – F]

Ponthieva R. Brown 1813 (Shadow Witch)

A genus of about 30-53 species, of tropical and warm temperate America. References: Ackerman in FNA (2002a); Pridgeon et al. (1999b); Correll (1950)=X.

Ponthieva racemosa (Walter) C. Mohr, Shadow Witch. Bottomlands, floodplains, moist ravines, nearly always over calcareous rock ("marl" or coquina limestone). September-October. Se. VA south to s. FL and west to se. TX; disjunct in the Eastern Highland Rim, TN, and south into Central and South America. The basal rosette of leaves, white (suffused with green) flowers in fall, and habitat are distinctive. [= RAB, C, F, FNA, G, GW, K, S, WH, X; = *P. racemosa* var. *racemosa* – L]

Pteroglossaspis Reichenbach filius 1878 (Wild Coco)

A genus of 7-10 species, of s. North America, Cuba, Colombia, and tropical Africa (Romero-González in FNA 2002). References: Romero-González in FNA (2002a); Correll (1950)=X.

Identification notes: The long (to 7 dm), plicate leaves are distinctive among our orchids. Small individuals can be mistaken for *Calopogon* when not in bloom. *Pteroglossaspis* differs, however, in having the stem covered from node to node by a succession of sheaths (vs. the sheaths much shorter) and in having the leaves 2-3 on a separate shoot emerging from the corm before the bloom-stalk (vs. leaf 1, on the bloom-stalk).

Pteroglossaspis ecristata (Fernald) Rolfe, Spiked Medusa, Smooth-lipped Eulophia. Mesic pinelands with blackjack oak, other sandhills and dry-mesic to mesic longleaf pinelands. June-September; July-November. Se. NC south to FL, west to LA; West Indies (Cuba). One of the rarest orchids in our region. [= FNA, K, WH; = *Eulophia ecristata* (Fernald) Ames – RAB, L, X; = *Triorchos ecristatus* (Fernald) Small – S]

Sacoila Rafinesque 1838

A genus of ca. 10 species, of the tropics and subtropics. References: Brown & Catling in FNA (2002); Correll (1950)=X.

Sacoila lanceolata (Aublet) Garay *var*. ***lanceolata***. Pine flatwoods, road shoulders. April-June. Ne. and Panhandle FL south to s. FL; West Indies, Mexico, Central America, South America. [= FNA, WH; = *Stenorrhynchos lanceolata* (Aublet) L.C. Richard var. *lanceolata* – K; = *Spiranthes lanceolata* (Aublet) Léon var. *lanceolata* – L; < *Stenorrhynchos orchioides* (Swartz) L.C. Richard – S] {add to genus key; add X to synonymy}

Spiranthes L.C. Richard 1817 (Ladies'-tresses, Pearl-twist, Spiral Orchid)

A genus of about 30-40 species, mainly north temperate, but with species scattered in other areas. The *Spiranthes* flora of our region is still rather poorly understood, and the treatment here will undoubtedly change further. References: Sheviak & Brown in FNA (2002a); Luer (1975); Sheviak (1991); Pridgeon et al. (1999c). Key adapted largely from Sheviak & Brown in FNA (2002a); Correll (1950)=X. [also see *Sacoila*]

Identification notes: Flowering plants are necessary for identification of the species.

1 Rachis of inflorescence with all hairs **not** glandular, tapering to a pointed tip; [flowering March-September] ..... ***S. vernalis***
1 Rachis of inflorescence **either** glabrous **or** with some or all hairs gland-tipped, capitate or clavate.
  2 Lip bright yellow or orange-yellow, with greenish veins; sepals and petals pure white; [flowering May-July] ..... ***S. lucida***
  2 Lip either white, or lip yellowish and lacking greenish veins; sepals and petals creamy, ivory, yellow, or greenish; [collectively flowering February-December].
    3 Lip with conspicuous, terminally widened, greenish (rarely yellowish) diverging veins extending nearly to the tip; [flowering March-July].
      4 Flowers white, with green veins; sepals appressed; flowers 6-9 mm long ..... ***S. praecox***

4 Flowers creamy green, with darker green veins; flowers 10-17 mm long..... ***S. sylvatica***

3 Lip lacking conspicuous, terminally widened, greenish diverging veins (veins not terminally widened); [collectively flowering February-December].

5 Rachis glabrous; flowers gaping from near middle, the tubular portion < 3 mm long; lip pure white; [flowering June-September]..... ***S. tuberosa***

5 Rachis pubescent or glabrous; flowers gaping only from beyond the middle, the tubular portion > 3 mm long; lip white, creamy, yellow, or centrally green; [collectively flowering February-December].

6 Inflorescence with 3 or 4 flowers per cycle of spiral, the spiral usually tight and obscure, but then with 3 or 4 secondary ranks of flowers evident; [collectively flowering August-December]..... **Key A**

6 Inflorescence with 5 or more flowers per cycle of spiral, the spiral usually open and obvious; [collectively flowering February-December]..... **Key B**

Key A

1 Petals ca. 6 mm long; lower portion of stem with recurved-spreading leaves.

2 Rostellum and viscidium absent; sepals 3.5-5 mm long..... ***S. ovalis*** *var.* ***erostellata***

2 Rostellum and viscidium present; sepals 4-6.1 mm long..... ***S. ovalis*** *var.* ***ovalis***

1 Petals 7.5 mm long or longer; leaves wholly basal, or lower portion of stem with recurved-spreading blades, or leaves absent at flowering.

3 Lip only slightly or not at all differentiated from the petals; buds often failing to open (but setting seed through agamospermy); column normal, or abnormal or aborted; leaves usually absent at flowering..... ***S. cernua***

3 Lip clearly differentiated from petals; buds opening into normal flowers; column normal; leaves present or absent at flowering.

4 Basal callosity of the lip relatively short and conic,a wide as high, and usually < 1 mm long; lateral sepals free and spreading, often over the top of the flower; leaves absent at flowering; [of dry calcareous barrens of the Ridge and Valley and westward, in the Ridge and Valley of sw. VA and nw. GA, and westward]..... ***S. magnicamporum***

4 Basal callosity of the lip 1-2 mm long; lateral sepals more or less appressed (very rarely spreading over the top of the flower); leaves present at flowering; [of various dry to wet sites, collectively widespread in our area].

5 Upper margin of the lateral sepals obviously separated from the adjacent margin of the dorsal sepal, the separation abrupt at the base (commonly by about 1 mm); lip strongly curving from the claw (the resulting angle 20-60 degrees), cuneate at the base; perianth creamy, yellowish, or greenish white; [of upland, dry to mesic sites]..... ***S. ochroleuca***

5 Upper margin of the lateral sepals touching (or nearly so) the adjacent margin of the dorsal sepal, or only gradually separated with distance from the base; lip not strongly curving from the claw (angle < 30 degrees), cordate to truncate at the base; perianth white to creamy or ivory, the center of the lip ivory to pale yellowish or rarely greenish; [primarily of wet sites, such as bogs, fens, marshes, bottonland swamps].

6 Plants to about 50 cm tall, not colonial; leaves comparatively slender, flaccid-membranaceous with thickened midrib, the petioles of the basal leaves < 6 mm wide; leaves wholly basal or the lower sheaths with ascending-spreading blades; perianth usually 8-11 mm long; lip membranaceous to fleshy, < 7 mm long; [widespread in our area]..... ***S. cernua***

6 Plants to over 100 cm tall, forming clonal colonies via stolons; leaves broad, stiffly aerenchymatous-thickened, the petioles of basal leaves 7 mm or more wide; leaves up the stem, with spreading recurved blades on the lower cauline sheaths, frequently also on the upper, with leaves extending to the inflorescence; perianth 10-15 mm long (sometimes smaller in depauperate plants); lip fleshy, usually over 7 mm long; [of the Coastal Plain]..... ***S. odorata***

Key B

1 Lateral sepals widely diverging from the base, 8-10 mm long; lip dilated at base, oblong toward tip, yellow centrally; inflorescence secund to twisted usually only a half-turn from bottom to top; [flowering late October-December]..... ***S. longilabris***

1 Lateral sepals spreading to appressed, not widely diverging, 3.8-10 mm long; lip ovate to oblong-quadrate, lacking a distinct basal dilation, white or creamy centrally; inflorescence usually with several spiral cycles (rarely nearly secund); [flowering February-November].

2 Lip with lacerate-dentate tip; leaves usually linear, > 30× as long as wide, persistent and present at flowering; [flowering May-August]..... ***S. laciniata***

2 Lip with undulate to crisped tip; leaves lanceolate to ovate or obovate, < 30× as long as wide, either persistent and present at flowering, or withering prior to flowering.

3 Flowers comparatively large and stout, the perianth 5-10 mm long, white to yellowish, the lip often darker centrally but not green or greenish yellow; leaves ascending, relatively slender, not ovate or obovate, present at flowering; rachis conspicuously and densely glandular-pubescent; [flowering August-November]..... ***S. cernua***

3 Flowers comparatively small and slender, the perianth usually < 5.5 mm long; leaves strictly basal, spreading and ovate to obovate or oblanceolate; rachis glabrous or densely but minutely glandular-pubescent; [flowering February-September].

4 Rachis densely pubescent; flowers yellowish to pale greenish yellow, the lip yellow centrally; [flowering February-April]; [of s. SC southward and westward]..... ***S. brevilabris***

4 Rachis glabrous or sparsely and minutely pubescent; flowers yellowish to white, the lip yellowish or green centrally; [flowering February-September]; [collectively widespread in our area].

5 Flowers yellowish to pale greenish yellow; lip yellow centrally..... ***S. floridana***

5 Flowers white, lip green centrally.

6 Leaves oblanceolate, withering at anthesis; lateral sepals spatulate, green at base; flowering February-May..... ***S. eatonii***

6 Leaves ovate to obovate or elliptic, spreading, present or absent at anthesis; lateral sepals acuminate, white throughout; flowering July-September.

7 Flowers densely arranged on the spike (ratio of spike length in mm: flower number < 2.3); entire plant essentially glabrous; leaves usually absent at anthesis; [flowering later, mostly August-September]..... ***S. lacera*** *var.* ***gracilis***

7 Flowers laxly arranged on spike (ratio of spike length in mm: flower number ≥ 2.3); inflorescence capitate-pubescent; leaves usually persisting through anthesis; [flowering earlier, mostly July]..... ***S. lacera*** *var.* ***lacera***

Spiranthes brevilabris Lindley, Short-lipped Ladies'-tresses. Pine savannas. Late February-April. Se. SC south to s. FL, west to se. TX. [= FNA, K, WH; = *S. gracilis* (Bigelow) Beck var. *brevilabris* (Lindley) Correll – GW; = *S. brevilabris* Lindley var. *brevilabris* – L]

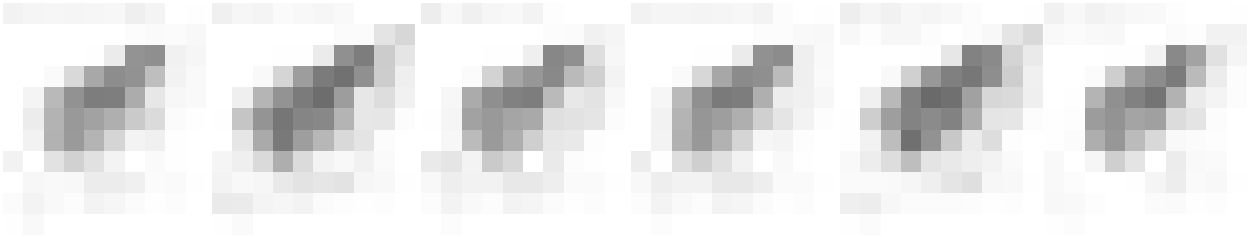
Spiranthes cernua (Linnaeus) L.C. Richard, Nodding Ladies'-tresses. Bogs, swamps, ditches, usually in acidic, sphagnous situations. July-November. NS west to ON and ND, south to FL Panhandle and c. TX. [= FNA, G, K, L, Pa, W, WH, WV; = *S. cernua* var. *cernua* – RAB, C, F, GW, L, X; < *S. cernua* var. *cernua* – F, X; = *Ibidium cernuum* (Linnaeus) House – S]

Spiranthes eatonii Ames ex P.M. Brown, Eaton's Ladies'-tresses. Pine savannas, dry to moist pine flatwoods. February-May. Se. VA south to s. FL, west to se. TX. Apparently previously confused with *S. lacera*, *S. floridana*, *S. brevilabris*, and *S. tuberosa*, but distinctive in the combination of spring blooming season, white flowers, and basal, narrowly oblanceolate leaves (Brown 1999). [= FNA, K, WH]

Spiranthes floridana (Wherry) Cory, Florida Ladies'-tresses. Wet savannas, other moist sites. April-May. Se. NC south to c. peninsular FL and west to TX. [= FNA, K, WH; = *S. brevilabris* Lindley var. *floridana* (Wherry) Luer – L; = *S. gracilis* (Bigelow) Beck var. *floridana* (Wherry) Correll – RAB, GW, X; = *Ibidium floridanum* Wherry – S]

Spiranthes lacera (Rafinesque) Rafinesque *var.* ***gracilis*** (Bigelow) Luer, Southern Slender Ladies'-tresses. Fields, meadows, pastures, woodlands. August-September. NS, MI, WI, and KS south to GA and TX. [= C, FNA, K, L, Pa, W; = *S. gracilis* (Bigelow) Beck var. *gracilis* – RAB, GW, X; = *S. gracilis* – F, WV; < *S. gracilis* – G (apparently including *S. lacera* var. *lacera*); = *Ibidium gracile* (Bigelow) House – S]

Spiranthes lacera (Rafinesque) Rafinesque *var.* ***lacera***, Northern Slender Ladies'-tresses. Clearings, openings. July. NS and NB west to SK, south to sw. NC, w. VA, TN, and MO. The occurrence of this species in NC is documented by a specimen at DUKE, collected at 5200 feet elevation on Tusquitee bald. [= C, FNA, K, L, Pa, W; = *S. lacera* – F (sensu stricto); < *S. gracilis* – G; < *S. gracilis* var. *gracilis* – X]



Spiranthes laciniata (Small) Ames, Lace-lip Ladies'-tresses. Pond cypress depressions and savannas, swamps. May-August. A Southeastern Coastal plain endemic: NJ south to s. FL and west to se. TX. [= RAB, C, FNA, K, L, WH, X; = *S.* ×*laciniata* – F, GW; = *Ibidium laciniatum* (Small) House – S]

Spiranthes longilabris Lindley, Giant Spiral Orchid. Wet pine savannas. Late October-December. A Southeastern Coastal Plain endemic: se. NC south to s. FL and west to e. TX. [= RAB, FNA, GW, K, L, WH, X; = *Ibidium longilabre* (Lindley) House – S]

Spiranthes lucida (H.H. Eaton) Ames, Shining Ladies'-tresses. Sunny seepage over amphibolite or other basic rock, moist banks and shores. June. Widespread in ne. United States, south to NC, e. TN, sc. TN (Chester et al. 1993), c. AL, MO, and KS. The species was reported for NC by Fernald (1950) and by Small (1933), but was not treated by RAB; its occurrence in NC was verified in 1992 by its discovery in a seepage area in Ashe County. [= C, F, FNA, G, K, L, Pa, W, WV, X; = *Ibidium plantagineum* (Rafinesque) House – S]

Spiranthes magnicamporum Sheviak, Great Plains Ladies'-tresses. Grassy barrens and glades over limestone. Primarily in the Great Plains, from ND south to TX, east (often as widely disjunct populations) to sw. ON, se. PA, sw. VA (Ludwig 1999), KY, w. TN (Jones 2006), and nw. GA. [= C, FNA, K, L, Pa; < *S. cernua* – G; < *S. cernua* var. *cernua* – F, X]

Spiranthes ochroleuca (Rydberg) Rydberg, Yellow Nodding Ladies'-tresses. Meadows and pastures at moderate to high elevations, up to at least 1500m in elevation. September-October. Largely northeastern, extending south in the mountains to NC. See Sheviak & Catling (1980) and Catling (1983a) for further information on this species. [= FNA, K, L, Pa, W; = *S. cernua* var. *ochroleuca* (Rydberg) Ames – C, F, X; = *Ibidium ochroleucum* (Rydberg) House – S]

Spiranthes odorata (Nuttall) Lindley, Fragrant Ladies'-tresses, Marsh Ladies'-tresses. Swamps and marshes. September-November. A Southeastern Coastal Plain endemic: se. VA south to FL and west to se. TX. [= F, FNA, G, K, L, WH; = *S. cernua* var. *odorata* (Nuttall) Correll – RAB, C, GW, L, X; = *Ibidium odoratum* (Nuttall) House – S]

Spiranthes ovalis Lindley *var.* ***erostellata*** Catling, Oval Ladies'-tresses. Swamp forests, bottomland forests, hammocks, ravine forests. August-November. Var. *erostellata* is fairly widespread in se. North America, ranging from sc. PA, MI, and IL south to Panhandle FL, s. MS, and s. LA. Var. *ovalis* is limited to AR, LA, and TX, differing in having a viscidium and rostellum. See Catling (1983b) for further information about this variety and its biology. [= C, FNA, K, Pa, W, WH; < *S. ovalis* – RAB, F, G, GW, L, WV, X; < *Ibidium ovale* (Lindley) House – S; ? *S. montana* Rafinesque]

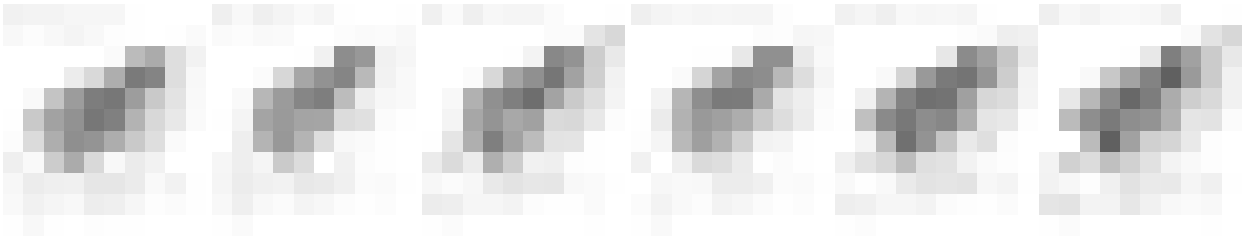
Spiranthes ovalis Lindley *var.* ***ovalis***, Oval Ladies'-tresses. Swamp forests, mesic ravines. October-November. GA, TN, AR, and TX, south to n. peninsular FL and LA. [= FNA, K, WH; < *S. ovalis* – GW, L, X; < *Ibidium ovale* (Lindley) House – S]

Spiranthes praecox (Walter) S. Watson, Grass-leaved Ladies'-tresses, Giant Ladies'-tresses. Savannas, swamps, bogs. March-July. A Southeastern Coastal Plain endemic: NJ south to s. FL and west to TX. [= WH; < *S. praecox* – RAB, C, F, FNA, G, GW, K, L, W, X (also see *S. sylvatica*); < *Ibidium praecox* (Walter) House – S (also see *S. sylvatica*)]

Spiranthes sylvatica P.M. Brown, Woodland Ladies'-tresses, Pale Green Ladies'-tresses. Live oak hammocks, other woodlands. Late March-early May. VA south to c. peninsular FL, west to e. TX. [= WH; < *S. praecox* – RAB, C, F, FNA, G, GW, K, L, X; < *Ibidium praecox* (Walter) House – S]

Spiranthes tuberosa Rafinesque, Little Ladies'-tresses, Little Pearl-twist. In a wide variety of habitats, especially relatively well-drained woodlands and fields, sandhills, dry hammocks, dry pine flatwoods. June-September. MA, OH, and MO south to c. peninsular FL and TX. [= C, FNA, G, K, L, Pa, W, WH, WV; > *S. grayi* Ames – RAB, L, X; > *S. tuberosa* var. *grayi* (Ames) Fernald – F; > *S. tuberosa* var. *tuberosa* – F; = *Ibidium beckii* (Lindley) House – S, misapplied]

Spiranthes vernalis Engelmann & A. Gray, Spring Ladies'-tresses. Savannas, bogs, marshes, fairly dry fields. March-July (-early September in the mountains). MA to s. FL and west to TX and SD, also in Mexico and Central America. [= RAB, C, F, FNA, G, GW, K, L, Pa, W, WH, X; = *Ibidium vernale* (Engelmann & A. Gray) House – S]



Tipularia Nuttall 1818 (Cranefly Orchid)

A genus of 3 species; the other species of the genus are e. Asian (1 in Japan and 1 in the Himalayas) (Catling & Sheviak in FNA 2002). References: Catling & Sheviak in FNA (2002a); Correll (1950)=X.

Identification notes: The leaves are present during the winter, withering before the flowering stalk appears, the plant thus occasionally mistaken for one of the saprophytic orchids. The leaves are usually purple underneath, a characteristic shared with *Aplectrum*, but *Tipularia* leaf blades are ovate, < 10 cm long, and are not notably plicate along the veins (vs. *Aplectrum*, with leaf blades narrowly elliptic, 10-20 cm long, and notably plicate along the very prominent, white, cartilaginous veins).

Tipularia discolor (Pursh) Nuttall, Cranefly Orchid. In a wide variety of mesic to rather dry forests. July-September. Se. MA, s. NY, OH, IN, and s. MI south to n. peninsular FL and TX. Along with *Goodyera pubescens*, *Tipularia* is one of the commonest orchids in e. North America. [= RAB, C, F, FNA, G, K, L, Pa, W, WH, WV, X; = *T. unifolia* (Muhlenberg) Britton, Sterns, & Poggenburg – S]

Triphora Nuttall 1818 (Three Birds Orchid)

A genus of about 25 species, of e. North America, the West Indies, and Central and South America (Medley in FNA 2002). References: Medley in FNA (2002a); Brown & Pike (2006)=Z; Correll (1950)=X.

1 Flowers yellow, erect, not opening fully, the lip uppermost ..... ***T. rickettii***
1 Flowers pink to white, nodding, opening fully, the lip lowermost ..... ***T. trianthophoros*** *var.* ***trianthophoros***

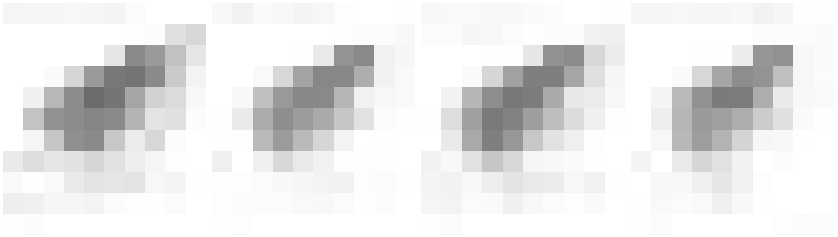
Triphora rickettii Luer. Upland hardwood hammocks. Late July-August. Ne. FL (Columbia County) south into wc. Peninsular FL. Sometimes treated as a disjunct component of the Mexican *T. yucatanensis*. [= L, WH, X; < *Triphora yucatanensis* Ames – FNA, K]

Triphora trianthophoros (Swartz) Rydberg *var.* ***trianthophoros***, Three Birds Orchid, Nodding Pogonia, Nodding Ettercap. Humid forests and swamps, rhododendron thickets, especially on rotten logs or on humus. July-September. The species is widespread (but scattered) in e. North America, and south into Central America. Var. *trianthophoros* occurs from ME and ON west to WI, south to c. peninsular FL and e. TX; disjunct in nc. Mexico; var. *mexicana* (S. Watson) P.M. Brown occurs from Mexico south to Central America. The recently named var. *texensis* P.M. Brown & R.B. Pike needs additional evaluation. The flowers are extremely ephemeral, making the species very difficult to locate. The correct spelling of the epithet is "*trianthophoros*." [= *Triphora trianthophora* (Swartz) Rydberg var. *trianthophora* – Pa, Z, orthographic variant; = *T. trianthophora* ssp. *trianthophora* – FNA, orthographic variant; < *T. trianthophora* – RAB, C, F, G, GW, K, L, S, W, WV, X; < *T. trianthophoros* – WH]

Zeuxine Lindley 1826 (Soldier Orchid)

A genus of about 26 species, of tropical and subtropical Old World (introduced elsewhere). References: Ackerman in FNA (2002a); Correll (1950)=X.

* ***Zeuxine strateumatica*** (Linnaeus) Schlechter, Lawn Orchid, Soldier Orchid. Lawns; native of Asia. [= FNA, GW, K, L, WH] {add X to synonymy}



67. HYPOXIDACEAE R. Brown 1814 (Stargrass Family) [in ASPARAGALES]

A family of about 9 genera and ca. 155 species, uerous or rhizomatous perennial herbs, subcosmopolitan (though not well distributed in the northern hemisphere of the Old World, and especially diverse in South Africa). The recognition of Hypoxidaceae at the family level is supported by a variety of authors, on morphologic and molecular grounds (Kocyan et al. 2011; Judd 2000). References: Nordal in Kubitzki (1998a); Herndon in FNA (2002a); Judd (2000); Kocyan et al. (2011).

Hypoxis Linnaeus 1759 (Stargrass)

A genus of about 50-150 species, herbs, of tropical and warm temperate regions of the Old and New World, with a center of diversity in South Africa. See Zona et al. (2009) for detailed images of the seedcoat character states of the species. References: Judd (2000)=Z; Herndon in FNA (2002a); Nordal in Kubitzki (1998a); Zona et al. (2009). Key based on Herndon in FNA (2002a).

1 Leaves glabrous, or with a few trichomes near the base; seeds black.
  2 Leaves filiform, 0.3-1.2 mm wide, stiff; seeds pebbled (the exposed portion of each cell rounded); floral bracts 1-7 (-12) mm, > 2× as long as the pedicels; ovaries densely pubescent; [of Coastal Plain pinelands]..... ***H. juncea***
  2 Leaves over 2 mm wide, soft and flexible; seeds coarsely muricate (the exposed portion of each cell pointed-conical); floral bracts (1-) 2-20 (-80) mm; ovaries sparsely to densely pubescent; [collectively widespread].
    3 Ovaries longer than broad, cylindric, with scattered trichomes; floral bracts (3-) 5-20 (-80) mm long; pedicels usually shorter than the floral bracts; tepals equaling or shorter than ovaries; [of Coastal Plain bottomlands]..... ***H. curtissii***
    3 Ovaries as broad as long or nearly so, deltate, densely pubescent; floral bracts (1-) 2-10 (-17) mm long; pedicels usually >2× as long as the floral bracts; tepals much longer than ovaries; [widespread].....***H. hirsuta***
1 Leaves evenly pubescent, at least near the base; seeds black or brown.
  4 Pedicels usually >2× as long as the bracts; seeds black; [collectively widespread].
    5 Leaves flattened, > 1 mm wide; seeds coarsely muricate (the exposed portion of each cell pointed-conical); [widespread] .....***H. hirsuta***
    5 Leaves filiform, 0.3-1.2 mm wide; seeds pebbled (the exposed portion of each cell rounded); [of Coastal Plain pinelands]..... ***H. juncea***
  4 Pedicels usually < 2× as long as subtending bracts; seeds black or brown; [of Coastal Plain pinelands].
    6 Anthers > 2 mm long; tepals longer than the pedicels; floral bracts longer than the pedicels; seeds black, pebbled with round pebbling (the exposed portion of each cell rounded) .....***H. rigida***
    6 Anthers < 2 mm long; tepals shorter than to longer than the pedicels; floral bracts shorter than to longer than the pedicels; seeds brown, with detached, wrinkled cuticle.
      7 Tepals 1.5-2× as long as ovaries; seed coats iridescent.....***H. sessilis***
      7 Tepals ca. 1 (-1.5)× the length of the ovaries; seed coats not iridescent .....***H. wrightii***

Hypoxis curtissii Rose in Small, Swamp Stargrass. Swamp forests, alluvial forests, water courses, wet hammocks. March-June; May-July. E. NC south to c. peninsular FL, west to e. TX. [= FNA, K, WH, Z; = *H. hirsuta* (Linnaeus) Coville var. *leptocarpa* (Engelmann & A. Gray) Fernald – RAB; < *H. hirsuta* – C, G; = *H. leptocarpa* (Engelmann & A. Gray) Small – GW, S]

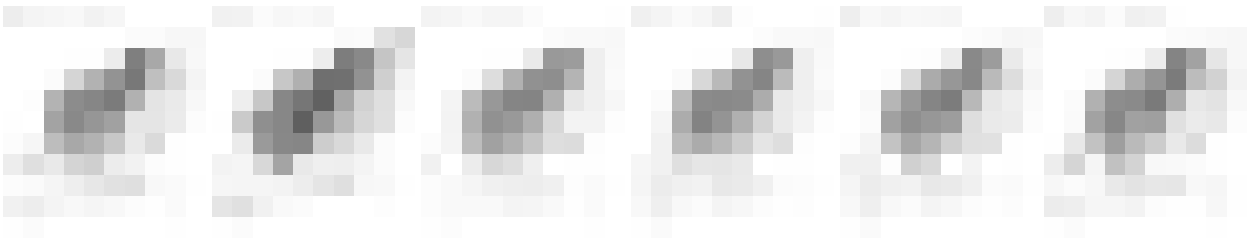
Hypoxis hirsuta (Linnaeus) Coville, Common Stargrass. In a wide variety of dry to moist forests. March-June; May-July. S. ME west to SK and ND, south to GA and e. TX. [= FNA, GW, Pa, S, WV, Z; = *H. hirsuta* var. *hirsuta* – RAB; < *H. hirsuta* – C, G, K]

Hypoxis juncea Sm., Fringed Stargrass. Wet pine savannas. April-May (-later, especially in response to fire); May-June.(-later, especially in response to fire). Se. NC south to s. FL, west to s. AL. [= RAB, FNA, GW, K, WH, S, Z]

Hypoxis rigida Chapman, Savanna Stargrass. Wet pine savannas. April (-later, especially in response to fire); May.(-later, especially in response to fire). Se. NC south to Panhandle FL, west to e. TX. [= RAB, FNA, GW, S, WH, Z; < *H. hirsuta* – K]

Hypoxis sessilis Linnaeus, Glossy-seed Stargrass. Wet pine savannas. April (-later, especially in response to fire); May (-later, especially in response to fire). NC south to s. FL, west to e. TX, s. AR, and se. OK. [= RAB, FNA, GW, K, S, WH, Z; > *H. longii* Fernald – C, F, G; > *H. sessilis* – C, F, G]

Hypoxis wrightii (Baker) Brackett, Bristleseed Stargrass. Wet pine savannas. March-April (-later, especially in response to fire); April-May (-later, especially in response to fire). Se. VA south to s. FL, west to TX; disjunct in the West Indies (Cuba, Bahamas, Jamaica, Hispaniola, Puerto Rico). [= FNA, K, Z; = *H. micrantha* Pollard – RAB, C, F, G, GW, S, misapplied]



71. IRIDACEAE A.L. de Jussieu 1789 (Iris Family) [in ASPARAGALES]

A family of about 65-82 genera and 1700-1810 species, herbs, of cosmopolitan distribution (most diverse in s. Africa). References: Goldblatt in FNA (2002a); Goldblatt, Manning, & Rudall in Kubitzki (1998a).

1 Inflorescence a spike or panicle of spikes; plants from corms; flowers slightly zygomorphic.
  2 Stem usually branched, the inflorescence appearing paniculate; tepals orange to red ..... ***Crocosmia***
  2 Stem unbranched, the inflorescence a spike; tepals any of a wide range of colors (including orange and red)
    3 Inflorescence bent at its base, the inflorescence axis more-or-less horizontal, the flowers facing upward ..... ***Freesia***
    3 Inflorescence erect, the flowers facing outward ..... ***Gladiolus***
1 Inflorescence an umbellate 1-sided cyme; plants from rhizomes or bulbs; flowers actinomorphic.
  4 Leaves planar; plants from rhizomes (or indistinct) or a bulb (in *Iris xiphium*).
    5 Style branches broad, petaloid, terminating in paired crests ..... ***Iris***
    5 Style branches not broad or petaloid.
      6 Tepals 16-35 mm long, orange or red; seeds 4-6 mm in diameter ..... ***Iris domestica***
      6 Tepals 6-15 mm long, blue, purple, lavender, pink, magenta, white, or yellowish-white; seeds 0.6-1.3 mm in diameter ..... ***Sisyrinchium***
  4 Leaves plicate; plants from bulbs.
    7 Tepals unequal, the inner whorl < ½ as long as the outer whorl ..... ***Herbertia***
    7 Tepals nearly equal in length.
      8 Style recurved, with 3 flat branches that are < 2 mm long ..... ***Calydorea***
      8 Style straight, each of the 3 branches further divided into slender lobes
        9 Style branches divided for ca. ½ their length; style arms arching over or between the anthers; tepals dark purple ..... ***Alophia***
        9 Style branches divided nearly to base; style arms extending horizontally between the anthers; tepals blue, white in the center ..... ***Nemastylis***

Alophia Herbert (Propellor-flower)

A genus of ca. 5 species, of sc. North America, Mexico, Central America, and South America. References: Goldblatt in FNA (2002a).

Alophia drummondii (Graham) R.C. Foster, Propellor-flower. E. LA (and MS?) west to TX and OK; Mexico; Guyana. [= FNA, K; = *Herbertia drummondii* (Graham) Small]

Calydorea Herbert 1843 (Ixia)

A genus of about 8 species, of warm temperate and tropical America. The circumscription relative to *Nemastylis* is uncertain. References: Goldblatt in FNA (2002a); Goldblatt, Manning, & Rudall in Kubitzki (1998a).

Calydorea coelestina (Bartram) Goldblatt & Henrich, Bartram's Ixia. Pine flatwoods. Endemic to ne. FL (Chafin 2000); the single GA record is by P.O. Schallert, notoriously sloppy with his location data, and is therefore best discounted unless additional information comes to light. [= FNA, K; = *Salpingostylis coelestina* (Bartram) Small – S; = *C. caelestina* – WH, orthographic variant; = *Nemastylis coelestina* (Bartram) Nuttall; = *Sphenostigma coelestinum* (Bartram) R.C. Foster; = *Ixia coelestina* Bartram]

Crocosmia Planchon 1851 (Montbretia)

A genus of 8-9 species, herbs, native of sub-Saharan Africa. References: Goldblatt in FNA (2002a); Goldblatt, Manning, & Dunlop (2004); Goldblatt, Manning, & Rudall in Kubitzki (1998a).

* ***Crocosmia ×crocosmiiflora*** (V. Lemoine) N.E. Brown [*C. aurea* × *pottsii*], Montbretia. Disturbed areas, ditches, especially in moist to wet sites, including salt marshes; the parents of the hybrid both native to sub-Saharan Africa. Late June-July. Reported for Lowndes and Thomas counties, GA (Carter, Baker, & Morris 2009). [= FNA, K, WH; = *C.* ×*crocosmiflora* – RAB, orthographic variant]

Crocus Linnaeus 1753 (Crocus)

A genus of about 80 species, herbs, from Mediterranean Europe to w. China. References: Goldblatt, Manning, & Rudall in Kubitzki (1998a).

Identification notes: Other species are sometimes cultivated, and may be persistent or naturalized as well.

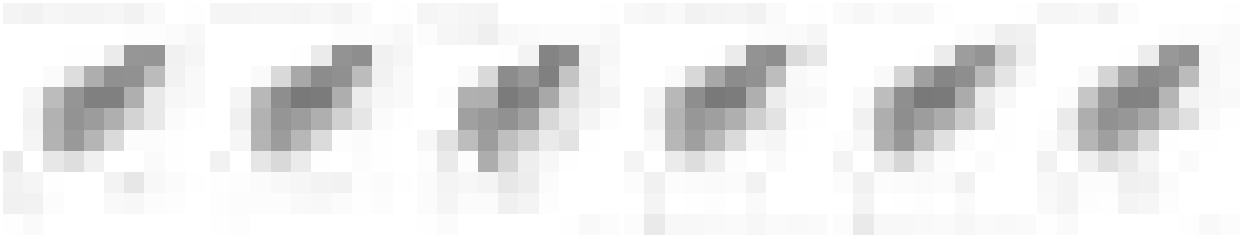
* ***Crocus tomasinianus*** Herbert, Woodland Crocus. Disturbed areas, long-persistent after cultivation around house-sites. Reported as rarely naturalizing in DE (McAvoy & Bennett 2001). {not yet keyed}

* ***Crocus vernus*** (Linnaeus) Hill, Dutch Crocus. Disturbed areas, long-persistent after cultivation around house-sites. [= K] {not yet keyed}

Freesia Eklon ex Klatt 1865 (Freesia)

A genus of about 15 species, perennials, natives of s. Africa. References: Goldblatt in FNA (2002a).

* ***Freesia alba*** (G.L. Meyer) Gumbleton, Freesia. Disturbed areas; native of s. Africa. [= FNA, WH; ? *F. corymbosa* (Burmann f.) N.E. Brown – K]



Gladiolus Linnaeus 1754 (Gladiolus)

A genus of about 255 species, largely of Africa. References: Goldblatt in FNA (2002a); Goldblatt, Manning, & Rudall in Kubitzki (1998a). Key based on FNA.

1 Inner tepals 60-70 mm long ..... ***G. ×gandavensis***
1 Inner tepals < 60 mm long.
2 Tepals white, cream, orange, or red; perianth tube plus dorsal sepal 60-95 mm long ..... ***G. dalenii*** *ssp.* ***dalenii***
2 Tepals pink, reddish, or light purple, with white markings on the outer 3 tepals.
3 Anthers 10-13 mm long; capsules oblong, 18-24 mm long; seeds winged ..... ***G. communis***
3 Anthers ca. 15 mm long; capsules globose, 10-12 mm long; seeds not winged ..... ***G. italicus***

* ***Gladiolus communis*** Linnaeus, False Corn-flag. Commonly cultivated as ornamentals, rarely persisting or weakly spreading; native of Mediterranean Europe and n. Africa. [= FNA; > *G. papilio* Hooker – RAB, K, misapplied; > *Gladiolus communis* Linnaeus ssp. *byzantinus* (P. Miller) A. Hamilton – K; > *G. byzantinus* P. Miller]
* ***Gladiolus dalenii*** Van Geel *ssp.* ***dalenii***. Sometimes cultivated, rarely persisting or spreading; native of s. Africa. Introduced in AL and LA. [= FNA]
* ***Gladiolus ×gandavensis*** Van Houtte [*G. dalenii* × *oppositiflorus*]. Commonly cultivated as ornamentals, rarely persisting or weakly spreading; native of s. Africa. Goldblatt suggests that as many as 5 species are involved in the origin of the large-flowered garden gladiolus. [= RAB, FNA, K, WH; *? G. hortulanus* L.H. Bailey – S; ? *G. dalenii* Van Geel]
* ***Gladiolus italicus*** P. Miller. Sometimes cultivated, rarely persisting or spreading; native of Eurasia. Introduced in TN. [= FNA, K; *? G. segetum* Ker-Gawler – S]

Herbertia Sweet 1827 (Pleat-leaf Iris)

A genus of about 5 species, herbs, in se. North America and temperate South America. References: Goldblatt in FNA (2002a).

Herbertia lahue (Molina) Goldblatt, Prairie-nymph. Prairies and marshes. AL and FL west to TX; central South America. [= FNA, WH; > *H. lahue* ssp. *caerulea* (Herbert) Goldblatt – K; > *H. caerulea* Herbert – S]

Iris Linnaeus 1753 (Iris, Flag, Blackberry-lily)

A genus of about 225 species, herbs, of Eurasia, n. Africa, and North America. Wilson (2004) suggests that *Belamcanda* is phylogenetically nested within *Iris* and should be included there; Goldblatt & Mabberley (2005) make the appropriate nomenclatural combination. References: Henderson in FNA (2002a); Goldblatt in FNA (2002a); Goldblatt & Mabberley (2005)=Z; Wilson (2004); Goldblatt, Manning, & Rudall in Kubitzki (1998a). Key based on Henderson in FNA (2002a).

Identification notes: the **petals** are usually erect, smaller than the petaloid **sepals** (which are brightly colored, generally reflexed, and marked with a "signal"). The **styles** are also petaloid, arched over the sepals, and 2-cleft at the tip (except in *I. domestica*).

1 Plant from an ovoid bulb; [subgenus *Xiphium*] ..... ***I.. xiphium***

1 Plant from short to elongate rhizomes.
2 Style branches not broad, petaloid, or crested; seeds black, shiny, in a blackberry-like cluster (the seeds exposed at maturity by dehiscence of the papery to chartaceous capsule walls).....***I. domestica***
2 Style branches broad, petaloid, terminating in paired crests; seeds tan to brown, in a capsule.
3 Sepal "signal" (see above) of multicellular hairs (the “beard”), along the midrib of the claw and the base of the blade; [subgenus *Iris*].
4 Spathes green (or purplish) and herbaceous, with scarious margins.....***I. germanica***
4 Spathes scarious, silvery-white.....***I. pallida***
3 Sepal "signal" consisting of contrasting color, ridges, small unicellular hairs, and/or a cockscomb-like crest; [subgenus *Limniris*].
5 Rhizome branches cord-like, with scale-like leaves, enlarging at the apex to produce vegetative leaves, additional branches, and flowering stems.
6 Stems 30-80 cm tall; leaves 30-60 cm long, 0.2-0.7 cm wide; cordlike portions of rhizomes to 4 dm long; [of wetlands]; [section *Limniris*, series *Prismaticae*].....***I. prismatica***
6 Stems 2-15 cm tall; leaves 10-45 cm long, 0.3-2.5 cm wide; cordlike portions of rhizomes to to 2 dm long; [of dry to mesic uplands].
7 Sepals crested with a 3-ridged, toothed crest; leaves 10-25 mm wide, green, falcate; flowers not or only slightly fragrant; rhizomes surficial (one can "pull" them off the ground by gently tugging on the leaves); [generally of mesic and fertile soils]; [section *Lophiris*].....***I. cristata***
7 Sepals not crested; leaves 3-13 mm wide, blue-green, straight or nearly so; flowers strongly fragrant; rhizomes deeply buried (not easily "pulled"); [generally of dry and acid soils; [section *Limniris*, series *Vernae*].
8 Leaves 5-13 mm wide; rhizomes 1-3 cm between offshoots, thus forming clumps; capsules 1.7-3.2 cm long; [primarily of the Mountains, and upper Piedmont, extending into the Coastal Plain in sw. GA and Panhandle FL]...***I. verna*** *var*. ***smalliana***
8 Leaves 3-8 mm wide; rhizomes 5-15 cm between offshoots, thus hardly clump-forming; capsules 1.2-1.8 cm long; [of the Coastal Plain and lower Piedmont, from e. GA northward].....***I. verna*** *var*. ***verna***
5 Rhizome branches like the primary rhizome, not as above.
9 Petals 1-2 cm long; [section *Limniris*; series *Tripetalae*].....***I. tridentata***
9 Petals 2-9.5 cm long.
10 Stems hollow; [section *Limniris*; series *Sibirica*].
11 Spathes herbaceous at flowering time; capsule 3.5-5.5 cm long.....***I. sanguinea***
11 Spathes scarious at flowering time; capsule 2-3.5 cm long.....***I. sibirica***
10 Stems solid.
12 Capsules 3-angled or nearly round in cross-section; [section *Limniris*; series *Laevigatae*].
13 Perianth yellow.....***I. pseudacorus***
13 Perianth blue-violet (rarely white).
14 Flowers 8-15 cm in diameter; leaves 0.5-1.5 cm wide; [alien, cultivated, rarely escaped].....***I. ensata***
14 Flowers 6-8 cm in diameter; leaves 1-4 cm wide; [native].
15 "Signal" a greenish-yellow, papillate patch, surrounded by an area of heavily veined purple-on-white; [of VA northward].....***I. versicolor***
15 "Signal" a bright yellow, pubescent patch.
16 Plants to 10 dm tall, usually with 1-2 well-developed branches; capsule 7-11 cm long.....***I. virginica*** *var*. ***shrevei***
16 Plants to 6 dm tall, little or not at all branched; capsule 4-7 cm long.....***I. virginica*** *var*. ***virginica***
12 Capsules 6-angled or ridged in cross-section; [section *Limniris*; series *Hexagonae*].
17 Perianth dull copper or orange-brown (or dark yellow) (fading in nature or drying in the herbarium to a bluish or purplish color); petals spreading or declining.....***I. fulva***
17 Perianth blue-violet (rarely white); petals erect to spreading.
18 Stems declining or semi-erect, sharply zigzag.....***I. brevicaulis***
18 Stems erect, slightly if at all zigzag.
19 Capsules 2.5-3.5 cm long, hexagonal in cross-section, 3 sides flat, the alternating sides with 2 rounded ridges separated by a shallow groove.....***I. hexagona***
19 Capsules 6-10 cm long, slightly to strongly hexagonal in cross-section.
20 Capsules with 6 broad rounded lobes, indehiscent.....***I. giganticaerulea***
20 Capsules with 6 sharp, winglike ridges, dehiscent.....***I. savannarum***

Iris brevicaulis Rafinesque, Short-stem Iris, Lamance Iris. Swamps, bottomlands, bogs, seeps, marshes. OH west to KS, south to Panhandle FL and TX. [= C, F, FNA, G, GW, K, WH; > *I. foliosa* Mackenzie & Bush – S; > *I. mississippiensis* Small – S]

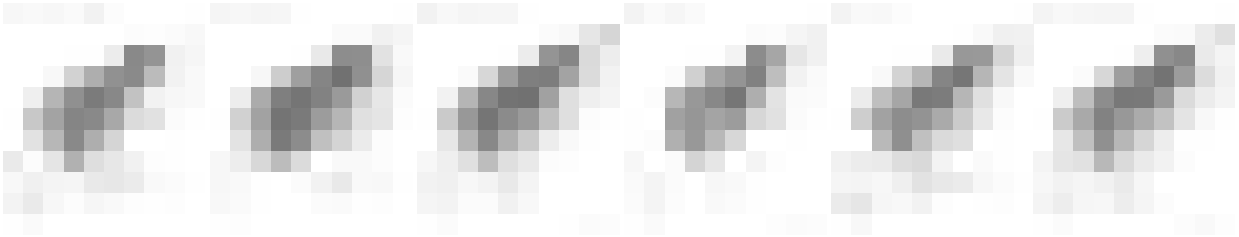
Iris cristata Aiton, Dwarf Crested Iris. Moist forests, rich woods, roadbanks. April-May; June-July. MD west to IN and MO, south to NC, AL, MS, AR, and e. OK. [= RAB, C, F, FNA, G, K, Pa, W, WV; = *Neubeckia cristata* (Aiton) Alefani – S]

* ***Iris domestica*** (Linnaeus) Goldblatt & Mabberley, Blackberry-lily. Dry woodlands, forests, edges of granitic flatrocks, suburban areas; native of e. Asia. June-August. [= Z; = *Belamcanda chinensis* (Linnaeus) de Candolle – C, F, FNA, G, K, Pa, RAB, S, W, WH, WV]

* ***Iris ensata*** Thunberg, Japanese Iris. Roadsides; cultivated and rarely escaped, native of Japan, n. China, and Sakhalin. Also reported from se. PA (Rhodes & Klein 1993). [= K; *I. kaempferi* Siebold ex Lamarck]

Iris fulva Ker-Gawler, Red Flag, Copper Iris. Swamp forests, wet hammocks. S. IL, MO, and TN south to GA, w. Panhandle FL, AL, and LA (introduced elsewhere). [= C, F, FNA, G, GW, K, S, WH]

* ***Iris germanica*** Linnaeus, German Iris, Fleur-de-Lys. Roadsides, old homesites, ditches; cultivated and rarely persistent or escaped, native of Europe. April-May. [= RAB, C, F, FNA, G, PA; > *I. flavescens* Delile – K; > *I.* ×*germanica* – K]



Iris giganticaerulea Small, Giant Blue Iris. Marshes and swamps. MS west to e. TX. [= FNA, K; > *I. giganticaerulea* Small – S; > *I. alticristata* Small – S; > *I. aurilinea* Alexander – S; > *I. citricristata* Small – S; > *I. elephantina* Small – S; > *I. fluviatilis* Small – S; > *I. miraculosa* Small – S; > *I. paludicola* Amexander – S; > *I. parvicaerulea* Alexander – S; > *I. rivularis* Small – S; > *I. venulosa* Alexander – S; > *I. wherryana* Small – S]

Iris hexagona Walter, Anglepod Blue Flag. Swamps. May-June. SC south to s. FL. [= RAB, FNA, GW, S, WH; = *I. hexagona* var. *hexagona* – K; > *I. hexagona* – S]

***** ***Iris pallida*** Lamarck in J. Lamarck et al., Sweet Iris. Cultivated and persistent around buildings in GA and elsewhere (FNA). [= F, FNA, K]

Iris prismatica Pursh ex Ker-Gawler, Slender Blue Iris, Slender Blue Flag. Bogs and marshes. May-June; June-July. NS south to GA, disjunct in w. NC (Henderson County) and sc. TN (Coffee County). [= RAB, C, FNA, G, GW, K, Pa, S, W; > *I. prismatica* var. *prismatica* – F; > *I. prismatica* var. *austrina* Fernald – F]

* ***Iris pseudacorus*** Linnaeus, Water Flag, Yellow Flag. Swamps, marshes, streams, ponds, streambanks, cultivated as a water plant; native of Eurasia and Africa. May-July; August-October. [= RAB, C, F, FNA, G, GW, K, Pa, S, W, WH, WV]

* ***Iris sanguinea*** Hornemann ex Donn, Japanese Iris. Roadsides, cultivated and rarely escaped; native of Japan, n. China, Korea, Japan, and w. Russia. [= K]

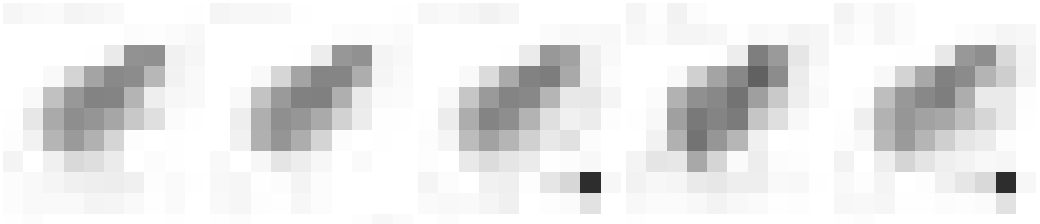
Iris savannarum Small. {habitat}. GA and AL south to s. FL. [= FNA, S; = *I. hexagona* Walter var. *savannarum* (Small) R.C. Foster – K; > *I. kimballiae* Small – S; > *I. alabamensis* Small – S]

* ***Iris sibirica*** Linnaeus, Siberian Iris. Cultivated and escaping or persisting near plantings; native of Eurasia (c. and e. Europe west to Lake Baikal). [= FNA, K]

Iris tridentata Pursh. Wet savannas, pine flatwoods, margins of pineland pools. Late May-June; August-October. Se. NC south to ne. FL and Panhandle FL. [= RAB, FNA, GW, K, WH; *? I. tripetala* – S, misapplied]

Iris verna Linnaeus *var*. ***smalliana*** Fernald ex M.E. Edwards, Upland Dwarf Iris. Dry, rocky or sandy woodlands and forests. April-May; June-early August. Sc. PA and WV south to w. NC, e. TN, n. GA, se. GA, Panhandle FL, and AL. [= F, FNA, K, Pa, RAB, W, WH, WV; < *I. verna* – C, G; < *Neubeckia verna* (Linnaeus) Alefani – S]

Iris verna Linnaeus *var*. ***verna***, Coastal Plain Dwarf Iris, Sandhill Iris. Longleaf pine sandhills, dry, rocky forests and woodlands. March-May; May-June. MD south to se. SC and e. GA, primarily on the Coastal Plain, but extending into the Piedmont. [= F, FNA, K, RAB; < *I. verna* – C, G; < *Neubeckia verna* (Linnaeus) Alefani – S]



Iris versicolor Linnaeus, Northern Blue Flag, Poison Flag. Marshes, swamps, shores. May-July. Reported as occurring as far south as VA in C, F, and W. [= C, FNA, G, K, Pa, S?, W]

Iris virginica Linnaeus *var*. ***shrevei*** (Small) E. Anderson. Marshes, swamps, streams. May-July; July-September. Sw. QC to MN, south to w. NC, n. AL, e. TN, AR, and e. KS. [= C, F, K, WV; < *I. virginica* – RAB, FNA, Pa, W; = *I. shrevei* Small – G, S]

Iris virginica Linnaeus *var*. ***virginica***, Southern Blue Flag. Marshes, swamps, streams. April-May; July-September. Se. VA south to c. peninsular FL, west to e. TX, north in the interior to w. TN; disjunct in sc. TN. [= C, F, K; < *I. virginica* – RAB, FNA, W; = *I. virginica* – G, S]

* ***Iris xiphium*** Linnaeus, Spanish Iris. Disturbed areas; native of Spain and Portugal. [= K]

Nemastylis Nuttall 1835 (Celestial-lily)

A genus of about 5 species, herbs, of s. North America and Central America. The circumscription relative to *Calydorea* is uncertain. References: Goldblatt in FNA (2002a); Goldblatt, Manning, & Rudall in Kubitzki (1998a).

Nemastylis geminiflora Nuttall, Prairie Celestial, Prairie Pleatleaf. Prairies. MO and e. KS south to w. LA and TX; disjunct eastward in AL and MS. [= FNA, K; *Ixia acuta* Bartram; *Nemastylis acuta* Herbert]

Sisyrinchium Linnaeus 1753 (Blue-eyed-grass, Irisette)
by B.A. Sorrie and A.S. Weakley

A genus of about 80 species, herbs, of the Americas. *Sisyrinchium* is a very difficult genus, with a number of taxonomic questions remaining in our area. References: Cholewa & Henderson in FNA (2002a); Hornberger (1991)=Y; Bicknell (1896, 1899a, 1899b); Goldblatt, Manning, & Rudall in Kubitzki (1998a).

Identification notes: For fully successful identification, it is necessary to collect underground parts; fibrous remains of leaves, and rhizomes (if any), are critical characters.

1 Perianth with tepals campanulate basally, flaring distally; annual; plants usually <2 dm tall; tepals lavender, pink, white, magenta, or yellow, with a maroon blaze near the base (*S. rosulatum*) or the base wholly yellow (*S. minus*).
2 Stems with 3-6 nodes; tepals yellow basally; mature capsules broadly fusiform or elliptical, uniformly light brown; [of MS to TX] ..... ***S. minus***
2 Stems with 1-2(-3) nodes; tepals with maroon blaze near base; mature capsules globose, tan with purple sutures; [widespread] ..... ***S. rosulatum***
1 Perianth with tepals abruptly spreading in a plane; perennial, plants usually >2 dm tall; tepals blue, violet, or white.
3 Inflorescences paired (each inflorescence composed of 1-several flowers, their pedicels emanating from within 2 chartaceous scales; thus, there are 2 pairs of scales within the 2 outer, leaflike, green spathe bracts); outer spathe bract connate 0-1 mm.
4 Stems 1.3-3.4 mm wide, obviously winged; base of plant without fibrous remains of leaves; [of the Piedmont and Mountains] ..... ***S. albidum***
4 Stems 0.5-1.0 mm wide, wiry, not or scarcely winged; base of plant with numerous fibrous remains of leaves; [of the Coastal Plain] ..... ***S. capillare***
3 Inflorescence solitary, not paired (within the 2 green spathe bracts there is only one pair of chartaceous scales); outer spathe bract connate 2-6 mm (except 0-1 mm in *S. campestre*).
5 Stems simple, unbranched (rarely branched).
6 Spathe bracts connate 0-1 mm ..... ***S. campestre***
6 Spathe bracts connate >1 mm.
7 Base of plant with fibrous remains of leaves ..... ***S. sagittiferum***
7 Base of plant without fibrous remains of leaves
8 Spathe bracts equal or subequal, outer bract up to 4.2 mm longer than inner; [coastal sw LA-s TX] ..... ***S. biforme***
8 Spathe bracts distinctly unequal, outer usually >6 mm longer than inner; [southern Appalachians and northward].
9 Stems (1.5-)2-4 mm wide, obviously winged; spathe bracts green, rarely purplish; capsules 4-6.8 mm long; [northern, extending south to n. VA] ..... ***S. montanum***
9 Stems 1-2 mm wide, narrowly winged; spathe bracts purple on margins at least (often throughout); capsules 3.2-5.5 mm long; [northern, extending south to nw. GA and c. AL] ..... ***S. mucronatum***
5 Stems branched, with 1-5 nodes.
10 Stems with 2-5 nodes, the branching dichotomous; tepals white, recurved at maturity; [of escarpment region of sw. NC and nw. SC] ..... ***S. dichotomum***
10 Stems with 1-3 nodes, the branching uneven; tepals blue to violet, oriented in a plane; collectively widespread.
11 Plant bases with fibrous remains of leaves (usually abundant).
12 Main stems 0.5-2.1 mm wide (usually <2 mm wide).
13 Stems mostly 1.5-2.1 mm wide, scabrous; plants drying dark brown or blackish; spathe bracts 15-20(-25) mm long ..... ***S. fuscatum***
13 Stems 0.5-1.2 mm wide, not scabrous; plants drying pale brown or greenish brown; spathe bracts 12-14(-15) mm long ..... ***S. rufipes***
12 Main stems 1.5-6 mm wide (usually >2 mm wide).
14 Stems and leaves shiny, especially in life; stems mostly 3-6 mm wide; mature capsules mostly 5.5-8 mm long; [of FL and sw. GA] ..... ***S. xerophyllum***
14 Stems and leaves dull; stems 1.5-4.5 mm wide; mature capsules 2.5-6 mm long; [widespread].
15 Stems and branches smooth on margins; stems mostly 2.3-4.5 mm wide; plants dry dull green or brownish green; [widespread] ..... ***S. nashii***
15 Stems and branches scabrous on margins at least distally; stems 1.5-3.0 (-3.5) mm wide; plants dry dark brown or blackish; [of the Coastal Plain].
16 Stems mostly 2.0-3.0(-3.5) mm wide; mature capsules 4-6 mm long; [of e. MD northward to sw. Nova Scotia] ..... ***S. arenicola***

16 Stems mostly 1.5-2.1 mm wide; mature capsules 2.5-4 mm long; [of se. VA to se. LA]..... ***S. fuscatum***
11 Plant bases without fibrous remains of leaves
17 Main stems usually >2 mm wide.
18 Spathe bracts connate 2.5-4 mm; spathe bracts and stems with abundant white spicules or papillae, sometimes these +/- flattened like lenticels; stems 1-2.8 mm wide; leaf blades scabrous..... ***S. pruinosum***
18 Spathe bracts connate 4-6 mm; spathe bracts and stems without spicules or papillae; stems 2.3-5 mm wide; leaf blades not scabrous.
19 Plant <45 cm tall; stems branched 1 time; nodes geniculate, nodes green; mature capsules pale brown..... ***S. angustifolium***
19 Plant 30-70 cm tall; stems branched 2(-3) times; nodes not geniculate, nodes purplish; mature capsules dark brown to black..... ***S. corymbosum***
17 Main stems usually <2 mm wide.
20 Rhizome present and obvious (although not longer than about 3 cm), about 2 mm thick, hard, blackish; hyaline margins of inner spathe bract acute (contra *S. atlanticum*)..... ***S. miamiense***
20 Rhizome absent or at least not evident; hyaline margins of inner spathe bract various.
21 Ovaries and capsules black, strongly contrasting with foliage (which dries pale yellowish or tan); hyaline margins of inner spathe bract obtuse or truncate apically, sometimes projecting as lobes..... ***S. atlanticum***
21 Ovaries and capsules pale to medium brown; foliage drying dull green or brownish; hyaline margins of inner spathe bract acute, never projecting as lobes.
22 Spathe bracts and stems without spicules or papillae; outer spathe bract usually > inner by 1-2.7 mm; spathe bracts purple tinged basally and sometimes also on margins; plants usually densely cespitose..... ***S. langloisii***
22 Spathe bracts and stems with abundant white spicules or papillae, sometimes these +/- flattened like lenticels; outer spathe bract usually > inner by 2.5-5.5 mm; spathe bracts green; plants usually with few-several stems, not densely cespitose..... ***S. pruinosum***

Sisyrinchium albidum Rafinesque. Woodlands, savannas?, mesic sandhills, open limestone barrens. March-May; May-June. S. NY west to s. WI, south to Panhandle FL and e. TX. [= C, F, FNA, G, K, Pa, Y; < *S. albidum* – RAB, W, WH (also see *S. capillare*); > *S. albidum* – S; > *S. scabrellum* E.P. Bicknell – S]

Sisyrinchium angustifolium P. Miller. March-June. Woodlands, forests, meadows, sandhill swales. March-June; May-July. VT, NH, and s. ON west to WI, e. KS, and OH, south to GA, AL, LA, and TX. [= RAB, C, F, FNA, GW, K, Pa, W, WV, Y; = *S. graminoides* E.P. Bicknell – G, S]

Sisyrinchium arenicola E.P. Bicknell, Sandyland Blue-eyed-grass. Pine-oak/heath woodlands and barrens, other sandy habitats. A Coastal Plain endemic: MA to e. MD (Caroline Co.) (Knapp et al. 2011). [= F; < *S. fuscatum* – FNA, Pa]

Sisyrinchium atlanticum E.P. Bicknell, Atlantic Blue-eyed-grass. Dry, sandy or rocky places. March-June; June-August. NS and ME west to OH, IN, and MO, south to s. FL and LA. [= C, F, FNA, G, GW, K, Pa, S, W, Y; = *S. mucronatum* var. *atlanticum* (E.P. Bicknell) H.E. Ahles – RAB; < *S. angustifolium* – WH]

Sisyrinchium campestre E.P. Bicknell, Prairie Blue-eyed-grass. Prairies. MI and SD south to MS and NM. [= FNA, K] {add to synonymy}

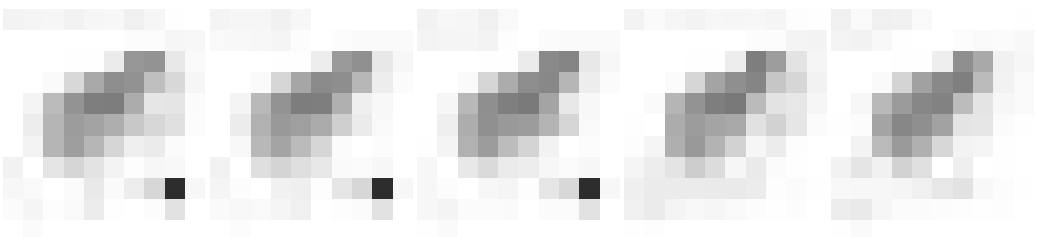
Sisyrinchium capillare E.P. Bicknell, Wiry Blue-eyed-grass. Wet pine savannas and flatwoods. March-June; May-June. Coastal Plain, from se. VA south to ne. FL. [= C, F, FNA, G, GW, K, S; < *S. albidum* – RAB, W, WH]

Sisyrinchium corymbosum E.P. Bicknell. Pinelands. Se. GA and ne. FL west to s. AL. See Ward (2005a) for its resurrection. [< *S. atlanticum* Bicknell – FNA, K; < *S. angustifolium* – WH]

Sisyrinchium dichotomum E.P. Bicknell, White Irisette, Isothermal Irisette. Dry to mesic woodlands and forests, usually over mafic rocks (such as amphibolite), at low to moderate elevations (400-1000 m) in the Blue Ridge escarpment. May-June; June-August. Endemic to Henderson, Polk, and Rutherford counties, NC, and Greenville County, SC. [= FNA, K, W]

Sisyrinchium fuscatum E.P. Bicknell. Xeric to dry soils of pine barrens, Carolina bay rims, sandhills, fluvial sand ridges. Late April-June; June-October. E. VA south to n. FL, west to LA. [= RAB, F, G, GW; < *S. fuscatum* – C, FNA, K; > *S. fuscatum* – S; > *S. incrustatum* E.P. Bicknell – S; < *S. nashii* – WH]

Sisyrinchium langloisii Greene. {habitats}. AR and OK south to w. LA and s. TX; disjunct eastward in AL, GA, MS, TN, and nw. GA. [= FNA; < *S. langloisii* – K (also see *S. pruinosum*)]



Sisyrinchium miamiense E.P. Bicknell. {habitats}. Ne FL and s. GA south to s. FL and west to s. MS. [= FNA, K; < *S. angustifolium* – WH] {add S to synonymy}

Sisyrinchium minus Engelmann & A. Gray. {habitats}. E. LA west to c. TX. Reported for NC (Sida 1962) and MS {check}. [= K] {add to synonymy}

Sisyrinchium montanum Greene *var*. ***crebrum*** Fernald. {habitat in our area not known}. May-July. NL (Newfoundland) and ON south to NY. The status of this taxon in our area is not clear. *S. montanum* var. *crebrum* is reported for VA by F, and *S. montanum* (variety not specified) is reported for NC and VA by C and G. FNA considers var. *crebrum* to range south only to NY, and var. *montanum* south only to OH and PA. Herbarium documentation is needed. [= C, F, FNA, K, Pa; < *S. montanum* – G; > *S. angustifolium* – G, S, misapplied]

Sisyrinchium montanum Greene var. *montanum*. Reported for n. WV (Harmon, Ford-Werntz, & Grafton 2006). {rejected; not keyed; not mapped} [= C, F, FNA, K; < *S. montanum* – G]

Sisyrinchium mucronatum Michaux. Forests, woodlands, fields. April-June; June-July. ME west to SK, south to SC, GA, MI, MN. [= C, F, FNA, GW, G, K, Pa, S, W, WV; = *S. mucronatum* var. *mucronatum* – RAB]

Sisyrinchium nashii E.P. Bicknell, Nash's Blue-eyed-grass. Woodlands and forests. April-June. NC and TN (sw. VA?) south to s. FL and MS. [= FNA, K, W; > *S. fibrosum* E.P. Bicknell – S; < *S. nashii* – WH]

Sisyrinchium pruinosum E.P. Bicknell. {habitats}. AR south to w. LA and AR; disjunct at scattered localities eastward in e. LA, MS, AL, and sc. TN. [= FNA; < *S. langloisii* – K] {add to synonymy}

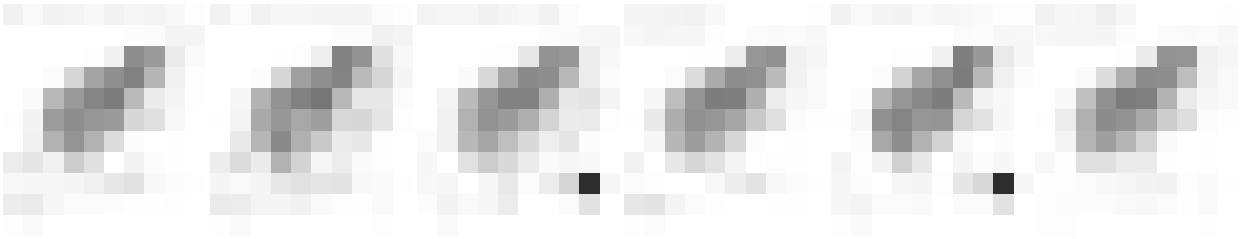
Sisyrinchium rosulatum E.P. Bicknell, Lawn Blue-eyed-grass, Fairy-stars. Lawns, roadsides. April-May; May-June. Se. VA south to FL, west to e. TX. [= RAB, FNA, GW, K, S, WH, Y; > *S. exile* E.P. Bicknell]

Sisyrinchium rufipes E.P. Bicknell. Xeric-dry longleaf pine sandhills, fluvial sand ridges. Se. NC to n. FL, west to s. AL. [= S; < *S. fuscatum* – FNA, K; < S. nashii – WH]

Sisyrinchium sagittiferum E.P. Bicknell. Ranges east to AL (FNA). [= FNA, K] {add to synonymy}

Sisyrinchium species 1, Glade Blue-eyed-grass. Calcareous glades of n. AL and sc. TN. Under study by Bruce Sorrie. Material of this taxon has sometimes been lableled as *S. capillare*. [= *S. calciphilum* Sorrie, in press] {not yet keyed or mapped}

Sisyrinchium xerophyllum Greene, Florida Blue-eyed-grass. Xeric sands. S. GA south to s. peninsular FL; also alleged to occur in NC (FNA) but this report does not seem plausible. [= FNA, K, S, WH]



73. XANTHORRHOEACEAE R. Brown 1810 (Day-lily Family) [in ASPARAGALES]

A family of about 35 genera and 900 species, herbs, shrubs, and trees, of the Old World and especially Australia and s. Africa. Here circumscribed broadly to include Hemerocallidaceae, Phormiaceae, Aloaceae, and Asphodelaceae, following the suggestion of APG III (2009) and Chase, Reveal, & Fay (2009). References: Chase, Reveal, & Fay (2009); APG III (2009); Zomlefer (1998, 1999); Clifford, Henderson, & Conran in Kubitzki (1998a).

Hemerocallis Linnaeus 1753 (Day-lily)

A genus of about 15-30 species, temperate, of e. Asia. References: Zomlefer (1998)=Z; Straley & Utech in FNA (2002a).

1 Flowers tawny-orange (or many variants thereof), not fragrant; inner tepal margins wavy ..... ***H. fulva***
1 Flowers lemon-yellow, fragrant; inner tepal margins planar..... ***H. lilioasphodelus***

* ***Hemerocallis fulva*** (Linnaeus) Linnaeus, Orange Day-lily, Tawny Day-lily. Commonly cultivated, frequently escaping to forests, streambanks, suburban woodlands, lawns, waste places; native of Asia. Late May-early July. [= C, FNA, G, K, Pa, RAB, W, WH, WV, Z; > *H. fulva* var. *fulva* – F; > *H. fulva* var. *kwanso* Regel – F]

* ***Hemerocallis lilioasphodelus*** Linnaeus, Yellow Day-lily, Lemon Day-lily. Roadsides, bottomlands, less commonly cultivated, only rarely escaping; native of Asia. May-July. [= C, FNA, K, Pa, Z; = *H. flava* (Linnaeus) Linnaeus – F, G, WV]

74. AMARYLLIDACEAE J. St. Hilaire 1805 (Amaryllis Family) [in ASPARAGALES]

A family of about 59 genera and 850 species, nearly cosmopolitan (especially diverse in the tropics). Here circumscribed to include the Alliaceae following the recommendation of APG III (2009). References: Dahlgren, Clifford, & Yeo (1985); Müller-Doblies & Müller-Doblies (1996); Meerow & Snijman in Kubitzki (1998a); Fay & Chase (1996); Rahn in Kubitzki (1998a). [also see *AGAVACEAE* and *HYPOXIDACEAE*]

1 Ovary superior; [subfamily *Allioideae*].
  2 Inflorescence a solitary flower; flowers blue, lavender, or white; fresh plant with an onion odor; [tribe *Gillesieae*] ..... ***3. Tristagma***
  2 Inflorescence an umbel; flowers white, greenish white, cream, pink, or magenta-purple; fresh plant with or without an onion odor.
    3 Tepals 2-9 mm long; ovary 3-celled, each with 1-2 ovules; fresh plant with an onion odor; [tribe *Allieae*] ..... ***1. Allium***
    3 Tepals 10-15 mm long; ovary 3-celled, each with 6-10 ovules; fresh plant usually without an onion odor; [tribe *Gillesieae*] ..... ***2. Nothoscordum***
1 Ovary inferior; [subfamily *Amaryllidoideae*].
  4 Corona present (a fused tubular or flattened petaloid structure in the center of the flower, above the tepals).
    5 Filaments fused with the corona; corona very membranous in texture, distinctly thinner than the tepals; flowers white; [native, of riverine or tidal shores and marshes]; [tribe *Hymenocallideae*, subtribe *Hymenocallidinae*] ..... ***12. Hymenocallis***
    5 Filaments not fused with the corona; corona membranous in texture, but similar to the tepals (in texture, though sometimes of a different color); flowers usually at least partly yellow or orange (sometimes purely white); [alien, naturalized in primarily upland and disturbed habitats]; [tribe *Narcisseae*, subtribe *Narcissinae*] ..... ***8. Narcissus***
  4 Corona absent.
    6 Flowers red; stamens about 2× as long as the tepals; [tribe *Lycoridae*] ..... ***5. Lycoris***
    6 Flowers white, yellow, copper, or white-pink; stamens shorter than or about as long as the tepals.
      7 Flowers yellow to copper.
        8 Tepals apiculate at the tip, especially the outer 3 tepals; scape hollow; [tribe *Hippeastreae*, subtribe *Zephyranthinae*] ..... ***10. Habranthus***
        8 Tepals rounded at the tip; scape solid; [tribe *Narcisseae*, subtribe *Narcissinae*] ..... ***9. Sternbergia***
      7 Flowers white or white-pink.
        9 Tepals 3-16 cm long, white or sometimes white-pink.
          10 Tepals spreading, separate, the perianth rotate; inflorescence a several-flowered umbel terminating the stem; leaves arranged spirally; leaf margins finely toothed; [tribe *Amaryllideae*, subtribe *Crininae*] ..... ***4. Crinum***
          10 Tepals ascending, overlapping, the perianth tubular; inflorescence of a single flower; leaves arranged distichously; leaf margins smooth; [tribe *Hippeastreae*, subtribe *Zephyranthinae*] ..... ***11. Zephyranthes***
        9 Tepals 0.4-2.5 cm long, white, with small green or yellow spots; [tribe *Galantheae*].
          11 Inner 3 tepals distinctly shorter and blunter than the outer 3 tepals ..... ***6. Galanthus***
          11 Inner 3 tepals and outer 3 tepals of similar size and shape ..... ***7. Leucojum***

1. Allium Linnaeus 1753 (Onion, Garlic, Leek, Ramps, Chives)

A genus of 500-700 species, herbs, of Eurasia, n. Africa, and North America (especially diverse in c. Asia). References: Mathew (1996)=Z; Rahn in Kubitzki (1998a); McNeal & Jacobsen in FNA (2002a). [also see *Nothoscordum*]

1 Leaves appearing before the flowers and withering before anthesis; leaves lanceolate to elliptic (the margins not parallel for most of the length), mostly > 2 cm wide; [subgenus *Rhizirideum*].
  2 Leaves (1.5-) 2-4 (-4.5) cm wide, without a distinct petiolar base, the basal portion white; flowers (6-) 10-18 (-25) per umbel (fruits often fewer by abortion); spathe bracts 1-2 cm long; fruiting pedicels (8-) 10-15 (-18) mm long ..... ***A. burdickii***
  2 Leaves (3-) 5-8 (-9) cm wide, with a distinct petiolar base, the petioles usually red or pink; flowers (15-) 30-55 (-63) per umbel (fruits often fewer by abortion); spathe bracts 2-3 cm long; fruiting pedicels (10-) 15-25 (-30) mm long ..... ***A. tricoccum***
1 Leaves present at flowering; leaves linear (the margins parallel for most of the length), mostly < 2 cm wide.
  3 Leaves cylindric (round or channeled-indented in cross section), hollow.
    4 Stem stout, usually > 10 mm in diameter; peduncles with a distinct swollen portion ..... ***A. cepa***
    4 Stem slender, < 5 mm in diameter; peduncles without a distinct swollen portion; [subgenus *Allium*]
      5 Stems clustered, 1-3 dm tall; pedicels shorter than the flowers ..... ***A. schoenoprasum*** *var.* ***schoenoprasum***
      5 Stems solitary, 3-10 dm tall; pedicels longer than the flowers ..... ***A. vineale***
  3 Leaves variously flattened or keeled (flat or V-shaped in cross section), not hollow.
    6 Stem leafy for half its length; leaves 1.5-4.5 cm wide; [subgenus *Allium*].
      7 Inflorescence of flowers only ..... ***A. ampeloprasum***
      7 Inflorescence of bulblets (and often flowers as well).
        8 Leaves 2-4 mm wide; bulbs simple at maturity; involucral bracts 2 ..... ***A. oleraceum***
        8 Leaves 6-12 mm wide; bulbs compound at maturity (with separable cloves); involucral bract 1 ..... ***A. sativum***
    6 Stem scapose, leafy only at its base; leaves < 1.4 cm wide; [subgenus *Amerallium*].
      9 Inflorescence erect, the peduncle not bent.
        10 Ovary or capsule crested with projections about 1 mm long; tepals acuminate.
          11 Spathe bracts usually 5-nerved; ovary crests contorted, ascending; tepals reflexed; leaves 3-10 mm wide ..... ***A. cuthbertii***
          11 Spathe bracts 1-nerved; ovary crests plane, flattened, spreading; tepals spreading; leaves 1-2 mm wide ..... ***A. speculae***
        10 Ovary or capsule not crested with projections; tepals acute.
          12 Inflorescence partly or entirely of bulblets ..... ***A. canadense*** *var.* ***canadense***
          12 Inflorescence entirely of normal flowers ..... ***A. canadense*** *var.* ***mobilense***
      9 Inflorescence nodding, the peduncle bent 30-150 degrees in its uppermost several cm (at least in bud – in *A. stellatum* becoming erect in flower or fruit).
        13 Flowers stellate, the tepals spreading; scape nodding in bud, becoming erect in flower or fruit; bulb ovoid ..... ***A. stellatum***

13 Flowers urceolate, campanulate, to nearly rotate, the tepals strongly to slightly incurved; scape nodding in bud, flower, and fruit; bulb elongate.
14 Perianth urceolate, deep magenta-purple; tepals obtuse; [plants of moderate to high elevations in the Mountains] ..... ***A. allegheniense***
14 Perianth campanulate to nearly rotate, pink, pale pink, or nearly white; sepals acute (obtuse in *A. oxyphilum*); [of moderate to low elevations in the Mountains, Piedmont, and Coastal Plain].
15 Plants flowering late August-early October; tepals 6-9 mm long, pale pink to nearly white; leaves moderately to strongly keeled in cross section (the angle between the two lower flat faces generally 90-135 degrees), 4-12 mm wide; [of calcareous wet savannas of the outer Coastal Plain] ..... ***A. species 1***
15 Plants flowering June-early August; tepals 5-6.5 mm long, pink to pale pink (white to greenish white in *A. oxyphilum*); leaves rounded to moderately keeled in cross section (if keeled, the angle between the two lower flat faces generally 120-165 degrees), 2-8 mm wide; [of the Piedmont and Mountains].
16 Pedicels relatively stout, 1.6-3 cm long; tepals pink or pale pink (sometimes nearly white); plants flowering June to early August; [widespread in our area, on moderately to strongly calcareous substrates] ..... ***A. cernuum***
16 Pedicels relatively slender, 2-4 cm long; tepals greenish white to white; plants flowering August; [of barrens developed over strongly acid shales in e. WV] ..... ***A. oxyphilum***

Allium allegheniense Small, Allegheny Onion. In thin soils around outcrops, generally of mafic rocks (such as amphibolite or hornblende gneiss) or calcareous rocks, primarily at moderate to fairly high elevations (1000-1600m). July-early September; August-October. Known from w. NC, w. VA, and e. WV, possibly more widespread. Although not recognized by most recent authors, *A. allegheniense* seems distinctive enough in morphology, ecology, and distribution to warrant taxonomic recognition at some level; additional study is needed. [= K, S; < *A. cernuum* – RAB, C, F, FNA, G, W]

* ***Allium ampeloprasum*** Linnaeus, Wild Leek, Yorktown Onion. Roadsides and other disturbed areas; native of Eurasia. Late May-early July; July-August. [= RAB, C, F, FNA, G, W, Z; > *A. ampeloprasum* var. *ampeloprasum* – K; > *A. ampeloprasum* var. *atroviolaceum* (Boiss.) Regel – K]

Allium burdickii (Hanes) A.G. Jones, Narrow-leaf Ramps, White Ramps. Northern hardwood forests, primarily at higher elevations than *A. tricoccum*, perhaps also in cove forests and rich mountain slopes. June; August. Only recently determined to be a separate taxon, *A. burdickii* is apparently rare in our area. It blooms about a month earlier than *A. tricoccum*. See Jones (1979) for more details and discussion. Largely sympatric with *A. tricoccum*, it is somewhat more northern and midwestern, ranging from ME west to ND and south to NJ, and in the Mountains to (?) w. VA. All material ascribed to *A. burdickii* in w. NC and e. TN appears to be *A. tricoccum*. [= K, W; = *A. tricoccum* var. *burdickii* Hanes – C, FNA; < *A. tricoccum* – F, G, Pa]

Allium canadense Linnaeus *var*. ***canadense***, Wild Onion. Bottomland forests, pastures, roadsides. Mid April-May; late May-June. NB west to ND, south to c. peninsular FL and TX. Though native, often appearing weedy. [= RAB, C, FNA, K, WH3; = *A. canadense* – F, G, S, W]

Allium canadense Linnaeus *var*. ***mobilense*** (Regel) Ownbey. Dry woodlands. Mid April-May; Late May-June. S. SC south to ne. FL and Panhandle FL, west to TX. This taxon is perhaps better treated as a distinct species. [= RAB, FNA, K, WH3; > *A. microscordion* Small – S; = *A. mutabile* Michaux – F; > *A. arenicola* Small – S; *A. canadense* ssp. *mobilense* (Regel) Traub & Ownbey]

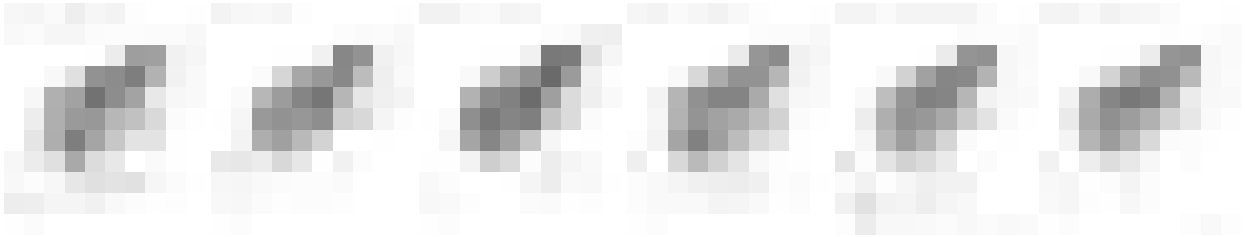
* ***Allium cepa*** Linnaeus, Garden Onion. Persisting from gardens, or appearing around compost or trash piles; native to c. Asia. May-June; July. [= RAB, C, FNA, G; > *A. cepa* var. *cepa* – K]

Allium cernuum Roth, Nodding Onion. Generally in open woodlands or around outcrops of shale, mafic, ultramafic, or calcareous rocks, in the mountains at low elevations. June-early August; August-October. NY, MI, MN, and BC, south to GA and AZ; the distribution is oddly fragmented into largely Rocky Mountain, Ozarkian, and Appalachian segments, and it is quite possible that cryptic taxa are involved. See discussion of *A. oxyphilum* at end of genus. [= S; < *A. cernuum* – C, F, FNA, G, Pa, RAB, W (also see *A. allegheniense* and/or *A. oxyphilum*); > *A. cernuum* var. *cernuum* – K]

Allium cuthbertii Small, Cuthbert's Onion. Sandhills, granite domes and flatrocks, in NC in thin soils around rock outcrops, receiving nutrient-rich seepage and occurring with many strict calciphiles. May-June; June-July. The bright emerald green ovary of the fresh flowers is striking and distinctive. Two morphological forms occur in our area, probably warranting taxonomic recognition. Typical *A. cuthbertii* occurs on xeric Coastal Plain sands and adjacent acid Piedmont rock outcrops, from c. SC south through GA and AL to ne. FL; the perianth is white and the plants 1.5-3.5 dm tall. A peculiar form of *A. cuthbertii* is apparently limited to a series of unusual "rich granitic" domes in the Brushy Mountains of Alexander and Wilkes counties, NC; these plants are more robust (4-8 dm tall), and the perianth is always pink. [= RAB, FNA, K, S, W, WH3]

Allium neapolitanum Cirillo, White Garlic. Disturbed areas; native of Eurasia. April. Reported from Franklin County, FL (Wunderlin & Hansen 2011), Marengo County, AL (Keener 2012), and other Gulf Coast states (Kartesz 2010). [= K2, WH3] {not yet keyed}

* ***Allium oleraceum*** Linnaeus, Field Garlic. Disturbed areas, native of Europe. July-September. [= C, F, FNA, G, J, K, Pa]



Allium oxyphilum Wherry. Shale barrens. Endemic to WV (Greenbrier, Mercer, Monroe, and Summers counties). Although there has been much discussion of its taxonomic status, it is apparently distinct from *A. cernuum*. It should be expected in VA, although the outcrops of suitable shales are quite limited (Bartgis, pers. comm.; Wieboldt, pers. comm.). [= K; < *A. cernuum* – C, F, FNA, G, W]

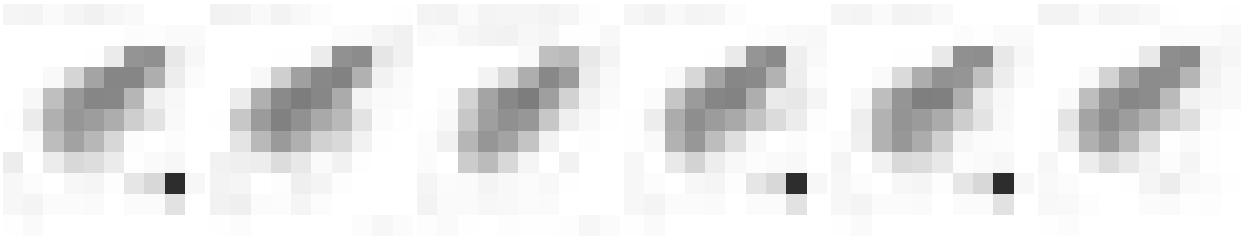
* ***Allium sativum*** Linnaeus, Garlic. Gardens, trash heaps, fields; commonly cultivated, rarely occurring as a waif or persistent in gardens, native of Eurasia. [= C, F, FNA, G, K, Z]

* ***Allium schoenoprasum*** Linnaeus *var*. ***schoenoprasum***, Chives. Disturbed areas, native of Eurasia. June-August. [= C, F, G; < *A. schoenoprasum* – FNA, K, Pa]

Allium species 1, Savanna Onion. Wet savannas over coquina limestone (marl). Late August-early October; late September-November. This remarkable Coastal Plain relative of *A. cernuum* was first discovered in 1981 by Steve Leonard in Pender County; it has since been found in similar sites in Onslow and Brunswick counties, always associated with other endemic species of primarily montane genera, such as *Thalictrum cooleyi* and *Parnassia caroliniana*. It appears to warrant taxonomic status.

Allium speculae Ownbey & Aase, Flatrock Onion. Seepy edges of vegetation mats on Lithonia granitic gneiss and on sandstone in ne. AL. May-June; mid June-mid July. Endemic to wc. GA and ne. AL. See Patrick, Allison & Krakow (1995) for additional information. [= FNA, K]

Allium stellatum Nuttall ex Ker-Gawler, Glade Onion, Prairie Onion. Limestone glades. July-September. ON and SK south to n. AR and e. TX; disjunct east of the Mississippi in c. TN. [= C, F, FNA, G, K]



Allium tricoccum Aiton, Ramps, Red Ramps, Wild Leek, Rampscallions. Cove forests and mesic slope forests. June-July: August-September. See *A. burdickii* for a discussion of the two taxa of ramps. NS and ND south to n. GA, n. AL, and MO. [= RAB, K, W; < *A. tricoccum* – F, G, Pa; = *A. tricocum* var. *tricoccum* – C, FNA; = *Validallium tricoccum* (Aiton) Small – S]

* ***Allium tuberosum*** Rottler ex Sprengel, Chinese Chives, Oriental Garlic. Dunes. July-August. [= FNA] {not yet keyed}

* ***Allium vineale*** Linnaeus, Field Garlic. Lawns, pastures, other disturbed places; native of Eurasia. Late May-June; June-August. This is the common weed, often known as "onion grass". [= C, F, FNA, G, Pa, RAB, S, W; > *A. vineale* ssp. *vineale* – K; > *A. vineale* var. *vineale* – Z; > *A. vineale* var. *capsuliferum* Koch – Z; > *A. vineale* var. *compactum* (Thuill.) Coss. – Z]

2. Nothoscordum Kunth 1843 (Grace Garlic, False Garlic)

A genus of about 25 species, herbs, of the Americas (primarily South America). References: Rahn in Kubitzki (1998a)=Z; Jacobsen & McNeal in FNA (2002a).

1 Leaves 1-4 (-5) mm wide; tepals distinct or only slightly connate at the base; flowers 3-6 (-10) per umbel; flowers not fragrant ..... ***N. bivalve***
1 Leaves 4-12 mm wide; tepals connate up to 1/3 of their length; flowers 10-20 per umbel; flowers fragrant (similar to cocoa)..... ***N. gracile***

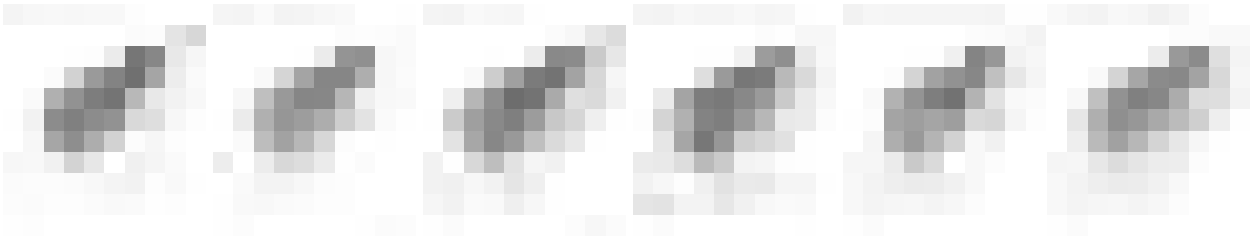
Nothoscordum bivalve (Linnaeus) Britton, Grace Garlic, False Garlic. Around granite flatrocks, in glades and barrens of various kinds, in open woodlands, and also weedy in fields and along roadsides. Mid March-mid May, and again in September-December; May-June, and again in October-January. Se. VA west to s. OH and KS, south to c. peninsular FL, TX, and South America. An onion-like plant, but generally lacking the odor of onion. [= C, F, G, K, S, W, WH, Z; = *Allium bivalve* (Linnaeus) Kuntze – RAB]

* ***Nothoscordum gracile*** (Aiton) Stearn, Fragrant False Garlic. Disturbed areas, lawns; native of South America. [= FNA, K; = *Nothoscordum borbonicum* Kunth – WH3, Z, misapplied?; = *Allium inodorum* Aiton – RAB; = *N. fragrans* (Ventenat) Kunth – S]

3. Tristagma Poeppig (Star-of-Bethlehem)

A genus of about 17 species, herbs, of South America. References: Rahn in Kubitzki (1998a).

* ***Tristagma uniflorum*** (Graham) Traub, Star-of-Bethlehem. Commonly cultivated, escaping to lawns, suburban woodlands, bottomlands, disturbed places; native of South America. March-April. Reported for South Carolina by Hill & Horn (1997). [= K; = *Ipheion uniflorum* (Graham) Rafinesque – RAB, WH3]



4. Crinum Linnaeus 1753 (Swamp Lily, String Lily)

A genus of about 65 species, pantropical, extending locally into warm temperate regions. References: Holmes in FNA (2002a); Meerow & Snijman in Kubitzki (1998a).

Identification notes: *Crinum* can be distinguished vegetatively from *Hymenocallis* by its spiral (vs. distichous) leaf arrangement and leaf margins finely toothed (vs. entire).

1 Leaves 7.5-12 cm wide; umbels 20-100-flowered ..... ***C. asiaticum***
1 Leaves 1-5 (-7) cm wide; umbels 2-13-flowered.
  2 Umbels 2-5-flowered; perianth white; [native]..... ***C. americanum*** *var.* ***americanum***
  2 Umbels 8-13-flowered; perianth usually at least in part reddish; [exotic].
    3 Flowers pedicellate; bulb 6-8 cm in diameter ..... ***C. bulbispermum***
    3 Flowers sessile; bulb 12-15 cm in diameter ..... ***C. zeylanicum***

Crinum americanum Linnaeus *var*. ***americanum***, Swamp-lily, String-lily, Seven-sisters. Swamp forests. June-October. Se. NC south to s. FL and west to TX. Var. *traubii* (Moldenke) R.S. Hannibal is endemic in se. TX. [= FNA; < *C. americanum* – GW, K, S, WH3]

* ***Crinum asiaticum*** Linnaeus, Poison-bulb. Disturbed areas, native of Asia. Reported for e. LA (East Baton Rouge Parish) and s. FL. [= FNA, K, WH3]

* ***Crinum bulbispermum*** (Burman f.) Milne-Redhead & Schweickerdt, Milk-and-wine Lily, Grass-lily, African Swamp-lily. Commonly cultivated, occasional in waste areas; native of s. Africa. June-July. [= FNA, K, WH3; ? *C. longifolium* (Linnaeus) Thunberg – S]

* ***Crinum zeylanicum*** (Linnaeus) Linnaeus, Milk-and-wine Lily. Disturbed areas, escaped or persistent from cultivation; native of Sri Lanka and w. India. [= FNA, K, WH3]

5. Lycoris Herbert 1819 (Magic Lily)

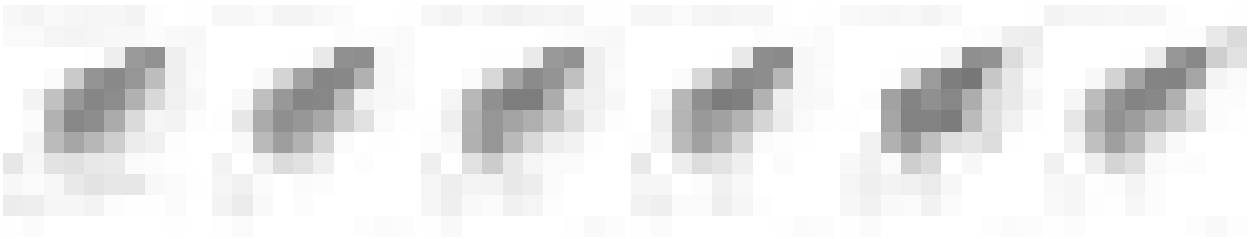
A genus of about 20 species, primarily e. Asian. References: Meerow & Snijman in Kubitzki (1998a).

* ***Lycoris radiata*** (L'Héritier) Herbert, Magic Lily, Surprise Lily, Hurricane Lily, Spider Lily. Frequently cultivated, sometimes persistent for long periods of time, especially in lawns around older homes; native of e. Asia. September-October. Leaves and flowers are not present at the same time. Reported as “established as waifs over past decade in lawn” in Jackson County, NC by Pittillo & Brown (1988). [= RAB, K, WH3]

6. Galanthus Linnaeus 1753 (Snowdrop)

A genus of about 17 species, of Europe and w. Asia. See Bishop, Davis, & Grimshaw (2001) for detailed information on the genus, especially on cultivars. References: Stace (2010)=Z; Straley & Utech in FNA (2002a); Bishop, Davis, & Grimshaw (2001); Meerow & Snijman in Kubitzki (1998a).

* ***Galanthus nivalis*** Linnaeus, Snowdrop. Persistent after cultivation; native of s. and c. Europe. February-March. [= F, FNA, K, Pa, Z]



7. Leucojum Linnaeus 1753 (Snowflake)

A genus of about 10 species, of Europe, n. Africa, and w. Asia. References: Straley & Utech in FNA (2002a); Meerow & Snijman in Kubitzki (1998a).

1 Seeds black; flowers (1-) 2-5 (-7) per stem, flowering March-April; tepals 10-22 mm long ..... ***L. aestivum***
1 Seeds pale; flowers 1 (-2) per stem, flowering January-March; tepals 15-25 mm long..... ***L. vernum***

* ***Leucojum aestivum*** Linnaeus, Summer Snowflake. Persistent after cultivation; native of Europe. March-April. Reported naturalized in NC by Leonard (1971b). [= RAB, C, F, FNA, G; > *L. aestivum* ssp. *aestivum* – K]

Leucojum vernum Linnaeus, Spring Snowflake. Persistent after cultivation; native of Europe. January-March. [= FNA, K, WH3]

8. Narcissus Linnaeus 1753 (Daffodil, Jonquil, Narcissus, Buttercup)

A genus of about 40-60 species, of Europe, n. Africa, and w. Asia. References: Stace (2010)=Z; Jefferson-Brown (1991)=Y; Straley & Utech in FNA (2002a); Hanks (2002); Jefferson-Brown (1969); Meerow & Snijman in Kubitzki (1998a).

Identification notes: The familiar flower consists of 6 tepals spreading in more or less a plane, and a fused, tubular, corona. The hypanthial tube is below the perianth lobes. Other taxa are under cultivation and may be expected as persistent or escaped in our area. Manuals of cultivated plants and the extensive horticultural literature on *Narcissus* (such as the references listed above) should be consulted by those interested in more information on members of this genus.

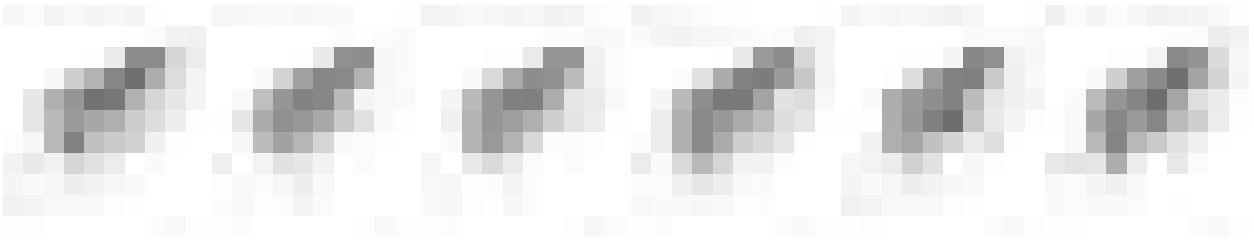
1 Perianth lobes 10-15 mm long; corona 3-5 mm long; leaves and stems cylindrical, hollow; umbel (or spathe, or stem) with 3-10 flowers..... ***N. jonquilla***
1 Perianth lobes 20-50 mm long; corona 5-50 mm long; leaves and stems flattened, solid; umbel (or spathe, or stem) with 1-4 flowers.
  2 Hypanthial tube (below the tepals) parallel-sided (though sometimes suddenly expanded at its apex); corona < 10 mm long, usually wider than high; corona < 0.5× as long as the perianth lobes; corona rarely undulate; umbel (or spathe, or stem) with 1-10 flowers; stamens of 2 distinct lengths.
    3 Corona rim red, contrasting with the white or yellow corona; umbel (or spathe, or stem) with 1 flower ..... ***N. poeticus***
    3 Corona of a single color, all white or yellow; umbel (or spathe, or stem) with (1-) 2-8 (-20) flowers.
      4 Umbel (or spathe, or stem) with (1-) 2 (-3) flowers; pollen sterile ..... ***N. ×medioluteus***
      4 Umbel (or spathe, or stem) with (2-) 3-8 (-20) flowers; pollen fertile.
        5 Corona white; umbel (or spathe, or stem) with <20 flowers..... ***N. papyraceus***
        5 Corona yellow; umbel (or spathe, or stem) with (2-) 3-8 (-15) flowers..... ***N. tazetta***
  2 Hypanthial tube (below the tepals) distinctly widening toward its apex; corona usually > 10 mm long, usually as long as wide or longer than wide; corona > 0.5× as long as the perianth lobes; corona margin undulate; umbel (or spathe, or stem) with 1 flower; stamens of the same length or nearly so.
    6 Tepals linear to lanceolate, < 5 mm wide..... ***N. bulbocodium***
    6 Tepals ovate, triangular-ovate, or suborbicular, > 10 mm wide.
      7 Corona 30-50 mm long, about as long as the perianth lobes..... ***N. pseudonarcissus***
      7 Corona 10-25 mm long, distinctly shorter than the perianth lobes
        8 Umbel (or spathe, or stem) with 1 flower; corona usually conspicuously darker in color than the tepals; leaves somewhat glaucous, > 8 mm wide; stem distinctly2-edged ..... ***N. ×incomparabilis***
        8 Umbel (or spathe, or stem) with (1-) 2-4 flowers; corona and tepals the same color; leaves green, < 8 mm wide; stem nearly terete ..... ***N. ×odorus***

* ***Narcissus bulbocodium*** Linnaeus, Hoop-petticoat Daffodil. Grassy roadsides, established; native of Eurasia. March. [= Y, Z]

* ***Narcissus ×incomparabilis*** P. Miller (pro sp.) [*poeticus* × *pseudonarcissus*], Nonesuch Daffodil. Cultivated as an ornamental, persistent and naturalized in lawns, roadsides, woodland borders, and disturbed areas; native of Europe. March-April. [= C, FNA, K, Z; = *N. incomparabilis* – RAB, F, G]

* ***Narcissus jonquilla*** Linnaeus, Jonquil, Apodanthus Daffodil. Cultivated as an ornamental, persistent and naturalized in lawns, roadsides, woodland borders, and disturbed areas; native of Europe. March-April. [= RAB, C, F, FNA, G, K, Z]

* ***Narcissus ×medioluteus*** P. Miller (pro sp.) [*poeticus* × *tazetta*], Primrose-peerless. Cultivated as an ornamental, persistent and naturalized in lawns, roadsides, woodland borders, and disturbed areas; native of Europe. March-May. [= FNA, K, Z; = *N. tazetta* × *poeticus* – RAB]



* ***Narcissus ×odorus*** Linnaeus (pro sp.) [*jonquilla* × *pseudonarcissus*], Campernelle Jonquil, Sweet-scented Jonquil. Cultivated as an ornamental, persistent and naturalized in lawns, roadsides, and disturbed areas; native of Europe. [= FNA, K, WH3, Z]

* ***Narcissus papyraceus*** Ker Gawler, Paper-white Daffodil. Cultivated as an ornamental, persistent and naturalized in lawns, roadsides, and disturbed areas; native of Mediterranean Europe. [= FNA, K, Z]

* ***Narcissus poeticus*** Linnaeus, Poet's Narcissus, Pheasant's-eye Daffodil. Cultivated as an ornamental, persistent and naturalized in lawns, roadsides, woodland borders, and disturbed areas; native of Europe. March-May. [= RAB, C, F, FNA, G, K, Pa, Z]

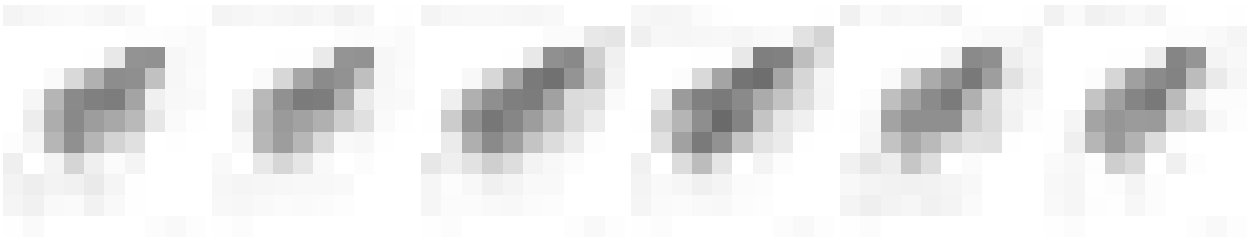
* ***Narcissus pseudonarcissus*** Linnaeus, Daffodil, Buttercup. Cultivated as an ornamental, persistent and naturalized in lawns, roadsides, woodland borders, and disturbed areas; native of Europe. February-April. [= RAB, C, FNA, K, Pa, Z; = *N. pseudo-narcissus* – F, G, orthographic variant]

* ***Narcissus tazetta*** Linnaeus, Bunch-flowered Daffodil. Cultivated as an ornamental, persistent and naturalized in lawns, roadsides, and disturbed areas; native of Mediterranean Europe. [= FNA, K, WH3, Z]

9. Sternbergia Waldst. & Kit. 1805 (Winter Daffodil)

A genus of about 8 species, of Mediterranean Europe, n. Africa, and w. Asia. References: Meerow & Snijman in Kubitzki (1998a).

* ***Sternbergia lutea*** (Linnaeus) Ker-Gawler ex Sprengel, Winter Daffodil, Lily-of-the-field. Cultivated as an ornamental, persistent and naturalized in lawns, roadsides, woodland borders, and disturbed areas; native of Europe. This species has yellow, *Crocus*-like flowers, in the autumn. [= K]



10. Habranthus Herbert (Copper-lily)

A genus ca. 30 species, perennial bulbous herbs, of s. North America and South America.

* ***Habranthus tubispathus*** (L'Héritier) Traub, Rio Grande Copperlily. Road shoulders, lawns, disturbed areas; native of s. Brazil. Reported for Coastal Plain of AL (Woods & Diamond 2006), GA (Carter, Baker, & Morris 2009), and FL. [= FNA, K, WH3]

11. Zephyranthes Herbert 1821 (Atamasco-lily, Zephyr-lily, Rain-lily)

A genus of about 70 species, from s. North America and the West Indies south to s. South America. References: Flagg, Smith, & Flory in FNA (2002a); Meerow & Snijman in Kubitzki (1998a). Key adapted in part from FNA.

1 Stigma 1, capitate; perianth **either** 3-5 cm long **or** (7.3-) 9-14 (-16) cm long; stamen filaments **either** 1-2 cm long **or** 0.2-0.5 cm long; leaves up to 5 mm wide.
  2 Perianth yellow. ..... ***Z. citrina***
  2 Perianth white (to pinkish).
    3 Perianth 3-4.5 cm long; perianth tube shorter than the spathe; perianth tube shorter than the filaments ..... ***Z. candida***
    3 Perianth (7.3-) 9-14 (-16) cm long; perianth tube longer than the spathe; perianth tube longer than the filaments ..... ***Z. chlorosolen***
1 Stigmas 3 (trifid); perianth (4-) 4.3-9.5 (-11) cm long; stamen filaments (1.5-) 1.6-4.4 (-4.7) cm long; leaves up to 8 mm wide.
  4 Stamen filaments 0.1-0.2 mm long; perianth tube 3-4 (-4.7) cm in length, the stigmas included ..... ***Z. drummondii***
  4 Stamen filaments (1.5-) 1.6-4.4 (-4.7) cm long; perianth tube (0.8-) 1-3.3 (-4) cm in length, the stigmas exserted.
    5 Anthers 13-22 mm long ..... ***Z. grandiflora***
    5 Anthers 3-6 (-8) mm long.
      6 Style and stigma as long as or shorter than the anthers; perianth segments erect-ascending at full anthesis, (4-) 4.3-8.5 (-10) cm long . ..... ***Z. simpsonii***
      6 Style and stigmas extending beyond the anthers; perianth segments spreading at full anthesis, (5.5-) 6.6-9.5 (-11) cm long.
        7 Mature leaves concave, 3-8 mm wide; perianth tube (0.8-) 1-2 (-2.1) cm long; filaments > 1.5× as long as the perianth tube ..... ***Z. atamasca***
        7 Mature leaves grooved, 1-4 mm wide; perianth tube usually (1.7-) 2-3 (-3.1) cm long; filaments < 1.5× as long as the perianth tube ..... ***Z. treatiae***

Zephyranthes atamasca (Linnaeus) Herbert, Common Atamasco-lily. Bottomland forests and adjacent road shoulders, wet meadows. Late March-April; May-June. Se. and sc. VA south to n. FL, west to s. MS. [= FNA; = *Z. atamasco* – RAB, C, F, G, GW, orthographic variant; = *Zephyranthes atamasca* var. *atamasca* – K, WH3; = *Atamosco atamasco* (Linnaeus) Greene – S, orthographic variant]

* ***Zephyranthes candida*** (Lindley) Herbert, Fall Rain-lily. Cultivated, persistent or spreading from cultivation; native of South America. Late September-October. [= RAB, FNA, K, WH3; = *Atamosco candida* (Lindley) Small – S]

Zephyranthes chlorosolen (Herbert) D. Dietrich. Prairies and other moist to dry habitats. May-October. [= FNA; = *Cooperia drummondii* Herbert – GW, S; = *Cooperia chlorosolen* Herbert – K]

* ***Zephyranthes citrina*** Baker, Yellow Zephyr-lily, Citron Rain-lily. Disturbed areas; native of South America. [= FNA, K, WH3]

* ***Zephyranthes drummondii*** (Herbert) D. Don, Ceboletta. Disturbed areas; native of TX and Mexico. [= FNA, WH3; = *Cooperia pedunculata* Herbert – K]

* ***Zephyranthes grandiflora*** Lindley. Disturbed areas; native of Mexico. [= K, SE, WH3]

Zephyranthes simpsonii Chapman, Florida Atamasco-lily, Red-margined Atamasco-lily. Dry to dry-mesic sandy soils (usually with admixture of shell hash) of coastal fringe sandhills or mainland maritime forests, usually associated with *Quercus hemispherica*, on barrier islands or within about 10 km of the ocean (NC, SC), pine flatwoods (FL, GA). April-May; May-June. Se. NC (Brunswick and Columbus counties) and ne. SC (Horry and Georgetown counties); s. GA, c. and s. peninsular FL. The disjunct populations in NC and SC may differ from *Z. simpsonii* (sensu stricto) of s. GA and c. and s. peninsular FL, and need additional study. [= RAB, FNA, GW, K, WH3; = *Atamosco simpsonii* (Chapman) Greene – S]

Zephyranthes treatiae S. Watson. Wet savannas. January-April. S. GA (Jones & Coile 1998) south to c. peninsular FL. [= FNA, GW; = *Z. atamasca* (Linnaeus) Herbert var. *treatiae* (S. Watson) Meerow – K, WH3; = *Atamasco treatiae* (S. Watson) Greene – S]

12. Hymenocallis Salisbury 1812 (Spider-lily)

A genus of about 50 species, from s. North America and the West Indies south to ne. South America. The appropriate systematics and nomenclature of *Hymenocallis* in se. United States are still unstable and uncertain. Recent publications by Smith and co-workers (e.g. Smith & Garland 1996, 2003; Smith & Flory 1990; Smith & Flory in FNA (2002a) have revolutionized our understanding of southeastern United States *Hymenocallis*. References: Smith & Garland (2003)=Z; Meerow & Snijman in Kubitzki (1998a); Smith & Flory in FNA (2002a). Key adapted from Smith & Flory in FNA (2002a).

Identification notes: *Hymenocallis* can be distinguished vegetatively from *Crinum* by its distichous (vs. spiral) leaf arrangement and leaf margins entire (vs. finely toothed).

1 Ovules 4-8 per locule; ovary 14-30 mm long, 6-15 mm wide; [FL].
- 2 Corona 6-9 cm wide ..... ***H. rotata***
- 2 Corona 3-6 cm wide.
  - 3 Tepals white ..... ***H. godfreyi***
  - 3 Tepals yellowish-green to pale green.
    - 4 Flowers 1 per inflorescence; tepals ascending, equal to or shorter than the perianth tube; [ne. FL south to s. FL] ..... ***H. palmeri***
    - 4 Flowers 2 per inflorescence; tepals spreading, nearly always longer than the perianth tube; [Panhandle FL].
      - 5 Leaves strongly glaucous; tepals to 16 cm long; plants in loose to dense clumps; [east of the Apalachicola River (Liberty County, FL)] ..... ***H. henryae*** *var.* ***glaucifolia***
      - 5 Leaves green to slightly glaucous; tepals to 13 cm long; plants singly or in loose clumps; [west of the Apalachicola River (Bay, Gulf, and Walton counties, FL)] ..... ***H. henryae*** *var.* ***henryae***

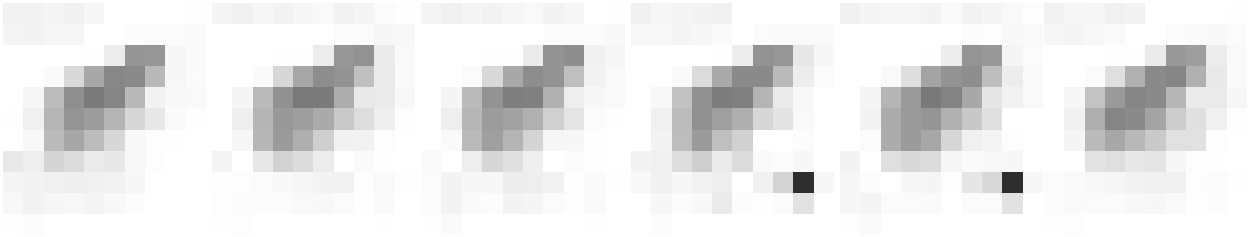
1 Ovules 1-3 (-4) per locule; ovary 7-15 mm long, 5-10 mm wide; [collectively more widespread].
- 6 Staminal cup >4.5 cm long; [rocky river shoals of the Piedmont of SC, GA, and AL] ..... ***H. coronaria***
- 6 Staminal cup <4.5 cm long; [Coastal Plain, Piedmont floodplains, and the GA Ridge and Valley].
  - 7 Leaves oblanceolate, slightly to distinctly wider toward the tip.
    - 8 Leaves not coriaceous, distinctly glaucous; scape bracts 4-7 cm long, the tip long-acuminate; bulbs non-rhizomatous; [of moist but not mucky habitats] ..... ***H. occidentalis*** *var.* ***occidentalis***
    - 8 Leaves coriaceous, not glaucous; scape bracts 3-4 (-6) cm long, the tip acute; bulbs rhizomatous; [of wet habitats].
      - 9 Scape bracts 3-4 (-6) cm long, the tip acute; leaves distinctly wider toward the tip; bulb 3-6 cm long, 1.5-5 cm wide ..... ***H. choctawensis***
      - 9 Scape bracts 4-5 cm long, the tip acuminate; leaves slightly wider toward the tip; bulb 4.5-7.5 cm long, 2.5-5.5 cm wide ..... ***H. gholsonii***
  - 7 Leaves liguliform, not wider toward the tip, the margins parallel throughout.
    - 10 Flowers (3-) 5-12 per inflorescence ..... ***H. liriosme***
    - 10 Flowers 1-3 (rarely more) per inflorescence.
      - 11 Staminal cups rotate at full anthesis; leaves chiefly arching low, often appearing prostrate; [of s. GA south into FL] ..... ***H. duvalensis***
      - 11 Staminal cups funnelform at full anthesis but gradually spreading in time; leaves suberect to erect; [of se. NC south to FL].
        - 12 Perianth segments 5.0-6.5 cm long; leaves 1.5-4 dm long ..... ***H. pygmaea***
        - 12 Perianth segments (6-) 7-11.5 cm long; leaves 3-7 dm long
          - 13 Scape bracts narrowly lanceolate, 2.5-5 cm long, 7-12 mm wide; [NC south to ne. FL] ..... ***H. crassifolia***

13 Scape bracts lanceolate, 3-4.5 cm long, 10-15 mm wide; [lower Ochlockonee River, Panhandle FL] .....***H. franklinensis***

Hymenocallis choctawensis Traub, Florida Panhandle Spiderlily, Choctaw Spiderlily. Floodplains. GA (floodplain of the Ochlockonee River) and Panhandle FL west to LA. [= FNA, K, WH3, Z; < *Hymenocallis sp. ?* – GW]

Hymenocallis coronaria (LeConte) Kunth, Shoals Spiderlily, Cahaba Lily. Rocky river shoals, usually with *Justicia americana* and *Podostemum ceratophyllum*. Mid May-July; July-September. SC south and west to AL. Notable stands of this spectacular plant occur at Landsford Canal State Park (on the Catawba River south of Rock Hill, SC), on the Saluda River (SC), on the Savannah River below I-20 (GA-SC border), and on the Cahaba River (Bibb County, AL). [= FNA, Z; *? H. occidentalis* (Le Conte) Kunth – RAB, S, misapplied; < *Hymenocallis sp. ?* – GW; *? H. caroliniana* (Linnaeus) Herbert – K, misapplied]

Hymenocallis crassifolia Herbert. Tidal marshes, margins of tidal guts, banks of blackwater rivers. May-June; June-July. Se. NC south to ne. FL. [= RAB, FNA, S, WH3, Z; < *Hymenocallis sp. ?* – GW; *? H. floridana* (Rafinesque) Morton – K, misapplied]



Hymenocallis duvalensis Traub, Dixie Spiderlily, Duval Spiderlily. Blackwater floodplain (Suwanee River). S. GA (floodplain of the Suwanee River) south to n. FL. [= FNA, K, WH3, Z; < *Hymenocallis sp. ?* – GW]

Hymenocallis franklinensis G. Lom. Smith, L.C. Anderson, & Flory, Cow Creek Spiderlily. Slightly brackish river margins. Endemic to the Ochlockonee River (Franklin and Wakulla counties) in the FL Panhandle. [= FNA, WH3, Z; < *Hymenocallis sp. ?* – GW] {synonymy incomplete}

Hymenocallis gholsonii G. Lom. Smith & Garland, Gholson's Spiderlily. Pineland bogs. April-May. Endemic to Liberty County in the FL Panhandle. See Smith & Garland (2008) for detailed information. [= WH3; < *Hymenocallis sp. ?* – GW]

Hymenocallis godfreyi G. Lom. Smith & Darst, Godfrey's Spiderlily, St. Marks Marsh Spiderlily. Brackish marshes. Endemic to Wakulla County in the FL Panhandle. [= FNA, K, WH3, Z; < *Hymenocallis sp. ?* – GW] {synonymy incomplete}

Hymenocallis henryae Traub *var.* ***glaucifolia*** J.N. Henry & G. Lom. Smith, Liberty Spiderlily, Blue Spiderlily. Cypress depressions and wet pine flatwoods. Endemic to Liberty County in the FL Panhandle. [= FNA, WH3, Z; < *Hymenocallis sp. ?* – GW; < *H. henryae* – K] {synonymy incomplete}

Hymenocallis henryae Traub *var.* ***henryae***, Henry's Spiderlily, Green Spiderlily. Cypress depressions and wet pine flatwoods. Endemic to Bay, Gulf, and Walton counties in the Panhandle of FL. [= FNA, WH3, Z; < *Hymenocallis sp. ?* – GW; < *H. henryae* – K] {synonymy incomplete}

Hymenocallis liriosme (Rafinesque) Shinners, Western Marsh Spiderlily; Louisiana Marsh Spiderlily. Swamps, bottomlands, ditches. March-May. AR and OK south to s. AL and TX. [= FNA, Z; < *Hymenocallis sp. ?* – GW; > *H. liriosme* – K]

Hymenocallis occidentalis (LeConte) Kunth *var.* ***occidentalis***, Hammock Spiderlily, Woodland Spiderlily, Northern Spiderlily. Mesic soils of slopes and floodplain forests, gabbro glades and other calcareous upland flats. NC south to Panhandle FL, west to AR and LA. Var. *eulae* (Shinners) G. Lom. Smith & Flory is endemic in the West Gulf Coastal Plain. [= FNA, Z; < *Hymenocallis sp. ?* – GW; < *H. occidentalis* – S, WH3; = *H. caroliniana* (Linnaeus) Herbert – K, misapplied]

Hymenocallis palmeri S. Watson, Alligator-lily. Cypress swamps; wet pine flatwoods, disturbed wet areas. From ne. FL (Bradford and Duval counties) south to s. peninsular FL. [= FNA, WH3, Z; < *Hymenocallis sp. ?* – GW; < *H. palmeri* S. Watson – K] {synonymy incomplete}

Hymenocallis pygmaea Traub, Pygmy Spiderlily, Waccamaw Spiderlily. Banks of blackwater rivers. May-June; June-July. Se. NC south to ne. SC, perhaps endemic to the Waccamaw River drainage. Needing further study, but strikingly different in appearance from *H. crassifolia*. [= FNA, Z; < *Hymenocallis sp. ?* – GW; < *H. palmeri* S. Watson – K]

Hymenocallis rotata (Ker Gawler) Herbert, Spring-run Spiderlily. Spring-runs. Endemic to FL, in the Panhandle (Wakulla County) and n. peninsular FL (Alachua, Columbia, and Duval counties southward to c. peninsular FL). [= FNA, K, WH3, Z; < *Hymenocallis sp. ?* – GW] {synonymy incomplete}

75a. ASPARAGACEAE A.L. de Jussieu 1789 (Asparagus Family) [in ASPARAGALES]

A family of a single genus and 170-300 species, widespread in Europe, Africa, Asia, and Australia (introduced elsewhere). References: Dahlgren, Clifford, & Yeo (1985); Kubitzki & Rudall in Kubitzki (1998a).

Asparagus Linnaeus (Asparagus)

A genus of 170-300 species, widespread in Europe, Africa, Asia, and Australia (introduced elsewhere). References: Kubitzki & Rudall in Kubitzki (1998a); Straley & Utech in FNA (2002a).

1 Cladophylls flattened, ca. 2 mm wide ..... ***A. aethiopicus***
1 Cladophylls filiform, < 0.7 mm wide.
  2 Flowers in 1-3-flowered axillary racemes; berries 6-10 mm long, red; erect herb (sometimes arching in age) ..... ***A. officinalis***
  2 Flowers in 1-4-flowered terminal umbels; berries 4-5 mm long, purplish-black; scrambling vine ..... ***A. setaceus***

* ***Asparagus aethiopicus*** Linnaeus, Sprenger's Asparagus-fern, Emerald-fern. Disturbed areas, seeding down especially around plantings; native of s. Africa. Recently found in SC by R. Stalter (pers. comm. 2009). Kunzer et al. (2009) report several locations for Panhandle FL. [= FNA, WH3; ? *A. densiflorus* (Kunth) Jessop (misapplied); ? *A. sprengeri* Regel]
* ***Asparagus officinalis*** Linnaeus, Asparagus, Sparrowgrass, Garden Asparagus. Commonly cultivated, commonly escaped to fencerows, roadsides, disturbed areas; native of Eurasia. April-June; July-October. [= C, F, FNA, G, K, Pa, RAB, S, W, WH3]
* ***Asparagus setaceus*** (Kunth) Jessop, Climbing Asparagus-fern. Disturbed areas, sometimes epiphytic; native of e. and s. Africa. Reported for Camden and Lowndes counties GA (Carter, Baker, & Morris 2009). [= FNA, WH3]

75b. RUSCACEAE M. Roemer 1840 (Ruscus Family) [in ASPARAGALES]

As here circumscribed, a family of about 28 genera and 500 species, of North America, Central America, Europe, and Asia. The Convallariaceae has been supported by molecular studies (Judd 2003, Bogler & Simpson 1995). Molecular studies show that *Nolina* is much more closely related to *Convallaria*, *Polygonatum*, etc. than to the Agavaceae (*Yucca* and *Manfreda* in our flora), with which it has often been associated. References: Bogler & Simpson (1995); Bogler in Kubitzki (1998a); Yeo in Kubitzki (1998a); Conran & Tamura in Kubitzki (1998a); Yamashita & Tamura (2000).

1 Plant with an upright stem with alternate leaves.
  2 Shrub; "leaves" (actually phylloclades) coriaceous, evergreen, glossy; [exotic, rarely naturalized]; [tribe *Rusceae*] ..... ***Danae***
  2 Herb; leaves herbaceous, deciduous, dull or slightly glossy; [native]; [tribe *Polygonatae*].
    3 Inflorescence terminal, a raceme or panicle; tepals separate ..... ***Maianthemum***
    3 Inflorescence of 1-several axillary flowers; tepals fused ..... ***Polygonatum***
1 Plant tufted, the leaves essentially basal (although the sheathing bases form a 'false' stem in *Convallaria*).
  4 Leaves 2-3, narrowly elliptic; tepals fused, white or greenish; [tribe *Convallarieae*] ..... ***Convallaria***
  4 Leaves many, linear; tepals separate (or fused basally), white or violet.
    5 Fruit dehiscent, dry and capsular; inflorescence a panicle or raceme, to 15 dm tall; [natives, of longleaf pine woodlands of SC, GA, and FL]; [tribe *Nolineae*] ..... ***Nolina***
    5 Fruit indehiscent, quickly exposing berry-like seeds with a fleshy seed coat; inflorescence spikelike, to 4 dm tall; [aliens, naturalized from horticultural plantings]; [tribe *Ophiopogoneae*].
      6 Flowers erect, the pedicel strict; ovaries superior ..... ***Liriope***
      6 Flowers nodding, the pedicel recurved; ovaries inferior or half-inferior ..... ***Ophiopogon***

Convallaria Linnaeus 1753 (Lily-of-the-Valley)

A genus of 3 species, of north temperate n. Eurasia and e. North America. References: Utech in FNA (2002a); Judd (2003)=Z; Conran & Tamura in Kubitzki (1998a).

1 Leaf blades averaging 10-15 cm long, 3-5 cm wide; rhizomes short-creeping, the individual above-ground shoots spaced closely (typically 5-10 cm apart); flowering scape > ½ as long as the leaves; longer bracts of the inflorescence 4-10 mm long; [introduced, persistent around old home sites and other plantings] ..... ***C. majalis***
1 Leaf blades averaging 15-35 cm long, 5-13 cm wide; rhizomes absent or long-creeping, the individual above-ground shoots spaced widely (usually at least 15 cm apart); flowering scape < ½ as long as the leaves; longer bracts of the inflorescence 8-20 mm long; [native, of forests of the Mountains and upper Piedmont] ..... ***C. pseudomajalis***

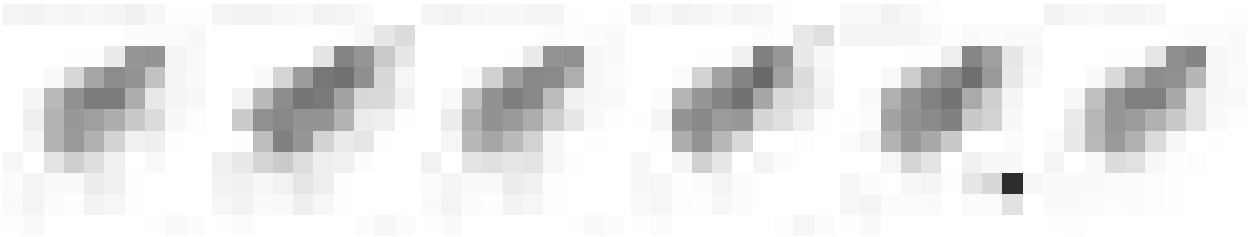
* ***Convallaria majalis*** Linnaeus, European Lily-of-the-Valley. Persistent after cultivation; native of Eurasia. April-May; July-August. [= F, K, Pa, W, WV; = *C. majalis* var. *majalis* – FNA, RAB; < *C. majalis* – C, G, S, Z (also see *C. majuscula*)]

Convallaria pseudomajalis Bartram, American Lily-of-the-Valley. Mountain forests, particularly in rocky woodlands or forests on or near ridgetops under northern red oak at about 1000 to 1500 m elevation, sometimes at lower elevations (down to at least 700 m) and under *Quercus montana*. April-June; August. Endemic to the Southern Appalachians: WV and VA through NC and TN to ne. GA (Jones & Coile 1988) and nw. SC (there appears to be no documentation for old reports by Bartram, Rafinesque, and Greene of this species for PA). Cronquist's (1991) statement that Southern Appalachian plants "may reflect an early escape of a different phase of the species from cultivation" can be discounted, as *C. majuscula* characteristically occurs on ridges remote from present or past habitations; there is no doubt that the taxon is both native and at least varietally distinct. Utech in FNA (2002a) states that our plants are more closely related to the Asian taxon, variously treated as *C. keiskei* Miquel or *C. majalis* var. *keiskei* (Miquel) Makino, than to the European *C. majalis* s.s. *C. montana* Rafinesque is an illegitimate and superfluous name and cannot be used; the oldest legitimate name is *C. pseudomajalis* Bartram. [= *C. majuscula* Greene – K; = *C. majalis* Linnaeus var. *montana* H.E. Ahles – FNA, RAB; = *C. montana* Rafinesque – F, W, WV, illegitimate and superfluous name; < *C. majalis* Linnaeus – C, G, S, Z]

Danae Medikus (Alexandrian Laurel, Danaë)

A monotypic genus, a shrub, of sw. Asia.

* ***Danae racemosa*** (Linnaeus) Moench, Alexandrian Laurel. Suburban forests; rare, uncommon in cultivation, rarely escaping to suburban forests; native of sw. Asia. The "leaves" are actually odd structures called phylloclades, and represent modified stems.



Liriope Loureiro 1790 (Liriope, Lilyturf)

A genus of 8 species, herbs, of e. and se. Asia. References: Nesom (in prep.)=Y; Conran & Tamura in Kubitzki (1998a); Judd (2003)=Z. Key based on Y.

1 .....***L. muscari***
1 .....***L. spicata***

* ***Liriope muscari*** (Decaisne) L.H. Bailey, Liriope, Big Blue Lilyturf. Commonly planted, rarely persistent and escaping, but locally abundant; native of China, Japan, and Taiwan. [= K, Y, Z]

* ***Liriope spicata*** Loureiro, Creeping Lilyturf. Commonly planted, rarely persistent and escaping; native of {}. [= Y, Z; = *L. spicatum* – K, orthographic variant]

Maianthemum G.H. Weber ex Wiggers 1780 (Mayflower, Solomon's-plume)

A genus of about 28 species, herbs, of n. Europe, e. Asia, North America, and Central America. The inclusion of the traditional *Smilacina* in *Maianthemum* will cause considerable consternation; LaFrankie's (1986) reasoning, however, seems very strong, and has been additionally supported by more recent evidence (Conran & Tamura in Kubitzki 1998a). The only consistent difference between the two previously accepted genera is whether the flowers are dimerous (*Maianthemum*) or trimerous (*Smilacina*). LaFrankie cites research that shows that the dimerous flowers of *Maianthemum* (*sensu stricto*) are the result of reduction from trimerous flowers, as indicated by vestigial vascular traces. Consideration of the many close similarities, particularly as compared to similar genera such as *Prosartes*, *Polygonatum*, *Streptopus*, and *Clintonia*, may convince the skeptical (see LaFrankie 1986 and Therman 1956). As an example, the fruits of *M. canadense* and *M. racemosum* are closely similar in form, coloration, and size; much more similar than the fruits of our 2 species of *Prosartes*. References: LaFrankie (1986)=Z; Judd (2003)=Y; LaFrankie in FNA (2002a); Conran & Tamura in Kubitzki (1998a).

1 Flowers in a terminal panicle..... ***M. racemosum*** *ssp.* ***racemosum***
1 Flowers in a simple raceme.
  2 Perianth segments 4 (flowers 2-merous); leaves (1-) 2 (-3).....***M. canadense***
  2 Perianth segments 6 (flowers 3-merous); leaves 6 or more .....***M. stellatum***

Maianthemum canadense Desfontaines, Canada Mayflower, False Lily-of-the-valley. Moist forests, especially at high elevations. Mid May-early July; August-September. NL (Labrador) and NL (Newfoundland) west to NT, south to MD, NC, n. GA (Jones & Coile 1988), KY and SD. Two varieties have been described, but their recognition is not strongly supported. Var.

canadense, with leaves glabrous beneath, the margins entire or minutely crenulate, cross-veins of the leaf well-developed, is widepread in the distribution of the species. Var. *interius* Fernald has the leaves pubescent beneath, the leaf margins distinctly ciliate, and cross-veins obscure; it is not known from our area, but extends east and south as far as MA, NY, and OH. Further study of these varieties is needed. Weller (1970) reports equivocal results on the recognition of varieties, based on a study in n. MI. [= FNA, K, Pa, RAB, W, WV, Y, Z; > *Maianthemum canadense* Desfontaines var. *canadense* – C, F, G; = *Unifolium canadense* (Desfontaines) Greene – S]

Maianthemum racemosum (Linnaeus) Link *ssp.* ***racemosum***, Eastern Solomon's-plume, False Solomon's-seal. Forests. Mid April-June; August-October. The species ranges from NS west to BC, south to GA, FL Panhandle, and AZ. A variety of chromosome races are known (2n = 36, 72, 144). The eastern ssp. *racemosum* is tetraploid; ssp. *amplexicaule* (Nuttall) LaFrankie is diploid and more western; these are perhaps more appropriately treated as species. Under the generic name *Smilacina*, two varieties had been described for our area, *Smilacina racemosa* var. *racemosa* and *S. racemosa* var. *cylindrata* Fernald, the former larger in nearly all respects and more northern than the latter, smaller, and more southern form (see F for details). If these varieties are determined to have merit (further research is needed), the appropriate transfer to *Maianthemum* will need to be made. [= FNA, K, Y, Z; < *Smilacina racemosa* (Linnaeus) Desfontaines – RAB, C, G, W; > *S. racemosa* var. *racemosa* – F, WV; > *S. racemosa* var. *cylindrata* Fernald – F, WV; > *Vagnera racemosa* (Linnaeus) Morong – S; > *Vagnera australis* Rydberg – S; < *M. racemosum* – Pa, WH]

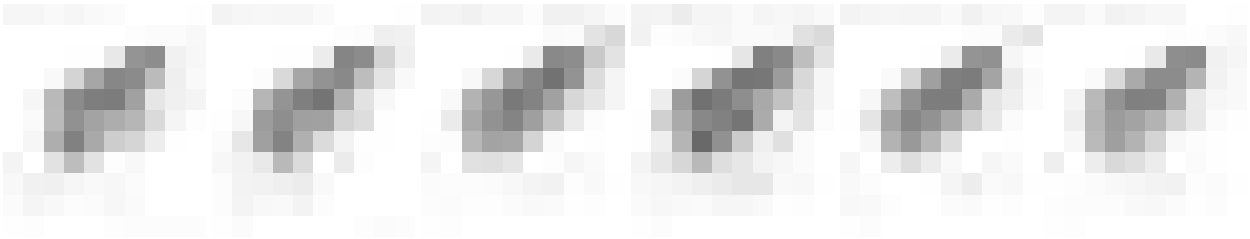
Maianthemum stellatum (Linnaeus) Link, Starry Solomon's-plume, Starflower. Alluvial forests. April-June; August-October. NL (Newfoundland) west to BC, south to NJ, w. VA, e. TN, IN, MO, and CA. [= FNA, K, Pa, Y, Z; = *Smilacina stellata* (Linnaeus) Desfontaines – C, F, G, W, WV]

Nolina Michaux 1803 (Beargrass)

A genus of about 30 species, rosette shrubs and trees, of s. United States and Mexico. References: Hess in FNA (2002a); Judd (2003)=Z; Bogler in Kubitzki (1998a).

1 Leaves 3-4 (-5) mm wide; fruit 4-4.5 mm long, strongly asymmetrical; [of moist flatwoods of the FL Coastal Plain] ..... ***N. atopocarpa***
1 Leaves 4-10 mm wide, glaucous; fruit 6.5-8 mm long, symmetrical; [of dry to dry-mesic sandhills of the GA and SC Coastal Plain] ..... ***N. georgiana***

Nolina atopocarpa Bartlett, Florida Beargrass. Pine flatwoods and savannas. Endemic to Panhandle FL (Liberty and Franklin counties) and e. peninsular FL (St. Johns and Brevard counties). [= FNA, K, S, WH, Z]



Nolina georgiana Michaux, Georgia Beargrass, Sandhills Lily. Sandhills, sometimes locally common on slightly less xeric lower sandhill slopes. Late May-June; late June-August. Nc. SC south to sc. GA. This species has been attributed to FL (Small 1933), but is not included in either Clewell (1985) or Wunderlin (1982, 1998). [= RAB, FNA, K, S, Z]

Ophiopogon Ker-Gawler (Mondo Grass)

A genus of 54 species, perennial herbs, of e. Asia. References: Nesom (in prep.)=Y; Conran & Tamura in Kubitzki (1998a).

* ***Ophiopogon japonicus*** (Thunberg) Ker-Gawler, Mondo Grass, Black Mondo. Suburban forests; native of China, Taiwan, Japan, and Korea. [= K, Y]

Polygonatum P. Miller 1754 (Solomon's-seal)

A genus of about 57 species, of temperate Eurasia and North America (most diverse in e. Asia). The *P. biflorum* complex is in need of further study. References: Ownbey (1944)=Z; Judd (2003)=Y; Utech in FNA (2002a); Eigsti (1942); Therman (1950, 1953); Kawano & Iltis (1963); Conran & Tamura in Kubitzki (1998a).

1 Leaves pubescent on the veins beneath; flowers 7-13 mm long..... ***P. pubescens***
1 Leaves glabrous; flowers 12-21 mm long.
  2 Stem robust, 5-13 mm thick below the leaves; plants to 20 dm tall; lower axillary peduncles strongly flattened, with (2-) 3-6 (-15) flowers; lowest peduncle in the axil of the (3rd-) 4th-5th (-8th) leaf; larger leaves 9-25 cm long, 3.5-13 cm wide; lower leaves clasping to 300° ..... ***P. biflorum*** *var.* ***commutatum***
  2 Stem slender, 1.5-5 mm in diameter; plants to 9 dm tall; lower axillary peduncles terete or nearly so, with (1-) 2-3 (-5) flowers; lowest peduncle in the axil of the (1st-) 3rd (-5th) axil; larger leaves 5.5-15 cm long, 1.2-6 cm wide; lower leaves clasping to 90 (-180)°.
    3 Corolla (11-) 13-15 (-19) mm long; larger leaves 5.5-15 cm long, 1.2-6 cm wide, 3-6× as long as broad; [widespread].....

.....***P. biflorum*** *var.* ***biflorum***

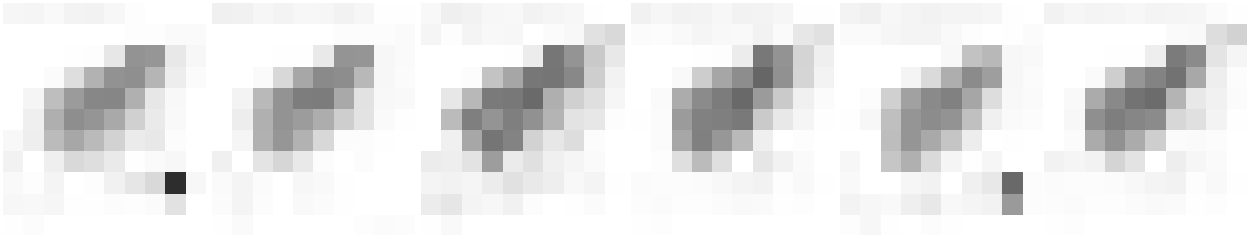
3 Corolla 20-23 mm long; larger leaves 6.5-13 cm long, 0.8-2 cm wide, 5-9× as long as broad; [endemic to Panhandle FL].....
.....***P. biflorum*** *var.* ***hebetifolium***

Polygonatum biflorum (Walter) Elliott *var.* ***biflorum***, Small Solomon's-seal. Moist to dry forests. April-June; August-October. CT, NY, and s. ON west to MI, NE, and IN, south to n. FL and s. AL. In addition to the varieties recognized for our area, *P. biflorum* includes two additional varieties: var. *melleum* (Farwell) R. Ownbey of MI and ON, and var. *necopinum* R. Ownbey from the Black Hills of SD. The complex needs additional study. See var. *commutatum* for discussion of its distinction from var. *biflorum*. [= Pa, Z; < *P. biflorum* – C, FNA, RAB, W, WH, Y; = *P. biflorum* – F, G, WV; < *P. biflorum* var. *commutatum* (J.A. & J.H. Schultes) Morong – K; < *P. commutatum* (J.A. & J.H. Schultes) A. Dietrich – S]

Polygonatum biflorum (Walter) Elliott *var.* ***commutatum*** (J.A. & J.H. Schultes) Morong, Large Solomon's-seal, King Solomon's-seal. Moist forests, roadbanks. May-June; September-October. NH west to s. MB, south to SC, GA, LA, and TX. There has been a wide divergence of opinion regarding the merits (and practicality) of distinguishing this taxon from typical *P. biflorum*, and the characters considered most reliable; the two taxa may differ in chromosome number and geographical distribution; they are not, however, always readily distinguished morphologically. I prefer to recognize this taxon as a variety. See references for additional discussion. [< *P. biflorum* – C, FNA, RAB, W, Y; = *P. canaliculatum* (Muhlenberg ex Willdenow) Pursh – F, G, WV, misapplied; < *P. biflorum* var. *commutatum* (J.A. & J.H. Schultes) Morong – K, Pa; < *P. commutatum* (J.A. & J.H. Schultes) A. Dietrich – S; = *P. commutatum* – Z]

Polygonatum biflorum (Walter) Elliott) *var.* ***hebetifolium*** R.R. Gates, Apalachicola Solomon's-seal. Rich bluff forests. Endemic to FL Panhandle. [= K, Z; < *P. biflorum* – FNA, WH; < *P. commutatum* (J.A. & J.H. Schultes) A. Dietrich – S]

Polygonatum pubescens (Willdenow) Pursh. Moist forests, especially cove forests. Late April-June; August-October. S. QC west to s. MB, south to nw. SC, WV, KY, IN, WI, and IA. [= C, F, FNA, G, K, Pa, RAB, W, WV, Y, Z; = *P. biflorum* – S, misapplied]



75c. AGAVACEAE Endlicher 1841 (Agave Family) [in ASPARAGALES]

A family of about 25 genera and 640 species, herbs and rosette shrubs, of temperate and tropical America. The placement of *Camassia*, *Schoenolirion*, and *Hastingsia*, sometimes grouped as Hyacinthaceae subfamily Chlorogaloideae, has been uncertain; they are better placed in the Agavaceae, a position supported by molecular, serological, and biogeographic evidence. Hostaceae is included here based on recent molecular analyses (Steele et al. 2012). References: Verhoek & Hess in FNA (2002a); Steele et al. (2012); Bogler & Simpson (1995, 1996); Verhoek in Kubitzki (1998a); Kubitzki in Kubitzki (1998a).

1 Plants with erect woody stems; leaves cauline.....***Yucca***
1 Plants acaulescent; leaves in basal rosettes.
2 Margins of leaves fraying into coarse, whitish, curly fibers; tepals about 4 cm long; leaves stiff and > 15 mm wide.....***Yucca***
2 Margins of leaves entire, not fraying; tepals < 2 cm long; leaves stiff and wiry (and < 5 mm wide), herbaceous, or fleshy.
3 Leaves oblong-acute, 2-9 cm wide, 2-10× as long as wide, fleshy.....***Manfreda***
3 Leaves linear, 0.3-1.8 cm wide, 20-100× as long as wide, herbaceous or wiry.
4 Leaves wiry and grasslike, narrowly linear, 3-5 mm wide; inflorescence a diffuse panicle; perianth segments 2-4 mm long, white .....
.....***[Nolina –*** *see RUSCACEAE****]***
4 Leaves herbaceous, **either** linear and 2-18 mm wide, or with an expanded ovate blade to 30 cm wide; inflorescence a raceme; perianth segments 13-130 mm long, blue or nearly white.
5 Leaves with an expanded ovate blade; perianth segments 40-130 mm long.....***Hosta***
5 Leaves linear; perianth segments 5-18 mm long.
6 Perianth segments 13-18 mm long, blue or nearly white .....***Camassia***
6 Perianth segments 5-7 mm long, white, cream, or yellow..... ***Schoenolirion***

Camassia Lindley 1832 (Wild Hyacinth, Quamash Lily, Camas Lily)

A genus of 6 species, of North America. The affinities of *Camassia* are with the Agavaceae, rather than the Hyacinthaceae (Fay & Chase 1996, Bogler & Simpson 1996, Speta in Kubitzki 1998a). References: Ranker & Hogan in FNA (2002a); Speta in Kubitzki (1998a).

Camassia scilloides (Rafinesque) Cory, Wild Hyacinth, Quamash Lily, Eastern Camas Lily. Moist forests, over circumneutral soils, in GA, VA, and WV on limestone, in NC on slopes and natural levees along the Roanoke River, in SC over gabbro. April-May. W. PA and s. ON west to s. WI and e. KS, south to nw. GA (Jones & Coile 1988) and TX, nearly entirely west of the Blue Ridge, with only a few disjunct occurrences in the Piedmont and Coastal Plain. [= C, F, FNA, G, K, Pa, RAB, W; = *Quamasia hyacintha* (Rafinesque) Britton – S]

Hosta Trattinick 1812 (Hosta, Plantain-lily)

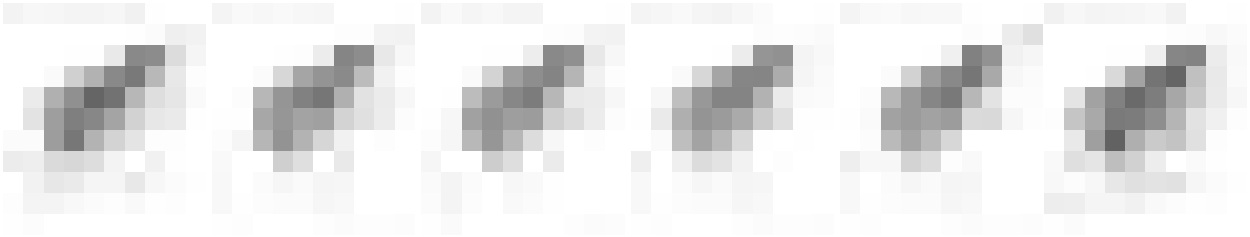
A genus of about 25-40 herbs, of temperate Asia, widely cultivated (since at least the 8th century), and with numerous cultivars. References: Kubitzki in Kubitzki (1998a); Utech in FNA (2002a). Key based on Utech in FNA (2002a).

1 Flowers long-tubular, to 13 cm long, white, fragrant ..... ***H. plantaginea***
1 Flowers campanulate to urceolate, 4-5.5 cm long, blue or purplish, not fragrant.
  2 Leaves lanceolate to oblong, 10-17 cm long, 5-7.5 cm wide, with 5-6 lateral veins on each side of the midvein; flowers purplish violet; anthers purple ..... ***H. lancifolia***
  2 Leaves ovate to cordate, the blade 20-30 cm long, 15-20 cm wide, with 7-9 lateral veins on each side of the midvein; flowers bluish purple; anthers spotted purple ..... ***H. ventricosa***

* ***Hosta lancifolia*** Engler, Narrowleaf Plantain-lily. Widely planted as a shade ornamental, rarely persistent; "native" of Japan (probably only of garden origin). July-September. [= FNA, K, Pa]

* ***Hosta plantaginea*** (Lamarck) Ascherson, Fragrant Plantain-lily. Widely planted as a shade ornamental, rarely persistent; rare, native of China. [= FNA, K, Pa]

* ***Hosta ventricosa*** (Salisbury) Stearn, Blue Plantain-lily. Widely planted as a shade ornamental; rare, native of China. June-July. [= FNA, K, Pa]



Manfreda Salisbury 1866 (False-aloe)

A genus of about 26 species, primarily in sw. United States, Mexico, and Central America. References: Verhoek in FNA (2002a); Speta in Kubitzki (1998a).

Manfreda virginica (Linnaeus) Salisbury ex Rose, Rattlesnake-master, Eastern False-aloe. Granite flatrocks, diabase glades, xeric woodlands over mafic or calcareous rocks, sandhill woodlands. Late May-August; August-October. E. SC, c. NC, sw. VA, w. WV, s. OH, s. IN, s. IL, and MO south to c. peninsular FL and TX. [= FNA, K, W, WH3; = *Agave virginica* Linnaeus – RAB, C, F, WV; > *M. tigrina* (Engelmann) Small – S; > *M. virginica* – S; = *Polianthes virginica* (Linnaeus) Shinners]

Schoenolirion Torrey ex Durand (Sunnybell)

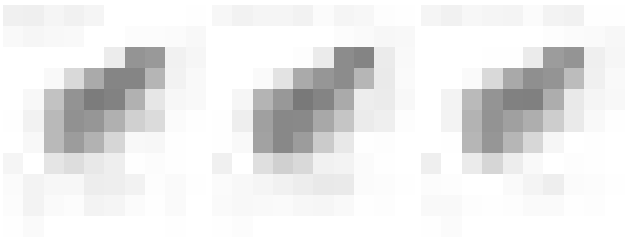
A genus of 3 species, herbs, of s. North America. References: Sherman in FNA (2002a).

1 Inflorescence with 1-6 branches; leaves without fleshy bases, withering to a persistent fibrous crown ..... ***S. albiflorum***
1 Inflorescence rarely branched; leaves with fleshy bases, not fibrous.
  2 Perianth golden-yellow ..... ***S. croceum***
  2 Perianth white ..... ***S. wrightii***

Schoenolirion albiflorum (Rafinesque) R.R. Gates, White Sunnybell. Wet pinelands, cypress depressions, *Hypericum* depressions, wet hammocks. E. GA south to s. FL and west to AL. [= FNA, K, WH; = *S. elliottii* Feay ex A. Gray – GW; = *Oxytria albiflora* (Rafinesque) Pollard – S]

Schoenolirion croceum (Michaux) Wood, Yellow Sunnybell. Wet pine savannas, bogs, seepage slopes, seepages on granite flatrocks. Late March-May; May-June. SC (and apparently NC) south to ne. FL, west to se. TX; and in c. TN on limestone glades (Chester et al. 1993). The occurrence in NC in "wet pinelands" in Richmond County referred to in RAB has not been relocated or further documented. [= RAB, FNA, GW, K, WH; = *Oxytria crocea* (Michaux) Rafinesque – S]

Schoenolirion wrightii Sherman, Texas Sunnybell. Seepage over sandstone. April-early May. N. AL; w. LA and e. TX. [= FNA, K; = *Oxytria texana* (Scheele) Pollard – S]



Yucca Linnaeus 1753 (Yucca, Adam's-needle)

A genus of about 40 species, of sw. North America, n. Mexico, se. United States, and the West Indies. References: Hess & Robbins in FNA (2002a); Speta in Kubitzki (1998a); Ward (2004c)=Z; Ward (2006a).

1 Leaf margins fraying into filamentous threads or fibrils; plant acaulescent (or essentially so); fruit erect.
  2 Inflorescence branches glabrous; tepals 5-7 cm long; leaves 2-6 cm wide, stiff, the apex acute-acuminate to obtuse, often concave upward at the apex, the marginal fibrils usually elongate (to 20 cm long) ..... ***Y. filamentosa***
  2 Inflorescence branches scurfy-pubescent; tepals 3-5 cm long; leaves 1.5-4 cm wide, pliable, the apex attenuate-acuminate, not notably concave, the marginal fibrils usually short (to 4 cm long).
    3 Leaves 1.5-4 cm wide, abundantly filiferous-margined; [widespread]..... ***Y. flaccida***
    3 Leaves 1-3 cm wide, sparingly filiferous-margined; [mainly west of the Mississippi River, rarely in the Florida parishes of e. LA]..... ***Y. louisianensis***
1 Leaf margins not fraying, minutely notched-serrulate or entire, and hyaline; plant with a trunk; fruit pendulous (or erect in *Y. recurvifolia*).
  3 Leaf margins minutely notched-serrulate, particularly toward the base; seeds 2.5 mm thick, marginless ..... ***Y. aloifolia***
  3 Leaf margins entire, smooth, hyaline-brown or hyaline-tellow; seeds ca. 1 mm thick, margined.
    4 Leaf blades rigid, straight; fruits pendent, 5.5-8 cm long; [of NC south to FL] ..... ***Y. gloriosa***
    4 Leaf blades recurved, flexible; fruits generally erect, 2.5-4.5 cm long; [of GA westward] ..... ***Y. recurvifolia***

Yucca aloifolia Linnaeus, Spanish Dagger. Dunes. June-early July; October-December. Se. VA south to s. FL and west to LA. [= RAB, FNA, K, S, WH3]

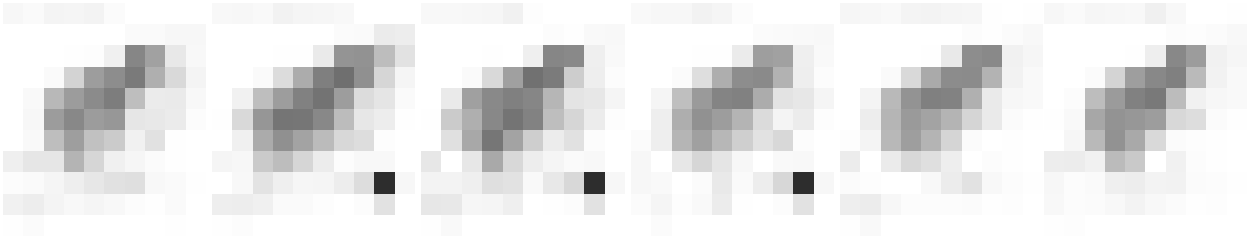
Yucca filamentosa Linnaeus, Curlyleaf Yucca, Spoonleaf Yucca. Woodlands, forests, dunes, roadsides, disturbed areas. Late April-early June; September-October. S. NJ south to GA, west to MS; escaped from cultivation over a broader area of e. United States. [= FNA, F, S, W, WV, Z; = *Y. filamentosa* var. *filamentosa* – RAB; < *Y. filamentosa* – C, G, K (also see *Y. flaccida*); > *Y. concava* Haworth – S; > *Y. filamentosa* – S]

Yucca flaccida Haworth, Weakleaf Yucca. Thin soils around rock outcrops, woodlands, roadsides, disturbed areas. Late April-July; September-October. C. NC and TN south to s. FL and AL. Whether or not this taxon is valid (and if so, as a variety or as a species) has been unclear; further research is needed. The occurrence of this species in VA is apparently the result of cultivation and persistence. [= S, W; = *Y. filamentosa* var. *smalliana* (Fernald) H.E. Ahles – RAB; < *Y. filamentosa* – C, G, K, WH3; = *Y. smalliana* Fernald – F, WV; < *Y. flaccida* Haworth – FNA, Pa; > *Y. flaccida* var. *flaccida* – Z; > *Y. flaccida* var. *smalliana* (Fernald) D.B. Ward – Z]

Yucca gloriosa Linnaeus, Mound-lily Yucca, Spanish Bayonet. Dunes, shell middens, also regularly cultivated and often persistent or weakly escaped around old homesites inland. (April-) October; November-December. E. NC (Dare County) south to ne. FL and w. peninsular FL (Sorrie & LeBlond 2008). [= RAB, K, S; = *Y. gloriosa* var. *gloriosa* – FNA; < *Y. gloriosa* – WH3]

Yucca louisianensis Trelease, Louisiana Yucca. Dry sandy areas. April-June. [= K; < *Y. flaccida* Haworth – FNA]

Yucca recurvifolia Salisbury, Curve-leaf Yucca. Dunes, dry sandy soils. GA and Panhandle FL west to w. LA. [= S; = *Y. gloriosa* Linnaeus var. *recurvifolia* (Salisbury) Engelmann – FNA; < *Y. gloriosa* – WH3]



75d. THEMIDACEAE Salisbury 1866 (Brodiea Family) [in ASPARAGALES]

A family of 12 genera and about 60 species, herbs, of w. North America south to Guatemala. References: Rahm in Kubitzki (1998a).

Dichelostemma Kunth 1843

A genus of 5 species, of w. United States and Mexico. References: Pires in FNA (2002a); Rahm in Kubitzki (1998a).

* ***Dichelostemma congestum*** (Smith) Kunth. Disturbed areas; native of Pacific northwestern North America, cultivated and apparently escaped in the Piedmont of nc. GA (Jones & Coile 1988). {further investigate} [= FNA, K; = *Brodiaea congesta* Smith]

75e. HYACINTHACEAE Batsch 1786 (Hyacinth Family) [in ASPARAGALES]

A family of about 67 genera and 900 species, herbs, nearly cosmopolitan. References: Speta in Kubitzki (1998a); Pfosser et al. (2003). [also see *AGAVACEAE*]

1 Tepals united into a perianth tube longer than the free portion; [subfamily *Hyacinthoideae*, tribe *Hyacintheae*].
  2 Perianth tube <2 × as long as the lobes; corolla spreading and open at the mouth ..... ***Hyacinthus***

2 Perianth tube >2 × as long as the lobes; corolla contracted at the mouth.....***Muscari***
1 Tepals separate or fused only at the extreme base.
3 Tepals white, with a greenish stripe on the outer surface, separate; bracts 0-1 per flower; [subfamily *Ornithogaloideae*] .....
.....***Ornithogalum***
3 Tepals blue (less commonly white or pink), separate or fused at the extreme base; bracts **either** 0-1 **or** 2 per flower; [subfamily *Hyacinthoideae*, tribe *Hyacintheae*].
4 Bracts 2 subtending each flower .....***Hyacinthoides***
4 Bracts 0-1 subtending each flower
5 Tepals connate basally for more than 1/10 of their length; flowers directed upward..... ***Chionodoxa***
5 Tepals separate; flowers directed outward.....***Scilla***

Chionodoxa Boissier 1844 (Glory-of-the-snow)

A genus of 6 species, bulbous herbs, of e. Mediterranean. References: McNeill in FNA (2002a).

* ***Chionodoxa luciliae*** Boissier, Glory-of-the-snow. Lawns, disturbed areas; native of w. Turkey. March-May. [= FNA, K, Pa]

Hyacinthoides Heister ex Fabricius 1759 (Bluebell)

A genus of ca. 10 species, herbs, of se. Europe and n. Africa. The narrow circumscription of *Scilla* (excluding *Hyacinthoides*) is supported by molecular phylogenetic studies (Pfosser et al. 2003). References: Stace (2010)=Z; McNeill in FNA (2002a); Grundmann et al. (2010)=Y; Speta in Kubitzki (1998a). Key based on Stace (2010).

1 Racemes erect; perianth campanulate; anthers blue.....***H. hispanica***
1 Racemes pendant at apex; perianth tubular; anthers cream.....***H. nonscripta***

* ***Hyacinthoides hispanica*** (P. Miller) Rothmaler, Spanish Bluebell. Persistent after cultivation; native of Europe. [= FNA, K, Y, Z; = *Endymion hispanicus* (P. Miller) Chouard]
* ***Hyacinthoides nonscripta*** (Linnaeus) Chouard ex Rothmaler, English Bluebell. Persistent after cultivation; native of Europe. [= K, Z; = *Scilla non-scripta* (Linnaeus) Hoffmannsegg & Link – C, G; = *Scilla nonscripta* (Linnaeus) Hoffmannsegg & Link – F; = *Hyacinthoides non-scripta* – FNA, Y, orthographic variant; = *Endymion nonscripta* (Linnaeus) Garcke]

Hyacinthus Linnaeus 1753 (Hyacinth)

A genus of 3 species, herbs, of w. Asia. References: Stace (2010)=Z; Speta in Kubitzki (1998a).

* ***Hyacinthus orientalis*** Linnaeus, Hyacinth. Persistent after cultivation; native of w. Asia. [= K, Z]

Muscari P. Miller 1754 (Grape-hyacinth)

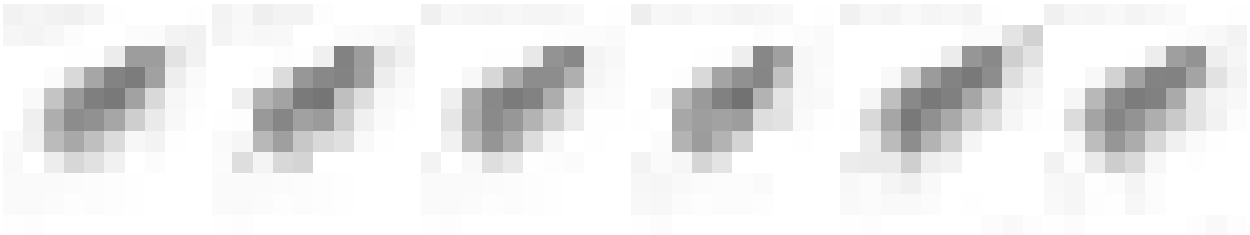
A genus of about 50 species, herbs, of Europe, Mediterranean areas, and w. Asia. References: Stace (2010)=Z; Straley & Utech in FNA (2002a); Speta in Kubitzki (1998a).

1 Raceme 10-20 cm long; pedicels of the terminal flowers > 5 mm long; flowers brown (the lower and fertile) and blue (the upper and sterile); leaves flat, mostly 8-20 mm wide.....***M. comosum***
1 Raceme 1-5 cm long in flower (somewhat longer in fruit); pedicels < 5 mm long; flowers all blue to blue-black; leaves flat, channeled, or terete, mostly 1-8 mm wide.
2 Leaves flat or channeled, 3-8 mm wide; corolla nearly spherical, the lobes strongly recurved .....***M. botryoides***
2 Leaves nearly terete, 1-3 mm wide; corolla ellipsoid-ovoid, distinctly longer than wide, the lobes erect.
3 Perianth of lower (fertile) flowers bright blue.....***M. armeniacum***
3 Perianth of lower (fertile) flowers deep blackish-blue or -purple.....***M. neglectum***

* ***Muscari armeniacum*** Leichtlin ex Baker, Garden Grape-hyacinth, Armenian Grape-hyacinth. Cultivated as an ornamental, persistent and naturalized in lawns, old fields, suburban woodlands, and disturbed areas; native of Mediterranean e. Europe and w. Asia. March-April; May-June. [= FNA, K, Z]

* ***Muscari botryoides*** (Linnaeus) P. Miller, Compact Grape-hyacinth. Cultivated as an ornamental, persistent and naturalized in lawns, old fields, suburban woodlands, and disturbed areas; native of Europe. March-April; May-June. [= C, F, FNA, G, K, Pa, RAB, S, WV, Z]

* ***Muscari comosum*** (Linnaeus) P. Miller, Tassel Grape-hyacinth. Cultivated as an ornamental, persistent and naturalized in lawns, old fields, suburban woodlands, and disturbed areas; native of Europe. March-April; May-June. [= C, F, FNA, G, K, Z]



* ***Muscari neglectum*** Gussoni ex Tenore, Grape-hyacinth. Cultivated as an ornamental, persistent and naturalized in lawns, old fields, suburban woodlands, and disturbed areas; native of Europe. March-May; May-June. [= FNA, K, Pa, WH, Z; = *M. racemosum* (Linnaeus) Lamarck & A.P. de Candolle – C, F, G, RAB, S, WV; *? M. atlanticum* Boissier & Reuter – W]

Ornithogalum Linnaeus 1753 (Star-of-Bethlehem)

A genus of about 50 species, herbs, of Mediterranean s. Europe, n. Africa, east to w. Asia. References: Straley & Utech in FNA (2002a); Stace (2010)=Z; Speta in Kubitzki (1998a).

1 Lower pedicels < 1 cm long, about as long as the upper pedicels (and shorter than the perianth segments); leaves mostly 8-15 mm wide; scape 2-5 dm tall ..... ***O. nutans***
1 Lowest pedicels 2-6 cm long, longer than the upper pedicels (and longer than the perianth segments); leaves mostly 2-5 mm wide; scape 1-3 dm tall..... ***O. umbellatum***

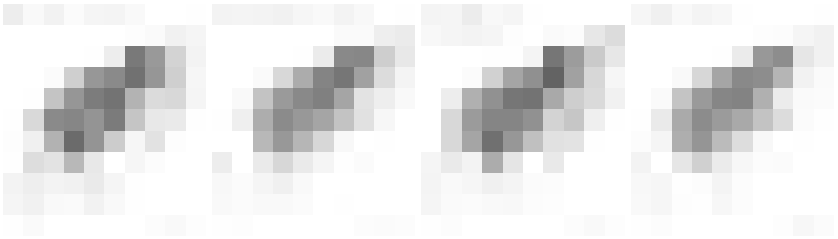
* ***Ornithogalum nutans*** Linnaeus, Drooping Star-of-Bethlehem. Lawns and suburban woodlands, commonly cultivated; native of w. Asia. March-April. [= RAB, C, F, FNA, G, K, WV, Z]

* ***Ornithogalum umbellatum*** Linnaeus, Star-of-Bethlehem, Snowflake, Nap-at-noon. Lawns, old fields, bottomlands, forests, commonly cultivated; native of Europe. March-May. [= C, F, FNA, G, K, Pa, RAB, S, W, WV; > *O. umbellatum* ssp. *umbellatum* – Z; > *O. umbellatum* ssp. *campestre* Rouy – Z]

Scilla Linnaeus 1753 (Squill)

A genus of ca. 50 species, of Eurasia and s. Africa. References: McNeill in FNA (2002a); Stace (2010)=Z.

* ***Scilla siberica*** Haworth, Siberian Squill. Suburban woodlands; native of Russia. March-April. [= FNA, K, Pa, Z]



76. ARECACEAE Schultz 1832 *or* ***PALMAE*** de Jussieu 1789 (Palm Family) [in ARECALES]

A family of about 190 genera and 2000 species, trees and shrubs, of tropical and subtropical regions of both hemispheres. Cold-hardy palms in other genera are sometimes planted in thje southern parts of our area, particularly near the coast. References: Zona in FNA (2000); Dransfield & Uhl in Kubitzki (1998b).

1 Leaves pinnate (with a well-developed central axis, the leaf blade much longer than wide); [introduced species].
  2 Petiole unarmed; fruit 20-30 cm long; [subfamily *Arecoideae*, tribe *Cocoeae*]..... ***Cocos***
  2 Petiole with spines; fruit 1.8-3.5 cm long
    3 Peliolar spines curved; [subfamily *Arecoideae*, tribe *Cocoeae*] ..... ***Butia***
    3 Petiolar spines straight (modified basal segments); [subfamily *Coryphoideae*, tribe *Phoeniceae*]..... ***Phoenix***
1 Leaves palmate or costapalmate (lacking a central axis or with a short central axis, the leaf blade about as long as wide; [native species]; [subfamily *Coryphoideae*, tribe *Corypheae*].
  3 Petioles armed with sharp recurved teeth; [subtribe *Livistoninae*]
    4 Petiolar spines > 2 mm long; tree (trunk erect) ..... ***Livistona***
    4 Petiolar spines 0.5-2 mm long; shrub (trunk prostate or leaning)..... ***Serenoa***
  3 Petioles smooth, unarmed (leaf sheaths with long needle-like spines in *Rhapidophyllum*).

5 Petioles and lower leaf surfaces more or less silvery pubescent; leaf sheaths bearing long (10-50 cm) needle-like spines; [subtribe *Thrinacinae*] ..... ***Rhapidophyllum***
5 Petioles and lower leaf surfaces green and glabrous; leaf sheaths without spines; [subtribe *Sabalinae*] ..... ***Sabal***

Butia (Beccari) Beccari 1916 (Butia)

A genus of about 8 species, trees, native of subtropical regions of South America. References: Dransfield & Uhl in Kubitzki (1998b).

* ***Butia capitata*** (Martius) Beccari, Brazilian Butia, South American Jelly Palm, Pindo Palm. Widely planted in the outer Coastal Plain of se. NC, e. SC, e. GA, and FL; native of s. Brazil and Uruguay. It persists and can appear naturalized in apparently semi-natural situations. [= WH3]

Cocos Linnaeus 1753 (Coconut Palm)

A monotypic genus, the single species now pantropical. References: Zona in FNA (2000).

* ***Cocos nucifera*** Linnaeus, Coconut Palm. Coconut palm rarely reaches our shores as propagules (coconuts, which may germinate and live briefly), but it is not established; native region unknown, but probably tropical islands of the western Pacific (now pantropical). Photographic evidence has been supplied from as far north as Bear Island, Onslow County, NC, 11 June 1996 (Dave Owen, pers. comm. and photograph). [= FNA, K, S, WH3]

Livistona R. Brown 1810 (Fan Palm)

A genus of ca. 25 species, trees, of Africa, Asia, and Australasia. References: Zona in FNA (2000); Dransfield & Uhl in Kubitzki (1998b).

* ***Livistona chinensis*** (Jacquin) R. Brown ex Martens, Chinese Fan Palm. Cultivated and persistent; native of China. [= FNA. K, WH3]

Phoenix Linnaeus 1753 (Date Palm)

A genus of 12-14 species, trees, of tropical Asia, Africa, and s. Europe. References: Zona in FNA (2000); Dransfield & Uhl in Kubitzki (1998b).

* ***Phoenix canariensis*** Chabaud, Canary Island Date Palm. Disturbed hammocks and maritime forests. [= FNA, K2]

Rhapidophyllum H. Wendl. & Drude ex Drude 1876 (Needle Palm)

A monotypic genus, a shrub of se. North America (Henderson, Galeano, & Bernal 1995). The closest relative to *Rhapidophyllum* is apparently *Trachycarpus* of the Himalayan region of se. Asia (Zona in FNA 2000). References: Zona in FNA (2000); Clancy & Sullivan (1990); Dransfield & Uhl in Kubitzki (1998b); Zona (1997)=Z.

Rhapidophyllum hystrix (Pursh) H. Wendl. & Drude ex Drude, Needle Palm. Moist to wet soils of small blackwater stream swamps, especially where underlain with coquina limestone ("marl"), hydric hammocks and rich, wetland-upland transitions. Se. SC (Beaufort and Jasper counties) south to c. peninsular FL, and west to s. MS. Becoming somewhat popular as a hardy palm that can be grown in the Southeast, well north of its natural range. [= FNA, GW, K, S, WH3, Z]

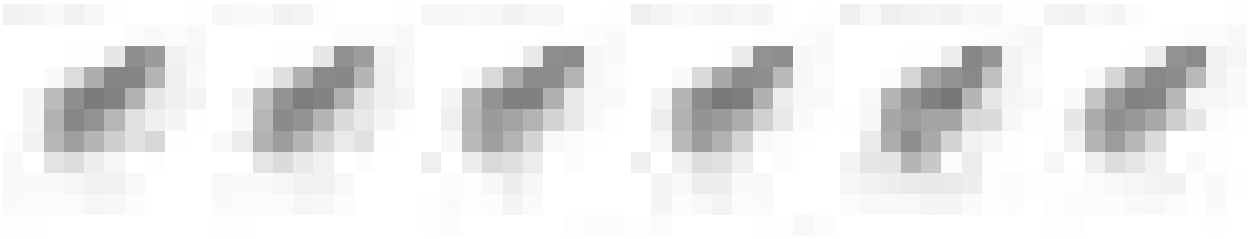
Sabal Adanson 1763 (Palmetto)

Sabal has 16 species, primarily distributed around the Caribbean Sea. The other species of se. United States are *S. miamiensis* Zona, endemic of s. FL pine rocklands, and *S. mexicana* Martius, of the s. TX coast (Henderson, Galeano, & Bernal 1995). References: Zona in FNA (2000); Zona (1997)=Z; Zona (1990)=Y; Dransfield & Uhl in Kubitzki (1998b).

Identification notes: The hastula is the midrib of the leaf, as seen on the **upper** (adaxial) surface.

1 Tree, with erect trunk (though young plants appear as trunkless shrubs, similar in habit to *S. minor*); leaves 15-30 per plant; hastula 5.3-18 cm long, acute to acuminate; margins of leaf segments with filamentose fibrils; leaf segment apices 2-cleft ..... ***S. palmetto***
1 Shrub, with subterranean, rhizomatous "trunk" (very rarely emerging as much as 1 meter from the ground); leaves 4-10 per plant; hastula 0.8-4.7 cm long, obtuse to acute; margins of leaf segments with or without filamentose fibrils; leaf segment apices 2-cleft (*S. etonia*) or entire (*S. minor*).
  2 Margins of leaf segments with filamentose fibrils; hastula acute; fruits 9.0-15.4 mm in diameter; segment apices 2-cleft; [of dry sandy habitats] ..... ***S. etonia***
  2 Margins of leaf segments without filamentose fibrils; hastula obtuse; fruits 6.4-9.7 mm in diameter; segment apices generally entire; [of moist to wet habitats] ..... ***S. minor***

Sabal etonia Swingle ex Nash, Scrub Palmetto. Florida scrub. Late May-July. Endemic to FL (Clay County, FL south to Miami-Dade County, FL, primarily on the Lake Wales Ridge but also on coastal and intermediate ridges). See Zona & Judd (1986) for extensive information about the ecology and distribution of this species. [= FNA, K, S, WH3, Y, Z]



Sabal minor (Jacquin) Persoon, Dwarf Palmetto. Swamps, maritime forests, low moist woods, especially in calcareous soils developed from shell limestone (marl), rarely planted as an ornamental farther inland, where persisting (and appearing native) or possibly naturalizing. May-July; September-November. Ne. NC (Currituck County) south to c. peninsular FL, west to e. TX, c. TX, se. OK, and s. AR; disjunct in Nuevo León (Goldman 1999). This palm reaches its northern limit at Monkey Island, Currituck County, NC (L. Musselman, J. Boggan, pers. comm., 2006). No other New World palm has a native range extending so far north. [= RAB, FNA, GW, K, WH3, Z; > *S. minor* – S; > *S. deeringiana* Small – S]

Sabal palmetto (Walter) Loddiges ex J.A. & J.H. Schultes, Cabbage Palmetto. Maritime forests, marsh edges, and other near-coastal communities. July; October-November. Native from se. NC south to s. FL, west to w. Panhandle FL, and in the West Indies in Cuba and the Bahamas; planted beyond that range, especially on the Gulf Coast. This palm is the state tree of South Carolina and is common and conspicuous (both as a native tree and in plantings) along the South Carolina coast; it currently reaches its northern limit as a native species in Brunswick County, NC, where it is a conspicuous part of the forest on Smith Island complex (Bald Head Island, Middle Island, Bluff Island). It is planted elsewhere (and farther north) on the coast. Periodic disturbance by hurricanes helps maintain populations of *Sabal palmetto*, which survives winds and flooding that topple or kill *Quercus virginiana*. Curtis (1883) reports that "Cape Hatteras is, or was, the northern limit of this Palm... It is to be deeply regretted, however, that a reckless indifference to the future, which has been charged as a characteristic of Americans, is likely to efface, at no very distant time, every vestige of this interesting ornament of our coast. The inner portion of the young plant is very tender and palatable, somewhat resembling the Artichoke and Cabbage in taste (hence its name of *Cabbage Tree*), and is often taken for pickling, and the stock is ruined by the process. Thus for a pound or two of pickles, no better either than many other kinds, the growth of half a century is destroyed in a moment, and posterity left to the wretched inheritance of vain mourning for the loss of the greatest beauty of our maritime forest." [= RAB, FNA, GW, K, S, WH3, Z]

Serenoa Hooker f. 1828 (Saw Palmetto)

Serenoa is monotypic shrub (Henderson, Galeano, & Bernal 1995). *Serenoa* is most closely related to *Acoelorraphe*, of the West Indies, including s. FL (Zona in FNA 2000). References: Zona in FNA (2000); Zona (1997)=Z; Dransfield & Uhl in Kubitzki (1998b).

Serenoa repens (Bartram) Small, Saw Palmetto. Pine flatwoods and maritime forests. May-July; October-November. Se. SC (in maritime forests in Charleston and Colleton counties, and in spodosolic flatwoods in Beaufort and Jasper counties) south to s. FL and west to e. LA. *Serenoa* forms extensive clonal patches, connected by underground rhizomes, and is a dominant plant in many parts of FL, in pine flatwoods or scrub. [= RAB, FNA, GW, K, S, WH3]

78. COMMELINACEAE R. Brown 1810 (Spiderwort Family) [in COMMELINALES]

A family of about 41 genera and 650 species, herbs, of tropical and warm temperate regions of both hemispheres. References: Faden in FNA (2000); Faden in Kubitzki (1998b); Burns, Faden, & Steppan (2011); Tucker (1989).

1 Spathes absent; inflorescence open and repeatedly branched; [tribe *Tradescantieae*] ..... ***Gibasis***
1 Spathes present, single or paired; inflorescence compact, unbranched.
  2 Spathes paired, terminating the stem, resembling foliage leaves in size, shape, texture, and coloration; [tribe *Tradescantieae*]..... ..... ***Tradescantia***
  2 Spathes single (or paired in *Callisia*), either terminal or axillary, differing from the foliage leaves (in *Commelina* folded, heart-shaped when spread, and usually pale-green, in *Cuthbertia* and *Murdannia* scale-like, scarious, and inconspicuous, sometimes hidden by foliage leaves in *Murdannia*).
    3 Spathe folded, heart-shaped when unfolded, usually pale-green, closely subtending and surrounding the flower pedicels; petals unequal, the 2 upper petals larger and usually more deeply colored than the lower petal (which is sometimes absent); [tribe *Commelineae*]..... ..... ***Commelina***
    3 Spathe scale-like, scarious, and inconspicuous, not closely subtending and surrounding the flower pedicels; petals equal, in both size and coloration.
      4 Leaves linear, > 20× as long as wide; petals bright pink (rarely white); [tribe *Tradescantieae*]..... ***Cuthbertia***
      4 Leaves lanceolate, < 20× as long as wide; petals white, pink, purplish, or bluish.
        5 Fertile stamens 3, alternating with 3 staminodia; petals pink to purplish or bluish; [tribe *Commelineae*] ..... ***Murdannia***
        5 Fertile stamens 0-6, all fertile; petals white; [tribe *Tradescantieae*]..... ***Callisia***

Callisia Loefling

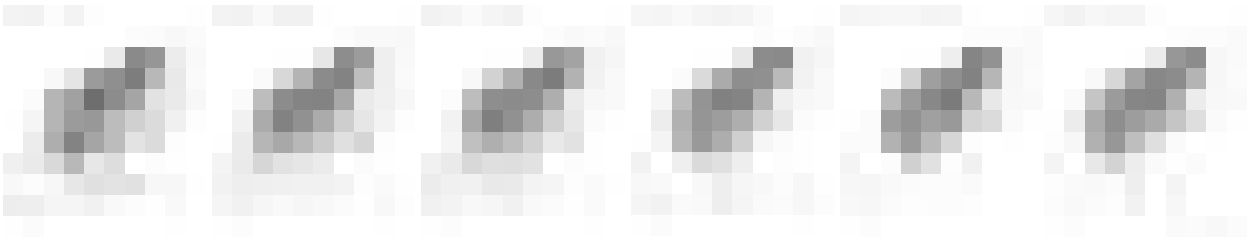
A genus of ca. 15-18 species, herbs, of tropical America. References: Faden in FNA (2000); Tucker (1989)=Z; Burns, Faden, & Steppan (2011).

1 Leaves 15-30 cm long, 2.5-5 cm wide; stems ascending ..... ***C. fragrans***
1 Leaves 1-3.5 cm long, 0.5-1.4 cm wide; stems creeping.
2 Inflorescences pedunculate; flowers on pedicels; capsule with 3 locules ..... ***C. cordifolia***
2 Inflorescences sessile; flowers sessile or nearly so; capsule with 2 locules ..... ***C. repens***

Callisia cordifolia (Swartz) E.S. Anderson & Woodson, Florida Roseling. Disturbed area? Native from n. peninsular FL to s. FL; Mexico, the West Indies, and n. South America. Reported for nw. GA (Faden in FNA 2000). [= FNA, K, WH3; ? *Tradescantella floridana* (S. Watson) Small – S; = *Tradescantia cordifolia* Swartz]

* ***Callisia fragrans*** (Lindley) Woodson, Basketflower. Disturbed areas; native of Mexico. February. [= FNA, K, WH3]

* ***Callisia repens*** (Jacquin) Linnaeus. Disturbed areas; native of tropical America. [= FNA, K, WH3]



Commelina Linnaeus 1753 (Dayflower)

A genus of about 170 species, herbs, cosmopolitan. References: Faden in FNA (2000); Tucker (1989)=Z; Faden (1993)=Y; Brashier (1966)=X; Faden in Kubitzki (1998b). The key is adapted in part from X, Y, and Z.

1 Spathes with margins free to the base; [introduced species, usually in weedy habitats].
2 Spathes generally whitish or pale green toward the peduncle, with contrasting dark green veins; middle petal white or paler than the others; capsules with 2 locules (the third aborting); seeds rugose foveate-reticulate ..... ***C. communis***
2 Spathes lacking contrasting veins; middle petal about the same color as the others; capsules with 3 locules; seeds reticulate or smooth to faintly alveolate.
3 Spathes not at all to slightly falcate (the lower margin straight or very nearly so); upper cyme usually vestigial (rarely well-developed and 1-flowered); seeds smooth to faintly alveolate; peduncles of the spathes with hairs to 0.5 mm long ..... ***C. caroliniana***
3 Spathes usually distinctly falcate (the lower margin curved); upper cyme in larger spathes usually well-developed and 1-several-flowered; seeds deeply reticulate; peduncles of the spathes with hairs to 0.1 mm long ..... ***C. diffusa***
1 Spathes with margins fused basally; [native species, usually in natural habitats, **or** introduced and weedy].
4 Flowers peach-colored ..... ***C. gambiae***
4 Flowers white and/or bluish.
5 Leaf sheaths ciliate with coarse reddish-brown hairs, the sheath not auriculate; middle petal blue, lilac, or lavender; [mostly of moist soils].
6 Annual from fibrous roots, the stem decumbent; leaf blades broadly elliptic-ovate, 2-9 cm long; leaf margin and upper surface pubescent; [alien, weedy] ..... ***C. benghalensis***
6 Perennial from horizontal rhizomes, often forming clonal patches of erect stems; leaf blades lance-oblong, 6-20 cm long; leaf margin and upper surface scabrous; [native, mostly of moist floodplain forests] ..... ***C. virginica***
5 Leaf sheaths ciliate with white hairs, the sheath prolonged upward into auricles; middle petal white; plant perennial from thickened, fibrous roots, not forming clonal patches; [mostly of dry, sandy or rocky soil].
7 Larger leaves 4-10 (-13) cm long, 0.4-1.4 cm wide; spathes 1-2 (-2.5) cm long; [primarily of the Coastal Plain, especially on sandhills and dunes] ..... ***C. erecta*** *var.* ***angustifolia***
7 Larger leaves (6-) 10-15 cm long, (1.1-) 1.5-3.5 cm wide; spathes (2.0) 2.5-3.6 cm long; [primarily of the Piedmont and Mountains] ..... ***C. erecta*** *var.* ***erecta***

* ***Commelina benghalensis*** Linnaeus, Tropical Spiderwort, Bengal Dayflower. Fields; native of tropical Asia and becoming a serious weed. This annual, pantropical weed is well established in FL and s. GA (Faden 1993). Spot infestations have been reported in NC (Wayne County), SC (Edgefield County), and MS as well. "This annual species can be recognized by: its funnelform spathes that are often clustered; relatively broad leaves that frequently have red hairs at the summit of the sheath; and cleistogamous flowers that are borne at the base of the plant and are usually subterranean (in addition to normal, aerial, chasmogamous flowers)" (Faden 1993). [= FNA, K, WH3, Y]

* ***Commelina caroliniana*** Walter, Indian Dayflower. Moist disturbed areas; native of India and Bangladesh. June-October. Faden (1989, 1993) discusses in detail the taxonomy and history of this species. It was apparently introduced to our area early, probably as a weed in rice. [= RAB, C, FNA, G, K, S, WH3, Y; < *C. diffusa* – GW, X, Z; > *C. hasskarlii* C. B. Clarke (the earliest name applied to the species in India)]

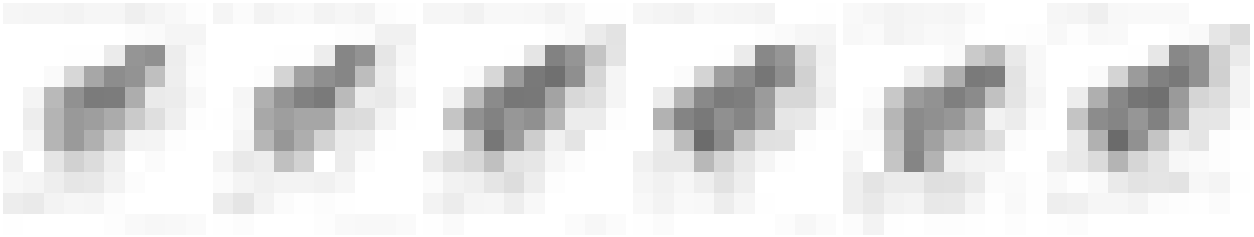
* ***Commelina communis*** Linnaeus, Common Dayflower. Gardens, bottomlands, disturbed ground; native of the Old World. May-October. Var. *communis* and var. *ludens* are sometimes distinguished (see synonymy): var. *communis* has flowers with larger petals pale blue and sterile anthers completely yellow, var. *ludens* has larger petals intense violet blue and sterile anthers

with a brownish-purple spot. [= RAB, C, FNA, GW, S, W, WH3, X, Y; > *C. communis* Linnaeus var. *ludens* (Miquel) C.B. Clarke – F, G, K, Pa, WV, Z; > *C. communis* var. *communis* – F, G, K, Pa, WV, Z]

* ***Commelina diffusa*** Burmann f., Creeping Dayflower. Roadsides, fields, disturbed ground; native of the Old World. June-October. [= RAB, C, F, G, Pa, W; < *C. diffusa* – GW, X, Z (also see *C. caroliniana*); = *C. longicaulis* Jacquin – S; = *C. diffusa* var. *diffusa* – FNA, K, WH3, Y]

Commelina erecta Linnaeus *var.* ***angustifolia*** (Michaux) Fernald, Sand Dayflower. Dunes and dry sand flats on barrier islands, sandhills, other dry sandy sites, shale barrens, other dry rocky sites. June-October. E. NC south to s. FL, west to TX, and north and west in the interior to IA, nw. NE, CO, and NM. Contrary to the specific epithet, *C. erecta* var. *angustifolia* is a trailing plant, the stems sometimes as long as 1.3 m. The taxonomy and distribution of the two varieties here recognized need further study. [= C, F, FNA, G, K, WV, X; < *C. erecta* – RAB, W, WH3, Y, Z; > *C. angustifolia* Michaux – S; > *C. crispa* Wooton – S]

Commelina erecta Linnaeus *var.* ***erecta***, Erect Dayflower. Dry openings and woodlands, especially in thin soil around rock outcrops, streambanks, riverbanks, mesic forests. June-October. PA west to MO and e. KS, south to FL and TX. [= C, F, FNA, G, K, X; < *C. erecta* – Pa, RAB, W, WH3, Y, Z; = *C. erecta* – S]



* ***Commelina gambiae*** C.B. Clarke. Disturbed areas. A West African species first collected in North America in 1976 (Manatee County, FL), is immediately distinguishable from our species by its peach-colored flowers and fused spathes. Faden (1993) reports that it "appears to be spreading rapidly," but whether it can spread significantly northward from peninsular FL is questionable. [= FNA, WH3; = *Commelina nigritana* Bentham var. *gambiae* (C.B. Clarke) Brenan – K, Y]

Commelina virginica Linnaeus, Virginia Dayflower. Bottomlands, swamp forests, other moist to wet forests and forest edges. July-October. NJ west to KS and OK, south to FL and TX. Our most robust species of *Commelina*. [= RAB, C, F, FNA, G, GW, K, Pa, S, W, WH3, WV, X, Y, Z]

Cuthbertia Small 1903 (Roseling)

A genus of 3 species, herbs, of se. North America. Over the last several decades, *Cuthbertia* has often been reduced to a component within *Callisia* (as by Hunt 1983; Hunt 1986; Tucker 1989; Faden in Kubitzki 1998b; Faden in FNA 2000); recent molecular analyses do not support such a course, however (Bergamo 2003; Burns, Faden, & Steppan 2011). References: Faden in FNA (2000); Tucker (1989)=Z; Giles (1942); Giles (1943); Lakela (1972); Bergamo (2003); Burns, Faden, & Steppan (2011); Faden in Kubitzki (1998b).

1 Leaves loosely spreading, the leaf blades 4-15 mm wide (as wide as or wider than the opened, flattened sheaths).....***C. rosea***
1 Leaves erect or ascending, the leaf blades 1-5 mm wide (narrower than the opened, flattened sheaths)
  2 Plants cespitose; roots glabrous to sparsely puberulent; inflorescence bracts scarious and small or to 14 mm long and green; petals 8-10 mm long; [of se. VA south to c. FL peninsula].....***C. graminea***
  2 Plants not cespitose; roots persistently densely woolly; inflorescence bracts 1-3 (-5) mm long, scarious; petals 9-13 mm long; [of the FL peninsula, disjunct in Gulf County in the FL Panhandle].....***C. ornata***

Cuthbertia graminea Small, Grassleaf Roseling. Sandhills. May-July. *Cuthbertia graminea* includes 3 morphologically distinguishable cytological races, occupying different (but partially overlapping) ranges (Giles 1942, Giles 1943, Tucker 1989). The predominant race is tetraploid, occupying the outer Coastal Plain of VA, NC, and SC, middle Coastal Plain of NC and SC, fall-line Sandhills of SC, and south into FL. The diploid race is endemic to the fall-line Sandhills of sc. NC and nc. SC, a distribution similar to those of *Pyxidanthera brevifolia*, *Liatris cokeri*, and *Lycopus cokeri*. Rare hexaploids have been found at scattered sites in SC and FL. The tetraploid race averages about 25% larger than the diploid in most vegetative and floral characters, and is reported to exhibit a greater ecological amplitude (Giles 1942, 1943). [= S; = *Tradescantia rosea* Ventenat var. *graminea* (Small) E.S. Anderson & Woodson – RAB, C, F, G; = *Callisia graminea* (Small) G. Tucker – FNA, K, WH3, Z]

Cuthbertia ornata Small, Florida Roseling. Sandhills, scrub, dunes. FL peninsula; disjunct in Gulf County in the FL Panhandle. [= S; = *Callisia ornata* (Small) G. Tucker – FNA, K, WH3, Z; = *Tradescantia rosea* Ventenat var. *ornata* (Small) E.S. Anderson & Woodson]

Cuthbertia rosea (Ventenat) Small, Common Roseling. Sandhills, other dry woodlands. May-July. MD south to peninsular FL, west to s. AL. [= S; = *Tradescantia rosea* Ventenat var. *rosea* – RAB; = *Callisia rosea* (Ventenat) D.R. Hunt – FNA, K, WH3, Z]

Gibasis Rafinesque 1837 (Bridal-veil)

A genus of 11 species, annual and perennial herbs, of the American tropics. References: Faden in FNA (2000); Faden in Kubitzki (1998b).

* ***Gibasis pellucida*** (M. Martens & Galetti) D.R. Hunt, Tahitian Bridal-veil. Disturbed areas; native of Mexico. April-October. [= FNA, WH3; = *G. schiedeana* (Kunth) D.R. Hunt]

Murdannia Royle 1839 (Murdannia)

A genus of about 50 species, herbs, of tropical and warm temperate regions. References: Faden in FNA (2000); Tucker (1989)=Z; Faden in Kubitzki (1998b).

1 Flowers solitary or in 2-4-flowered racemes borne in the upper leaf axils; capsules 8-10 mm long; seeds ca. 3 mm long; pedicels much longer than the capsule ..... ***M. keisak***
1 Flowers in stalked cymose racemes borne terminally or in the uppermost leaf axil; capsules 4-5 mm long; seeds 1.0-1.5 mm long; pedicels about as long as the capsule ..... ***M. nudiflora***

* ***Murdannia keisak*** (Hasskarl) Handel-Mazzetti, Mud-Annie. Stream banks, canals, ditches, marshes, swamp forests, wet disturbed places; native of Asia, now widespread in the se. United States. September-October. [= C, FNA, G, GW, K, W, WH3, Z; = *Aneilema keisak* Hasskarl – RAB, F]

* ***Murdannia nudiflora*** (Linnaeus) Brenan. Moist sands, ditches, wet disturbed places; native of Asia, now widespread in the tropics and subtropics of both hemispheres. May-October. This species apparently arrived in the se. United States earlier than *M. keisak* (S, for instance, treats this species and not *M. keisak*), but is distinctly less common. [= FNA, GW, K, WH3, Z; = *Aneilema nudiflorum* (Linnaeus) Sweet – RAB, S]

Tradescantia Linnaeus 1753 (Spiderwort)

A genus of about 70 species, herbs, of the New World. References: Faden in FNA (2000); Anderson & Woodson (1935)=Y; Tucker (1989)=Z; Faden in Kubitzki (1998b). [also see *Callisia* and *Cuthbertia*]

1 Leaves purple; flowers nearly sessile; petals clawed, the claws fused basally; stamens epipetalous ..... ***T. pallida***
1 Leaves green; flowers distinctly pedicelled; petals neither clawed nor connate; stamens not adnate to the petals.
  2 Plant sprawling, rooting at the nodes; leaves 2.5-5 cm long, < 4× as long as wide; [exotic] ..... ***T. fluminensis***
  2 Plant erect or ascending, not rooting at the nodes; leaves > 4 cm long, > 5× as long as wide; [native].
    3 Leaf blades of the upper stem constricted at their bases to a narrower subpetiolar sheath, the opened sheath narrower than the leaf blade; leaf blades 6-27 cm long, 1.0-5.0 cm wide, mostly < 10× as long as wide; stomates much more abundant on the lower leaf surface than on the upper, giving the lower surface a much paler color.
      4 Pedicels 2.0-3.2 cm long; sepals 9-16 mm long ..... ***T. ernestiana***
      4 Pedicels 1.0-1.7 cm long; sepals 4-10 mm long ..... ***T. subaspera***
    3 Leaf blades of the upper stem not constricted to a subpetiolar sheath, the opened sheath about as wide or wider than the leaf blade; leaf blades 11-45 cm long, 0.4-2.0 (-4.5) cm wide, mostly > 10× as long as wide; stomates slightly more abundant on the lower leaf surface than on the upper, or about equally distributed on the two surfaces, the lower surface slightly to not at all paler than the upper.
      5 Sepals, pedicels, and ovary pubescent with glandular hairs or a mixture of glandular and eglandular hairs; leaves slightly to densely puberulent or pubescent.
        6 Leaves dull green, densely pilose (rarely glabrate); sepals, pedicels, and ovary pubescent with a mixture of glandular and eglandular hairs; pedicels 2.0-3.5 cm long ..... ***T. hirsuticaulis***
        6 Leaves glaucous to subglaucous, puberulent; sepals, pedicels, and ovary puberulent with glandular hairs only; pedicels 1.2-2.5 cm long ..... ***T. roseolens***
      5 Sepals, pedicels, and ovary glabrous or pubescent with eglandular hairs only (use 10× magnification); leaves glabrous or pilose at the junction of the blade and the sheath (or pilose throughout in *T. hirsutiflora*).
        7 Pedicels pubescent; sepals eglandular-villous; leaves green; sepals green, inflated-turgid (*T. virginiana*) or not (*T. hirsutiflora*).
          8 Stems usually hirsute or pilose throughout; roots 1.0-1.5 (-2.0) mm thick; sepals not inflated-turgid ..... ***T. hirsutiflora***
          8 Stems glabrous, or sparsely puberulent on the upper stem only; roots (1.5-) 2.0-4.0 mm thick; sepals usually inflated-turgid ..... ***T. virginiana***
        7 Pedicels glabrous; sepals glabrous or the tip with a tuft of eglandular hairs; leaves glaucous or green; sepals glaucous (or rarely also suffused with purple), not inflated-turgid.
          9 Plants distinctly glaucous; leaves 5-45 cm long, arcing, at an acute angle to the stem ..... ***T. ohiensis***
          9 Plants green or slightly glaucous; leaves 4-11 cm long, straight, at nearly right angles to the stem ..... ***T. paludosa***

Tradescantia ernestiana E.S. Anderson & Woodson. Dry woodlands. Primarily Ozarkian (AR, MO, OK, disjunct east to nw. GA and ne. AL, and west to n. TX (Faden in FNA 2000). [= FNA, K, Y, Z; < *T. pilosa* J.G.C. Lemaire – S]

* ***Tradescantia fluminensis*** da Conceição Vellozo, Wandering Jew. Disturbed areas, lawns, vacant lots, moist suburban woods, along streams; native of tropical America. Reported for Beaufort Co. SC (Daniel C. Payne 2009, pers. comm.). [= FNA, K, WH3, Z]

Tradescantia hirsuticaulis Small, Hairy Spiderwort. Dry rocky woodlands, and rock outcrops (especially granitic flatrocks and domes). April-June. W. NC and wc. TN south to sc. SC, s. GA, s. AL, and sc. MS; disjunct in AR, e. OK, and nw. LA. There is some question about the validity of this species. [= RAB, FNA, K, W, Y, Z]

Tradescantia hirsutiflora Bush. Sandhills, dry hammocks. C. SC (Richland County), s. and e. GA and FL Panhandle, west to TX. Reported for SC (Richland Co.) (P. McMillan 2003). [= FNA, K, WH3, Y, Z; >< *T. hirsuticaulis* – S, misapplied]

Tradescantia ohiensis Rafinesque, Smooth Spiderwort. Woodlands and forests, alluvial bottoms, disturbed areas. April-July. MA west to MN, south to c. peninsular FL and TX, some of that range the result of naturalization from cultivation. [= RAB, C, F, FNA, G, K, Pa, W, WH3, WV, Z; ? *T. reflexa* Rafinesque – S; ? *T. canaliculata* Rafinesque – Y]

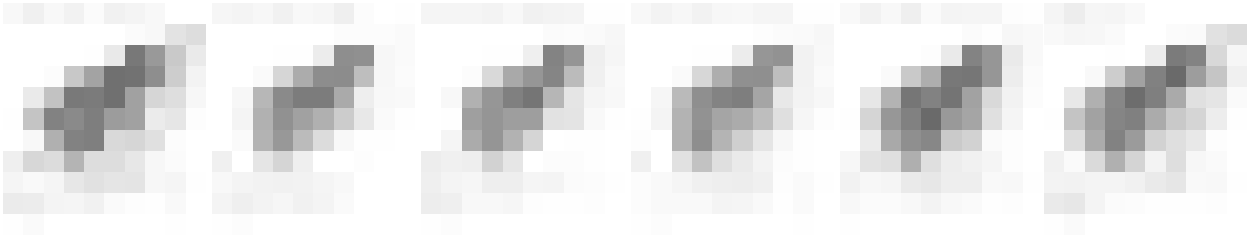
* ***Tradescantia pallida*** (Rose) D.R. Hunt, Purplequeen, Purpleheart, Wandering Jew. Disturbed areas; native of Mexico. [= FNA, K, WH3]

Tradescantia paludosa E.S. Anderson & Woodson. Swamps and bottomlands. March-May. Coastal Plain of AL and FL (?) west to TX and AR. [= FNA, K, Y, Z; = *T. ohiensis* Rafinesque var. *paludosa* (E.S. Anderson & Woodson) D.T. MacRoberts]

Tradescantia roseolens Small, Sandhill Spiderwort. Dry sandy woodlands. May-June. SC south through GA to c. peninsular FL, west to AL. [= RAB, FNA, K, WH3, Y, Z; = *T. longifolia* Small – S]

Tradescantia subaspera Ker-Gawler, Wide-leaved Spiderwort. Dry to mesic woodlands and forests, hammocks. June-July. Nc. NC, w. VA, WV, OH, IN, IL, and MO, south to NC, SC, sw. GA, Panhandle FL, and AL. Two questionable varieties are sometimes recognized. Var. *subaspera* may be distinguished by the stem conspicuously zigzag above, except on depauperate or juvenile plants (vs. the stems straight or only slightly zigzag), uppermost lateral cymes sessile or short-pedunculate (vs. pedunculate throughout), uppermost internodes very reduced, crowding the upper leaves (vs. internodes less reduced), leaves much broader than the sheath (vs. only slightly broader), and its generally greater size than var. *montana*. *T. subaspera* var. *montana* ranges from sw. VA and c. WV south to nw. SC, n. GA, and se. TN, with disjunct occurrences in c. AL and Panhandle FL. Var. *subaspera* ranges from WV west to n. IL, south to se. TN, ne. AR, and s. MO, with disjunct occurrences in NC. [= RAB, FNA, W, WH3; > *T. subaspera* Ker-Gawler var. *montana* (Shuttleworth ex Britton) E.S. Anderson & Woodson – C, F, G, K, WV, Y, Z; > *T. subaspera* var. *subaspera* – C, F, G, K, WV, Y, Z; < *T. pilosa* J.G.C. Lemaire – S]

Tradescantia virginiana Linnaeus, Virginia Spiderwort. Nutrient-rich forests and woodlands. April-July. ME west to MI and WI, south to n. GA, MO, and AR. Very variable in flower color, including deep blue, purple, pink, light pink, and pure white. [= RAB, C, F, FNA, G, K, Pa, S, W, WV, Y, Z; ? *T. brevicaulis* Rafinesque – S]



80. PONTEDERIACEAE Kunth 1816 (Pickerelweed Family) [in COMMELINALES]

A family of about 9 genera and 33 species, primarily of the tropics, but with some temperate representatives. References: Rosatti (1987a); Cook in Kubitzki (1998b); Horn in FNA (2002a).

1 Inflorescence with >50 flowers; fruit 1-seeded, indehiscent; leaves lanceolate to ovate, 1.5-10× as long as wide, the base cordate, truncate, or cuneate.....***Pontederia***
1 Inflorescence with <30 flowers; fruit 10-200-seeded, capsular; leaves **either** reniform, 0.5-1.5× as long as wide, the base cordate or rounded, **or** narrowly linear, 20-50× as long as wide, the base attenuate.
  2 Leaves coriaceous; petioles expanded into air-filled floats or not; perianth lobes 1.3-3.7 cm long .....***Eichhornia***
  2 Leaves membraneous; petioles never expanded into air-filled floats; perianth lobes 0.4-1.0 cm long..... ***Heteranthera***

Eichhornia Kunth 1842 (Water Hyacinth)

A genus of 7-8 species, native of tropical America and Africa, but now introduced widely in warm regions. References: Cook in Kubitzki (1998b); Horn in FNA (2002a).

1 Plants rooted; stems elongate, with leaves spaced and alternate; petioles not inflated.....***E. azurea***
1 Plants floating (or stranded by dropping water levels); stems short, with leaves in a rosette with very short internodes; petioles inflated..... .....***E. crassipes***

* ***Eichhornia azurea*** (Swartz) Kunth, Rooted Water-hyacinth. Ditches, rivers; native of tropical America. June-October. [= FNA, K, WH]

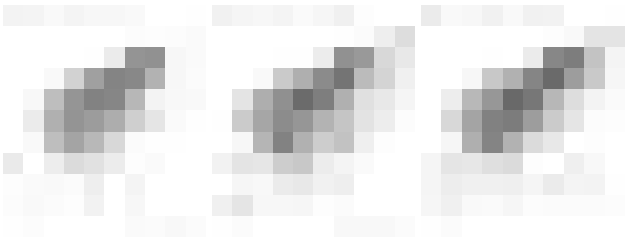
* ***Eichhornia crassipes*** (Martius) Solms-Laub, Water Hyacinth. Ponds, ditches, sluggish water, native of tropical America. June-September. *E. crassipes* is "generally considered the world's most serious aquatic weed" (Rosatti 1987). Originally native to tropical South America, *E. crassipes* is now a widespread naturalized weed throughout the tropics and subtropics. In the northern part our area, water hyacinth is rare, probably not long persisting. Farther south, it can be an aggressive aquatic weed. [= RAB, C, F, FNA, G, GW, K; = *Piaropus crassipes* (Martius) Rafinesque – S]

Heteranthera Ruiz & Pavón 1794 (Mud-plantain)

A genus of 10-12 species, of tropical and temperate America and tropical Africa. References: Cook in Kubitzki (1998b); Horn (1998)=Z; Horn in FNA (2002a). Key based in part on FNA.

1 Leaves narrowly linear, 20-50× as long as wide, the base attenuate; flowers solitary, the corolla yellow; stamens and anthers all alike ..... ***H. dubia***
1 Leaves reniform, 0.5-1.5× as long as wide, the base cordate; flowers 1-several, the corolla white or pale blue; stamens and anthers dimorphic.
  2 Spathe with 2-several flowers; perianth tube 3-12 mm long.
    3 Anthers and filaments with dark purple hairs; internode below the spathe < 1 cm long; spike with (3-) 7-16 flowers, typically elongating well out of the spathe ..... ***H. multiflora***
    3 Anthers and filaments with white hairs; internode below the spathe > 1 cm long; spike with 2-8 flowers, typically mostly included within the spathe ..... ***H. reniformis***
  2 Spathe with solitary flower; perianth tube 11-45 mm long.
    4 Vegetative stems elongating only in water deeper than 5 cm; blades of petiolate leaves oblong to ovate, the base truncate to cuneate; perianth tube 15-45 mm long ..... ***H. limosa***
    4 Vegetative stems commonly elongating; blades of petiolate leaves round to oblong, the base cordate to truncate; perianth tube 11-29 mm long ..... ***H. rotundifolia***

Heteranthera dubia (Jacquin) MacMillan, Water Stargrass. Streams, rivers. Late July-October. QC west to WA, south to Cuba and Central America, but rare or absent in much of the se. United States. The attribution of this species to SC is in error (as by Kartesz 1999), based on a misidentified specimen (C. Horn, pers. comm.). [= RAB, F, FNA, GW, K, Pa, W, WV; = *Zosterella dubia* (Jacquin) Small – C, G, S]



Heteranthera limosa (Swartz) Willdenow. Wet ditches, other wet areas. KY, MN, SD, and CO, south to AL, MS, LA, TX, and AZ; Mexico, Central and South America, West Indies. East to TN, KY, AL (Diamond & Woods 2009), and FL (Kartesz 1999); it is attributed to VA in Small (1933), but the documentation is not known. [= FNA, C, F, G, K, S, Z]

Heteranthera multiflora (Grisebach) Horn. In shallow, stagnant water in floodplains, or emersed on mud. June-October. IL west to NE, south to MS; also on the Atlantic Coastal Plain from NJ south through PA to ne. NC; also in South America (Brazil, Paraguay, Argentina, and Venezuela). [= C, FNA, K, Pa, Z]

Heteranthera reniformis Ruíz & Pavón. In shallow, stagnant water in floodplains, or emersed on mud. June-October. CT west to NE, south to FL and TX and into South America. First reported for South Carolina by Hill & Horn (1997). [= RAB, C, F, FNA, G, GW, K, Pa, S, W, WV, Z]

Heteranthera rotundifolia (Kunth) Grisebach. Ponds. Midwestern, as a rare disjunct east to c. KY (Larue County) (Medley 1993); Central and South America, West Indies. [= FNA, C, K, Z]

Pontederia Linnaeus 1753 (Pickerelweed)

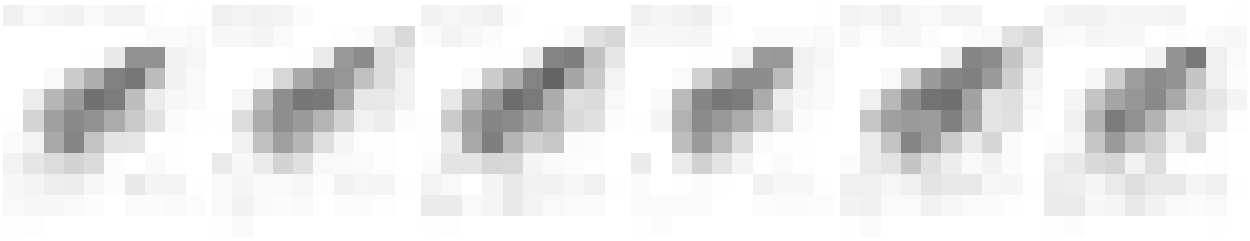
A genus of 3-6 species, from North America to South America. References: Lowden (1973)=Z; Cook in Kubitzki (1998b); Horn in FNA (2002a).

1 Floral tube villous when young, essentially glabrous to sparsely glandular in maturity; leaves primarily ovate to triangular-lanceolate, 2.2-21 cm wide, the base generally cordate or truncate (rarely cuneate) ..... ***P. cordata*** *var.* ***cordata***
1 Floral tube persistently pubescent with short glandular hairs; leaves lanceolate, 0.4-8.3 cm wide, the base generally cuneate to truncate..... ..... ***P. cordata*** *var.* ***lancifolia***

Pontederia cordata Linnaeus *var.* ***cordata***, Heartleaf Pickerelweed. Marshes, pond-shores, lake-shores. May-October. NS west to MN, south to FL and TX; Belize; s. Brazil, Argentina, Paraguay, and Uruguay. The recognition of infraspecific taxa in *Pontederia cordata* is controversial and requires additional study. *P. cordata* exhibits tristyly, an interesting breeding system. Each plant has one of 3 types of flowers: (a) a short style, 3 medium and 3 long stamens, (b) a medium style, 3 short and 3 long

stamens, or (c) a long style, 3 short and 3 medium stamens. [= GW, Z; < *P. cordata* – RAB, C, FNA, K, Pa, W; = *P. cordata* – F, G, S, WV]

Pontederia cordata Linnaeus *var.* ***lancifolia*** (Muhlenberg ex Elliott) Torrey, Lanceleaf Pickerelweed. Marshes, pond-shores, lake-shores. May-October. S. MA (alleged to occur as far north as ME, but these reports may be entirely based on misidentifications of var. *cordata*) to s. FL, west to e. TX, mostly on the Coastal Plain, with a few records around the Great Lakes; Cuba; s. Brazil, Argentina, Paraguay, and Uruguay. A third variety of *P. cordata*, var. *ovalis* (Martens in Roemer & Schultes) Solms in A.P. de Candolle, is restricted to South America. [= GW, Z; < *P. cordata* – RAB, C, FNA, K, Pa, W; = *P. lanceolata* Nuttall – F, G, S]



81. HAEMODORACEAE R. Brown 1810 (Bloodwort Family) [in COMMELINALES]

A family of about 14 genera and 100 species, herbs, of semicosmopolitan distribution, but centered in Australia. The Haemodoraceae is primarily a family of the Southern Hemisphere; *Lachnanthes* is the only member native to e. North America. *Lophiola* has often been treated in the Haemodoraceae; recent evidence, however, indicate that it is better placed in the Nartheciaceae (or Liliaceae *sensu lato*); see *Lophiola* (Nartheciaceae) for additional details. References: Robertson (1976)=Z; Simpson in Kubitzki (1998b); Robertson in FNA (2002a). [also see *MELANTHIACEAE*]

Lachnanthes Elliott 1816 (Redroot)

A monotypic genus, an herb, of se. North America and the West Indies. References: Simpson in Kubitzki (1998b); Robertson in FNA (2002a); Gandhi (1999)=Y; Robertson (1976)=Z.

Identification notes: A very distinctive plant when in flower, with its densely woolly inflorescence and flowers. When not in flower, recognizable by its equitant (iris-like) base and bright red roots.

Lachnanthes caroliniana (Lamarck) Dandy, Redroot. Wet savannas, pocosin edges, shores of Coastal Plain depression ponds (and similar ponds in the mountains of Virginia), ditches, wet disturbed ground. June-early September; September-November. The range is almost strictly on the Coastal Plain, and rather disjunct: s. NS, from MA to DE, from se. VA south to s. FL and west to e. LA (the Florida parishes), with inland disjunctions in w. VA and sc. TN (Coffee County); Cuba. The correct spelling of the specific epithet has been disputed; the original spelling was "*caroliana*," but Gandhi (1999) argues convincingly that this is a correctable typographic error. [= RAB, C, FNA, GW, W, Y; = *Lachnanthes caroliana* – K, WH, Z, orthographic variant (correctable typographic error); = *L. tinctoria* (J.F. Gmelin) Elliott – F, G; = *Gyrotheca tinctoria* (J.F. Gmelin) Salisbury – S]

86. CANNACEAE A.L. de Jussieu 1789 (Canna Family) [in ZINGIBERALES]

A family of a single genus, herbs, of tropical and warm temperate America. References: Kress & Prince in FNA (2000); Kubitzki in Kubitzki (1998b).

Canna Linnaeus 1753 (Canna)

A genus of about 10-25 species, of tropical and warm temperate America. References: Kress & Prince in FNA (2000); Kubitzki in Kubitzki (1998b).

Identification notes: The petals are generally sepaloid (sometimes brightly colored); the showy, colored portions of the flower are the staminodes.

1 Flowers not tubular at the base (or with a short tube to 2 cm long); petals erect; [alien, cultivated and persistent] .....***C. ×generalis***
1 Flowers tubular at the base; petals reflexed; [native or cultivated].
  2 Flowers yellow; capsule 5-6 cm long, ellipsoid (longer than broad); leaves glaucous; [native] .....***C. flaccida***
  2 Flowers red, orange, or mixed red-and-yellow; capsule 1.5-3 cm long, globose or subglobose (about as long as broad); leaves green; [alien, cultivated and persistent].....***C. indica***

Canna flaccida Salisbury, Golden Canna, Yellow Canna. Wet pine savannas, marshes, ditches. May-early July; July-August. E. SC south to FL, west to TX, and south into Central America. [= RAB, FNA, K, S, WH3]

* ***Canna ×generalis*** L.H. Bailey (pro sp.) [= *C. glauca* × *indica*], Common Garden Canna. Cultivated and persisting; native of tropical America. June-September; August-October. [= RAB, FNA, K, WH3]

* ***Canna indica*** Linnaeus, Indian-shot, Platanillo. Cultivated and persisting; native of tropical America. June-September; August-October. [= FNA, GW, K, S, WH3]

87. MARANTACEAE Petersen in Engler & Prantl 1888 (Arrowroot Family) [in ZINGIBERALES]

A family of about 31 genera and 550 species, herbs and vines, nearly pantropical (absent from Australia), and rarely extending ino subtropical and warm temperate regions. References: Kennedy in FNA (2000); Andersson in Kubitzki (1998b).

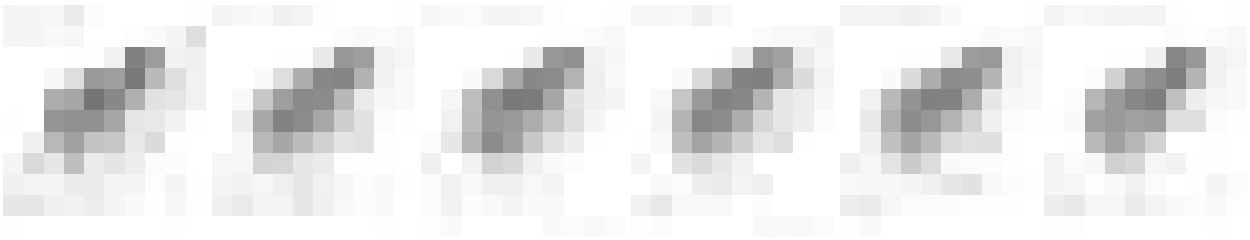
Thalia Linnaeus 1753 (Thalia)

A genus of 6-7 species, in subtropical and tropical America. References: Kennedy in FNA (2000); Andersson in Kubitzki (1998b).

1 Flowers crowded on the rachis, the zigzag internodes 2-3 mm long; leaves pilose at the base on the upper surface; bracts of the inflorecence white-pruinose ..... ***T. dealbata***
1 Flowers separated on the rachis, the zigzag internodes 5-10 mm long; leaves glabrous at the base on the upper surface; bracts of the inflorescence green or purple, not pruinose ..... ***T. geniculata***

Thalia dealbata Fraser ex Roscoe, Powdery Thalia, Powdery Alligator-flag. Swamp forests, wet ditches, brackish marshes. May-September; June-October. Ne. SC south to GA, west to TX and OK, north in the Mississippi Embayment to w. KY, s. IL, and se. MO. [= RAB, FNA, GW, K, S]

Thalia geniculata Linnaeus, Lilies, Bent Thalia, Bent Alligator-flag. Ponds, sloughs, marshes. AL, FL, LA, south through Central and South America; West Indies; w. Africa. [= FNA, GW, K, S, WH]



89. ZINGIBERACEAE Martynov 1820 (Ginger Family) [in ZINGIBERALES]

A family of about 50 genera and 1200 species, herbs, of tropical and subtropical areas, especially se. Asia.

1 Inflorescence terminal on short stems with scale leaves, distinct from the main leafy stems ..... ***Curcuma***
1 Inflorescence terminal on long stems with normal, well-developed leaves ..... ***Hedychium***

Curcuma Linnaeus 1753 (Hidden Lily)

A genus of about 80 species, rhizomatous herbs, native of the Old World tropics.

* ***Curcuma zedoaria*** (Bergius) Roscoe, Zedoary, White Turmeric. Disturbed areas; native of se. Asia. [= K, WH]

Hedychium J. König 1783 (Ginger-lily)

A genus of about 40 species, rhizomatous herbs, native of the Old World tropics.

Hedychium coronarium J. König, White Ginger-lily. Disturbed areas, commonly cultivated, rarely persisting and spreading; native of India. [= K, WH]

91. TYPHACEAE A.L. de Jussieu 1789 (Cattail Family) [in POALES]

A family of 2 genera with 16-30 species, wetland herbs, cosmopolitan. References: Kaul in FNA (2000); Smith in FNA (2000); Thieret & Luken (1996); Kubitzki in Kubitzki (1998b). [including *SPARGANIACEAE*]

1 Inflorescences headlike, globular ..... ***Sparganium***
1 Inflorescences spikelike, cylindrical ..... ***Typha***

Sparganium Linnaeus 1753 (Bur-reed)

A genus of about 14 species, wetland and aquatic herbs, primarily circumboreal in arctic and temperate regions, but also in the tropics of Asia, and temperate Australia. References: Kaul in FNA (2000); Thieret (1982)=Z; Beal (1960)=Y; Crow & Hellquist (2000b)=X; Kubitzki in Kubitzki (1998b).

1 Stigmas 2; fruits truncate at apex, obpyramidal, very abruptly beaked, 4-8 mm broad ..... ***S. eurycarpum***
1 Stigmas 1; fruits rounded or acuminate to a beak at the apex, elliptic, fusiform, or obovate, 1-3 (-4) mm broad.
  2 Pistillate heads (primarily those upward) supra-axillary (borne distinctly above the axils of the subtending leaf-like bracts); tepals lacking subapical dark spot ..... ***S. emersum***
  2 Pistillate heads (all) axillary (borne in the axils of the subtending leaf-like bracts) or several on axillary branches which lack leaf-like bracts; tepals with prominent subapical dark spot.
    3 Mature fruits dull, finely pitted, the body 3-5 mm long; fruiting heads 1.5-2.5 cm in diameter; branches of the inflorescence with (0-) 1-3 pistillate heads (in addition to staminate heads); stigma 0.8-1.9 (-2.8 in the Coastal Plain) mm long ..... ***S. americanum***
    3 Mature fruits shiny, smooth, the body 5.5-7 mm long; fruiting heads 2.5-3.5 cm in diameter; branches of the inflorescence with 0 (-1) pistillate heads (in addition to staminate heads); stigma 1.5-3 mm long ..... ***S. androcladum***

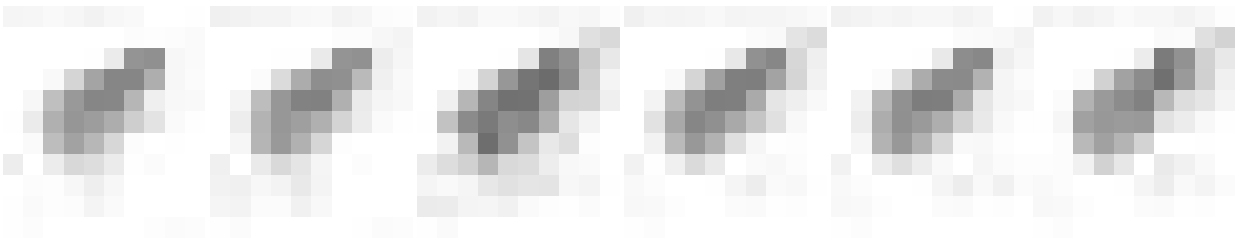
Sparganium americanum Nuttall, American Bur-reed. Streams, marshes, ponds, pools, often submerged. May-September. NL (Newfoundland) west to MN, south to c. peninsular FL and c. TX. Beal (1960) discusses the interesting variation in *S. americanum*, perhaps worthy of taxonomic recognition. The "Appalachian Race" has stigmas 0.6-0.9 mm long, inflorescence branches 0-3, and relatively narrow leaves; in our area it is montane in distribution, and in general is Appalachian, Ozarkian, and northern. The "Coastal Race" has stigmas 1.5-2.8 mm long, 2-5 inflorescence branches, and relatively wide leaves; in our area it is primarily of the Coastal Plain, disjunct to the mountains of NC and SC south of the Asheville Basin (like many Coastal Plain taxa), and in general is nearly limited to the Coastal Plain, ranging from MA south to FL, west to e. TX, and north in the interior to sc. TN, s. IN, and s. MO. The "Ubiquitous Race" is intermediate, with stigmas 1.0-1.4 m long; it occurs throughout the range of the species. The pattern is suggestive of imperfect evolutionary separation of two taxa. [= C, F, FNA, G, GW, K, Pa, RAB, S, W, WH, WV, X, Y, Z]

Sparganium androcladum (Engelmann) Morong. Marshes, shores. May-September. ME and QC west to MN, south to se. VA, s. WV, e. TN, s. MO, and ne. OK. [= C, F, FNA, G, K, Pa, W, WV, X, Y, Z]

Sparganium angustifolium Michaux, Narrow-leaved Bur-reed. South to n. NJ and n. PA; attributed to VA and WV by Kartesz (1999), apparently erroneously. [= C, FNA, K, Pa, X] {rejected; not keyed; synonymy incomplete}

Sparganium emersum Rehmann, Greenfruit Bur-reed. Bogs, stream margins. May-September. NL (Newfoundland) and c. QC west to s. AB and WA, south to w. NC, IN, IA, CO, and CA; Eurasia. [= FNA, Pa, X; > *S. chlorocarpum* Rydberg – RAB, C, F, G, W, WV, Y, Z; > *S. chlorocarpum* var. *acaule* (Beeby) Fernald – F; *? S. angustifolium* Michaux – K, misapplied; > *S. acaule* (Beeby) Rydberg; > *S. emersum* var. *acaule* (Beeby) A. Haines]

Sparganium eurycarpum Engelmann ex A. Gray, Giant Bur-reed. Marshes, shores. NS west to BC, south to w. VA, n. WV, IN, OK, CA and Baja California; e. Asia. Its attribution to more southern localities in some older sources (such as FL according to Small) is believed to be in error. [= C, F, FNA, G, K, Pa, S, W, WV, X; = *S. erectum* Linnaeus ssp. *stoloniferum* (Graebner) C.D.K. Cook & M.S. Nicholls]



Typha Linnaeus 1753 (Cattail)

A genus of 8-13 species, wetland herbs, cosmopolitan. References: Ward (2007a)=Z; Smith in FNA (2000); Kubitzki in Kubitzki (1998b). Key adapted from FNA.

1 Pistillate bracteoles absent, or if present then narrower than stigmas and generally not evident at spike surface; stigmas ovate to lanceolate, persistent on mature spikes; pistillate spikes green in flower when fresh, in fruit mostly 19-36 mm thick; carpodia concealed among pistil hairs; compound pedicels on denuded axis 0.6-3.5 mm; staminate scales colorless to brown.
  2 Pistillate bracteoles absent; stigmas ovate to ovate-lanceolate, often blackish when dry; {add} ..... ***T. latifolia***
  2 Pistillate bracteoles present (but generally evident only at 20-30× after removal from spike, resembling perigonial hairs, with brown, enlarged tips narrower than stigmas); stigmas lanceolate, brown when dry; pistillate spikes usually separated from staminate spikes by gap, in fruit mostly 19-25 mm thick; compound pedicels on denuded axis 0.6-2 mm; seeds absent or few; staminate scales brownish; pollen a mixture of tetrads, triads, dyads, and single grains, sometimes mostly single grains.
    3 Mucilage glands absent from blade; pistillate spikes after flowering medium to dark brown, rarely bright orange-brown ..... ***T ×glauca [T. angustifolia × latifolia]***
    3 Mucilage glands usually present on adaxial surface of blade near sheath summit; pistillate spikes after flowering bright orange-brown ..... ***T. domingensis × latifolia***
1 Pistillate bracteoles present, many as wide as or wider than stigmas, evident at spike surface; stigmas linear (to narrowly lanceolate), sometimes deciduous and thus absent from mature spikes; pistillate spikes brown at all stages (or whitish when flowering and fresh) (*T. angustifolia* sometimes greenish in fruit when fresh), in fruit mostly 13-25 mm thick; carpodia often evident at spike surface among pistil-hair tips; compound pedicels on denuded axis 0.5-0.9 mm; staminate scales brown or straw-colored.
  4 Mucilage glands absent from adaxial surface of blade and generally from central part of sheath near sheath summit; pistillate bracteole tips darker than (or as dark as) stigmas, very dark to medium brown, rounded (to acute), in mature spikes about equaling pistil hairs; pistil-hair

tips medium brown, distinctly enlarged at 10-20× magnification; pistillate spikes medium to dark brown; leaf sheath summits with membranous auricles (often disintegrating late in season) ..... ***T. angustifolia***

4 Mucilage glands present on adaxial surface of all of sheath and usually about 1-10 cm of adjacent blade; pistillate bracteole tips much paler than to about same color as stigmas, straw-colored to light brown, mostly acute to acuminate, in mature spikes exceeding pistil hairs; pistil-hair tips colorless to usually orangish (or slightly brownish in hybrids), not evidently enlarged, or often with 1 subapical, orange, swollen cell evident at 20-30×; pistillate spikes bright cinnamon- to orange- or medium brown; leaf sheath summits tapered to blade or sometimes with membranous auricles.

5 Pistillate bracteole blades much paler than to nearly same color as stigmas, straw-colored to mostly bright orange-brown, usually many acuminate; pistillate spikes usually bright cinnamon- to orange-brown; mucilage glands numerous on proximal 1-10 cm of leaf blade .... ***T. domingensis***

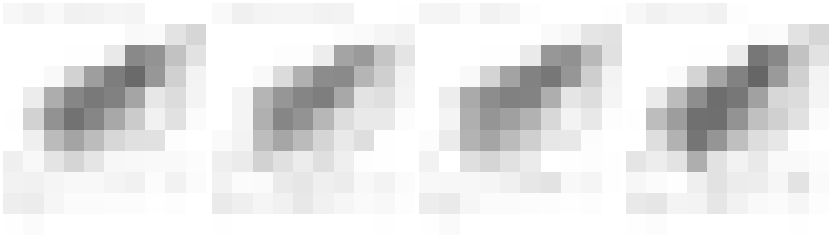
5 Pistillate bracteole blades usually about same color as stigmas, light- to medium brown, usually acute; pistillate spikes usually medium brown; mucilage glands often few or absent from leaf blade ..... ***T. angustifolia* × *domingensis***

Typha angustifolia Linnaeus, Narrowleaf Cattail. Brackish to fresh waters of marshes and swamps, usually tidal, and also inland in non-tidal wetlands (where probably only introduced). May-July; June-November. NS west to ND, south to SC, FL (?), LA, and TX (?); Eurasia. Stuckey & Salamon (1987) consider *T. angustifolia* an invasive alien in North America, but later studies suggest that it was native at least in coastal areas of ne. and Mid-Atlantic North America, and has expanded its range westward in recent decades (Shih & Finkelstein 2008). [= C, F, FNA, G, GW, K, Pa, RAB, W, WH, WV, Z; < *T. angustifolia* – S (also see *T. domingensis*)]

Typha domingensis Persoon, Southern Cattail. Brackish to nearly fresh waters of marshes and swamps, usually tidal. June-July; July-November. DE south to s. FL, west to TX; north inland to NE and UT; and south into tropical America; Eurasia; Africa; Oceania. [= C, F, FNA, G, GW, K, RAB, Z; < *T. angustifolia* – S]

Typha* ×*glauca Godron (pro sp.) [*angustifolia* × *latifolia*], Hybrid Cattail. Fresh to brackish waters of lakes, ponds, and rivers. May-July; June-November. Both C and K apply this name to two different hybrids: *T. angustifolia* × *latifolia* and *T. domingensis* × *latifolia*. The name properly applies to *T. angustifolia* × *latifolia* (Smith in FNA 2000). [= GW, Pa, Z; = *T. glauca* Godron – RAB, F; < *T.* ×*glauca* – C, K]

Typha latifolia Linnaeus, Common Cattail. Fresh waters of ponds, lakes, ditches, marshes, including in tidal freshwater marshes. May-July; June-November. NL (Newfoundland) west to AK, south to FL, TX, CA, and Mexico; Central America; South America; Eurasia. [= C, F, FNA, G, GW, K, Pa, RAB, S, W, WH, WV, Z]



92. BROMELIACEAE A.L. de Jussieu 1789 (Bromeliad or Pineapple Family) [in POALES]

A family of about 56 genera and 2600 species, herbs, shrubs, and trees, of the New World tropics and subtropics (very rarely warm temperate). References: Luther & Brown in FNA (2000); Smith & Till in Kubitzki (1998b).

Tillandsia Linnaeus 1753 (Spanish-moss)

A genus of about 540 species, herbs, of s. North America south to s. South America. References: Luther & Brown in FNA (2000); Smith & Till in Kubitzki (1998b). Key based in part on FNA.

1 Leaves distichous; inflorescence 1-2 (-3) flowered.

2 Plants in dense, more or less spherical clusters; inflorescence scapose, exserted from the cluster; corolla violet..... ***T. recurvata***

2 Plants in elongate, pendulous festoons; inflorescence sessile; corolla yellowish green ..... ***T. usneoides***

1 Leaves spiral in a rosette; inflorescence > 3-flowered.

3 Leaves narrowly linear, 1-5 mm wide.

4 Leaves densely and coarsely lepidote, appearing gray; floral bracts rose; corolla violet..... ***T. bartramii***

4 Leaves finely lepidote, appearing green or reddish; floral bracts green or reddish; corolla lavender ..... ***T. setacea***

3 Leaves broader, 10-35 mm wide.

5 Scape 10-35 cm long; floral bracts imbricate, covering all of the rachis, or nearly all ..... ***T. fasciculata*** *var.* ***densispica***

5 Scape 20-50 cm long; floral bracts widely spaced, leaving much of the rachis exposed at anthesis..... ***T. utriculata***

Tillandsia bartramii Elliott, Bartram's Air-plant. On tree branches in bayswamps, tidal swamp forests, and mesic hardwood bluffs. E. GA south through FL; disjunct in Tamaulipas. In five counties in e. GA, as far north as Liberty County (Jones & Coile 1988), and reported for SC as extirpated (Kartesz 1999). [= FNA, K, WH3; ? *T. myriophylla* Small – S]

Tillandsia fasciculata Swartz *var*. ***densispica*** Mez, Quill-leaf Airplant. Branches of trees, especially evergreen oaks. Se. GA south through FL, and in the West Indies, Mexico, and Central America. [= FNA, K; < *T. fasciculata* – S, WH3]

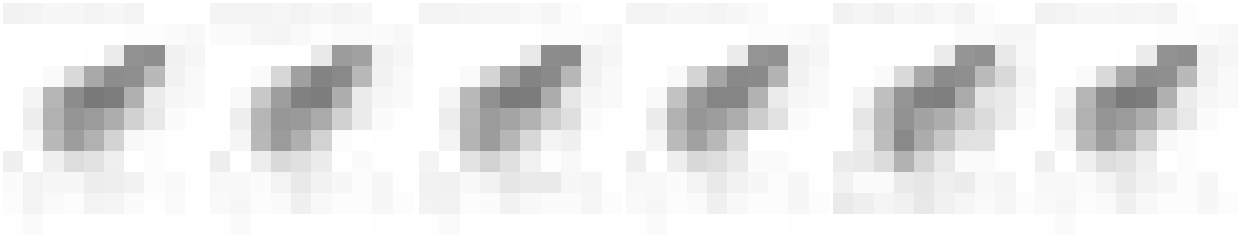
Tillandsia recurvata (Linnaeus) Linnaeus, Ball-moss, Bunch-moss. On tree branches in maritime forests. Se. GA (Duncan 1985) south to s. FL; LA to AZ and south through Mexico, Central America , and South America; West Indies. Introduced in e. SC (Beaufort, Jasper, Charleston, Georgetown counties) via landscaping plants (Gramling 2010; P. McMillan, pers. comm.

2005). Outside of our area, this species also occurs on rock cliffs and is frequent on powerlines. [= FNA, K, WH3; = *Diaphoranthema recurvata* (Linnaeus) Beer – S]

Tillandsia setacea Swartz, Wild-pine, Pine-needle Airplant. In tree branches, especially on hardwoods, in mesic bluff forests. Se. GA south to s. FL; West Indies; Mexico and Central America. [= FNA, K, WH3; = *T. tenuifolia* Linnaeus – S, misapplied]

Tillandsia usneoides (Linnaeus) Linnaeus, Spanish-moss. Branches of trees, especially in swamps, but elsewhere where air humidity is high enough, often even in dry forests (near Wilmington, NC *Tillandsia* is abundant on *Quercus laevis* in an extensive dry sandhill area which receives frequent fog from the Cape Fear, Brunswick, and Northeast Cape Fear rivers). April-June. S. MD (historically), se. VA south to s. FL, west to TX and Mexico; Central and South America, West Indies. *T. usneoides* is the only member of a very large genus to occur north of s. GA. The epithet *'usneoides'* refers to its resemblance to the common lichen *Usnea*. [= RAB, C, F, FNA, G, K, WH3; = *Dendropogon usneoides* (Linnaeus) Rafinesque – S]

Tillandsia utriculata Linnaeus, Giant Wild-pine. On tree branches in hammocks qnd cypress swamps. FL (and GA?); West Indies, Mexico, Central America, South America. Reported for GA by Kartesz (1999), but not by Luther & Brown in FNA (2000). [= FNA, K, S, WH3]



94. XYRIDACEAE C. Agardh 1823 (Yellow-eyed Grass Family) [in POALES]

A family of 5 genera and about 325-350 species, nearly cosmopolitan (most diverse in tropical and subtropical regions, and especially South America). References: Kral in FNA (2000); Kral in Kubitzki (1998b).

Xyris Linnaeus 1753 (Yellow-eyed Grass)

A genus of about 300 species, nearly cosmopolitan (most diverse in tropical and subtropical regions, and especially South America). This "technical" genus is known well by only a few botanists, and additional undescribed taxa are possible. References: Kral in FNA (2000); Ward (2007b)=V; Bridges & Orzell (2003)=X; Kral (1966a)=Z; Kral (1983b, 1999); Kral in Kubitzki (1998b). Key adapted from X, GW, and Z.

Identification notes: In vegetative condition, *Xyris* is often confused with other monocots with equitant leaves, such as *Iris* spp. (Iridaceae), *Lachnanthes caroliniana* (Haemodoraceae), and *Tofieldia* spp. (Tofieldiaceae).

1 Keel of the lateral sepals shortly ciliate-scabrid (or sometimes entire in *X. brevifolia*, and then the bract tips purplish-tinged).
- 2 Plants small, usually < 30 cm tall; principal leaves usually < 10 cm long; mature spikes < 1 cm long when mature.
  - 3 Leaves filiform, with expanded brownish lustrous bases, usually exceeding the sheath of the scape; [plants of s. AL and the FL Panhandle] ..... ***X. isoetifolia***
  - 3 Leaves linear, the bases not expanded, shorter than, equaling, or slightly exceeding the sheath of the scape; [plants collectively more widespread].
    - 4 Keel of the lateral sepals straight to slightly curved, remotely ciliate or entire; spikes broadly ovoid to subglobose, the bracts loose, bicolored, the distal portions maroon or purplish and often with erose margins ..... ***X. brevifolia***
    - 4 Keel of the lateral sepals strongly curved, densely ciliate; spikes lance-ovoid to ovoid, the bracts entire, not purple-tinged, and lacking erose borders.
      - 5 Plants perennial; leaves ascending, green with a distinct brown patch at the base; fruiting spikes ovoid, blunt, somewhat 2-edged from the strongly keeled outer bracts ..... ***X. drummondii***
      - 5 Plants annual; leaves flabellate arranged, spreading to recurved against the substrate, usually maroon; fruiting spikes often elongated and acute, not 2-edged ..... ***X. flabelliformis***
- 2 Plants large, usually > 30 cm tall; principal leaves > 10 cm long; mature spikes > 1 cm long when mature.
  - 6 Leaves ascending, twisted, strongly grooved; spikes ovoid, the bracts and lateral sepals with a small tuft of short, reddish-brown hairs; bases of leaves abruptly expanded, pinkish or purplish (dark brown in age), the outermost leaves often scale-like, the plant base therefore appearing bulbous; [of the Mountains, Piedmont, and Coastal Plain] ..... ***X. torta***
  - 6 Leaves spreading, not twisted or only slightly so; spikes narrowly ovoid, ellipsoidal, or oblong; bracts and sepals without a small apical tuft of hairs; bases of leaves whitish, tan, pink, purplish, maroon, or dark brown, the outermost leaves not scale-like, the plant base not appearing bulbous; [typically of the Coastal Plain, rarely disjunct inland].
    - 7 Seeds lustrous, translucent, broadly ovoid; spike pale brown or tan, the scales loosely imbricate; plant bases pinkish, purplish, or tan, with dark longitudinal striations on the inner leaf bases; leaves 3-20 mm wide; petal blades obovate, 6-7 mm long, opening in early morning, usually closing by mid-day ..... ***X. ambigua***
    - 7 Seeds farinose, dark brown (*X. stricta*) or pale (*X. louisianica*) at maturity, narrowly ellipsoid to ovoid; spike dark brown, the scales tightly imbricate; plant bases maroon, purplish, dark-brown, or reddish-brown; leaves 2-5 mm wide; petal blades triangular-cuneate, 3-5 mm long, opening at mid-day.
      - 8 Seeds pale when mature; plant bases maroon to maroon-brown, solitary or in small clumps; upper end of scape somewhat flattened, but not nearly as broad as the spike; spike narrowly ovoid to ellipsoid, slightly pointed ..... ***X. louisianica***
      - 8 Seeds dark brown when mature; plant bases dark maroon to dark brown, desnely cespitose; upper end of the scape conspicuously flattened, almost as broad as the spike; spike oblong-cylindrical, obtuse ..... ***X. stricta***

1 Keel of the lateral sepals irregularly lacerate or fimbriate, or if entire then the bract tips not purplish.
9 Leaves narrowly linear to filiform, 0.5-2.0 (-2.5) mm wide, not twisted (or scarcely so); leaf bases expanded, lustrous, hard, tan to brown, neither bulbous nor deeply set in the substrate; spikes ovoid or ellipsoid, 4-15 mm long.
10 Leaves filiform, terete or elliptic in cross-section, 0.5-1.0 mm wide, without a paler, hardened margin; scape as broad as or broader than the leaf blades; scales smooth-edged to denticulate, not curled away from the head, the head thus appearing smooth; staminodia beardless ..... ***X. baldwiniana***
10 Leaves linear, flattened in cross-section, 1-2 (-2.5) mm wide, with a pale, hardened margin; scape usually narrower than the leaf blades; scales ragged-lacerate, the tips curling away from the head, giving it a ragged appearance; staminodia bearded..... ***X. elliottii***
9 Leaves broader, (1.5-) 2.0-25 mm wide, strongly twisted to straight, the leaf bases either not expanded, lustrous, hard, and tan to brown, or, if so, then the base also either bulbous and/or deeply seated in the substrate; spikes narrowly lanceolate, ellipsoid, to broadly ovoid, 4-40 mm long.
11 Keel of the lateral sepals long-fimbriate toward its apex, the fimbriate tip conspicuously exserted from the subtending bract (sometimes eroded and less conspicuous on older spikes).
12 Leaves strongly twisted, 2-5 mm wide; leaf bases hardened, swollen, bulbous, dark lustrous brown; scape ridges smooth; petal blades white or yellow; [of moist to dry pinelands]..... ***X. caroliniana***
12 Leaves not twisted or slightly twisted, 3-25 mm wide; leaf bases **either** soft, not swollen, not bulbous, and pale green (*X. fimbriata*) **or** somewhat hardened and bulbous, deep red (*X. panacea*); scape ridges strongly scabrous or smooth; petal blades yellow; [of aquatic to very wet peaty, mucky, or sandy ponds, marshes, or other wetlands].
13 Leaves 5-25 mm wide; scape ridges well-developed, strongly scabrous; flowers open 1:00-3:00 p.m. EDT; [widespread] .... ***X. fimbriata***
13 Leaves 3-5 (-8) mm wide; scape ridges poorly-developed, smooth; flowers open 11:30-4:00 p.m. EDT; [endemic to Wakulla County, FL]..... ***X. panacea***
11 Keel of the lateral sepals lacerate, or if very shortly fimbriate, then not conspicuously exserted from the subtending bract.
14 Lateral sepals longer than and exserted from the subtending bracts; scapes 5-15 dm tall.
15 Leaf blades 1-2 (-3) mm wide, 6-30 cm long; spikes 10-16 mm long; seeds 0.4-0.6 mm long; [endemic to Panhandle FL and s. AL] ..... ***X. longisepala***
15 Leaf blades 5-15 mm wide; (20-) 30-50 (-60) cm long; spikes 10-20 (-25) mm long; seeds (0.6-) 0.7 (-0.8) mm long; [more widespread in our area]..... ***X. smalliana***
14 Lateral sepals shorter than the subtending bracts, and therefore hidden (except when the spikes open to shed seeds); scapes 1.5-12 dm tall.
16 Scapes flexuous, usually spirally twisted; upper portion of leaf blades conspicuously twisted; plant bases pinkish, purplish, or dark brown, bulbous or deeply set in the substrate.
17 Plant forming a rather dense tuft; scape usually < 50 cm long; spike diverging at a 10-20° angle; seed surface farinose; of ne. FL southward] ..... ***X. calcicola***
17 Plant solitary or in small tufts; scape usually > 50 cm long; spike vertical; seed surface not farinose; [collectively widespread].
18 Base of plant deeply set in the substrate, without distinct outer scale leaves; leaf bases not noticeably expanded, the plant base therefore not bulbous; leaves smooth, 2-4 mm wide; petal blades ca. 3 mm long ..... ***X. chapmanii***
18 Base of plant shallowly set on the substrate, often with short, black outer scale leaves; leaf bases noticeably expanded, the plant base therefore appearing bulbous; leaves either smooth and 5-10 mm wide, or scabrous and 2-10 mm wide; petal blades ca. 5 mm long.
19 Leaf and scape surfaces prominently papillose or tuberculate-scabrid; petal blades suborbicular, yellow; seeds narrowly ovoid or narrowly ellipsoidal, ca. 1.0 mm long..... ***X. scabrifolia***
19 Leaf and scape surfaces smooth (or scabrous only along margins and ridges); petal blades obovate, white or yellow; seeds ovoid or ellipsoid, 0.5-0.6 mm long.
20 Seeds translucent; leaf margins smooth; [plants of acidic sites of the Coastal Plain] ..... ***X. platylepis***
20 Seeds opaque; leaf margins slightly scabrous; [plants of calcareous seeps and fens of the Ridge and Valley]..... ..... ***X. tennesseensis***
16 Scapes usually not flexuous, usually not spirally twisted; upper portion of leaf blades not conspicuously twisted; plant bases variously colored, flabellate or equitant and set at ground level.
21 Summit of the scape distinctly flattened and broad relative to the spike; scape ridges 2-3, the 2 most prominent comprising the flattened edge of the scape.
22 The 2 principal scape ridges noticeably and abruptly flattened and winglike below the spike, their combined width (on fresh material) broader than the scape proper; fruiting spikes mostly 8-15 mm long; seeds 0.4-0.6 mm long, translucent, ovoid or ellipsoidal, about 1.5× as long as wide, with lines of very fine papillae, not farinose ..... ***X. difformis***
22 The 2 principal scape ridges not abruptly flattened and winglike below the spike, their combined width < the scape proper, which is itself flattened (narrowly elliptic in cross-section); fruiting spikes mostly (10-) 20-25 mm long; seeds 0.8-1.0 mm long, dark when ripe, fusiform to narrowly elliptic, 2-3× as long as wide, with lines of very fine papillae, these however obscured by a farinose covering..... ***X. iridifolia***
21 Summit of the scape nearly terete or somewhat flattened, much narrower than the spike; scape ridges several (usually > 3), at least on the mid to lower portion of the scape.
23 Seeds farinose, very dark; surfaces of leaves tuberculate-scabrid, the leaves strongly ascending, linear, generally > 10 cm long; leaves generally dull-colored.
24 Mature spikes ovoid, sharply acute; plants solitary or in small clumps; leaves 10-30 (-50) cm long, 1.5-6.0 mm wide, dark maroon or purplish at the base ..... ***X. floridana***
24 Mature spikes ovoid to ellipsoid, acute to obtuse; plants typically in large dense tufts; leaves 20-50 cm long, 3-12 mm wide, the older ones with dark-brown to gray bases, the younger with tan bases..... ***X. serotina***
23 Seeds translucent, not farinose; surfaces of leaves smooth (or sparsely tuberculate-scabrid in *X. curtissii*, which also has leaves linear-curvate and generally < 10 cm long); leaves generally a bright yellowish-green above the base.
25 Leaves ascending to erect, 5-60 cm long, 2-5 (-15) mm wide; scapes (0.5-) 1.0-1.5 (-2.0) mm wide; mature spikes 7-15 (-25) mm long; fertile bracts 5-7 mm long; leaf bases tan to brown (very rarely pinkish); old flowers often persisting on spikes, drying blackish..... ***X. jupicai***
25 Leaves spreading-recurved to erect, 3-10 (-13) cm long, 1-4.5 mm wide; scapes 0.4-0.6 (-0.7) mm wide; mature spikes 3-7 (-12) mm long; fertile bracts 3-5 mm long; leaf bases various; old flowers fugacious, not persisting on spikes.

26 Leaves spreading-recurved to ascending, 2-4.5 mm wide; leaf bases pinkish or purplish; spikes 3-5 (-7) mm long, often abruptly acute; seeds 0.4-0.5 mm long, yellowish-amber.....***X. curtissii***
26 Leaves ascending to erect, 1-2 mm wide; leaf bases tan to brown; spikes 3-7 (-12) mm long, blunt; seeds 0.3-0.4 mm long, reddish-brown to brown .....***X. species 1***

Xyris ambigua Beyrich ex Kunth. Wet savannas and flatwoods, pinelands, edges of depression ponds. June-August. Se. VA south to s. FL, west to AL and ec. TX, primarily on the Coastal Plain; also West Indies (Cuba), and Mexico south into Central America. [= RAB, C, F, FNA, G, K, W, WH, X; < *X. ambigua* – GW, S, Z (also see *X. louisianica*)]

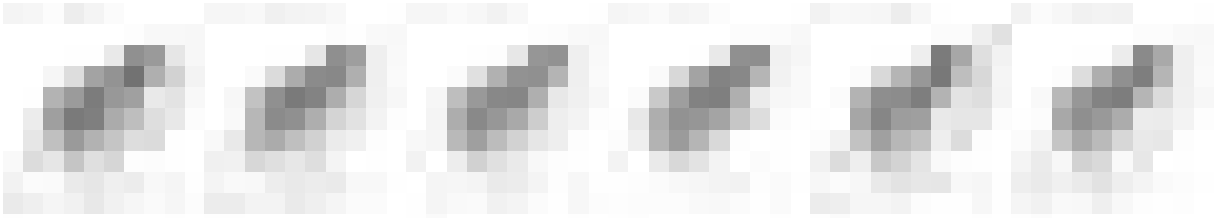
Xyris baldwiniana J.A. Schultes, Grassleaf Yellow-eyed Grass. Wet savannas, seepage bogs, sandhill seeps, wet savanna ecotones. June-July. Se. NC south to n. peninsular FL, west to s. AR and ec. TX, primarily on the Coastal Plain; also s. Mexico and Central America. [= RAB, FNA, GW, K, S, WH, X, Z]

Xyris brevifolia Michaux, Shortleaf Yellow-eyed Grass. Wet sands of pinelands, especially seasonally wet, open, white sands of spodosol longleaf pine flatwoods (Leon series soils), margins of Carolina bay sandrims. June-August. Se. NC south to s. FL, west to s. AL and w. FL; West Indies and South America. [= RAB, FNA, GW, K, S, WH, X, Z]

Xyris calcicola E.L. Bridges & Orzell, Limestone Yellow-eyed Grass. Wet calcareous savannas and flatwoods. August-November. C. and s. peninsular FL; disjunct in ne. FL (Baker County; Wunderlin & Hansen 2008). See Bridges & Orzell (2003) for detailed information. [= WH, X]

Xyris caroliniana Walter, Pineland Yellow-eyed Grass. Dry to moist pine flatwoods, moist savannas, scrub oak sandhills. June-July. Se. VA south to s. FL, west to se. TX, disjunct northward in s. NJ and in the West Indies (Cuba). White-petaled populations of *X. caroliniana* occurring in the East Gulf Coastal Plain need additional study. [= RAB, C, FNA, GW, K, WH, X, Z; > *X. flexuosa* Muhlenberg ex Elliott – F, G, S; > *X. pallescens* (C. Mohr) Small – S]

Xyris chapmanii E.L. Bridges & Orzell, Chapman's Yellow-eyed Grass. Sandhill seepage bogs in areas of copious lateral seepage in deep muck soils. Sc. NC south to Panhandle FL, west to e. TX. This taxon is abundantly distinct from *X. scabrifolia*. [= WH, X; < *X. scabrifolia* – FNA, K, Z]



Xyris curtissii Malme, Curtiss's Yellow-eyed Grass. Savannas. July-August. Se. VA south to ne. FL, FL Panhandle, and west to s. AR and ec. TX, primarily on the Coastal Plain; disjunct in s. NJ and Central America (Belize). [= RAB, G, WH; = *X. difformis* Chapman var. *curtissii* (Malme) Kral – C, FNA, GW, K, X, Z; > *X. bayardii* Fernald – F; > *X. curtissii* – F; = *X. neglecta* Small – S]

Xyris difformis Chapman. Savannas, roadside ditches, pond margins, other wet habitats. August-October. New England and s. Canada south to n. peninsular FL and ec. TX. [= X, WH; = *X. difformis* Chapman var. *difformis* – C, FNA, GW, K, Z; < *X. difformis* – RAB, F, G, Pa, S, W (also see *X. curtissii*)]

Xyris drummondii Malme, Drummond's Yellow-eyed Grass. Wet pine flatwoods, ditches. Se. GA south to ne. FL, west to Panhandle FL and s. MS. [= FNA, GW, K, WH, X, Z]

Xyris elliottii Chapman, Elliott's Yellow-eyed Grass. Margins of drawdown zones of clay-based Carolina bays, limesinks and flatwoods swales, wet savannas. May-June. E. SC south to s. FL, west to s. AL; West Indies; South America. [= RAB, FNA, GW, K, S, WH, X, Z; > *X. elliottii* var. *elliottii*; > *X. elliottii* var. *stenotera* Malme]

Xyris fimbriata Elliott, Giant Yellow-eyed Grass. In mucky or sandy soils of upland depression ponds, also along sandhill streams, impoundments and in deep muck of sandhills seepage slopes often just below the zone occupied by *Xyris chapmanii*. September-October. Se. VA south to c. peninsular FL, west (interruptedly) to se. TX; disjunct in s. NJ, DE, and c. TN. [= RAB, C, F, FNA, G, GW, K, S, WH, X, Z]

Xyris flabelliformis Chapman, Savanna Yellow-eyed Grass. Wet sands of pinelands, especially seasonally wet, open, white sands of spodosol longleaf pine flatwoods (Leon series soils), margins of Carolina bay sandrims. May-June. Se. NC south to s. FL, west to se. LA, on the Coastal Plain. [= RAB, FNA, GW, K, S, V, WH, X, Z]

Xyris floridana (Kral) E.L. Bridges & Orzell, Florida Yellow-eyed Grass. Savannas, wet pine flatwoods, ditches. August. Se. NC south to s. FL, west to se. LA; Central America. [= WH, X; = *Xyris difformis* Chapman var. *floridana* Kral – FNA, GW, K, Z]

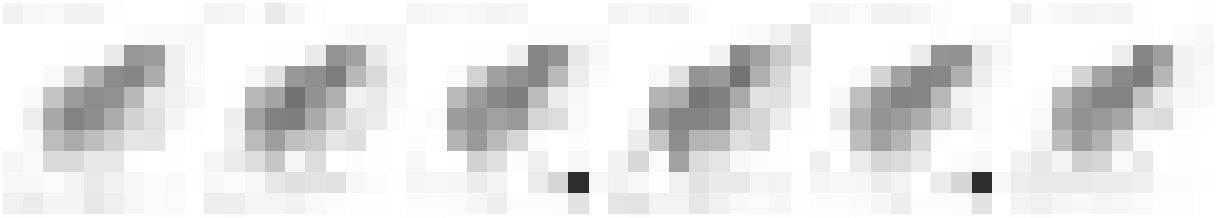
Xyris iridifolia Chapman, Irisleaf Yellow-eyed Grass. Marshes, upland pond margins, blackwater river channels, floodplain pools, other wet habitats. July-September. Se. VA south to ne. FL and FL Panhandle, west to e. TX; disjunct in c. TN and Mexico. [= RAB, C, GW, S, Z; = *X. laxifolia* Mart. var. *iridifolia* (Chapman) Kral – FNA, K, WH, X]

Xyris isoetifolia Kral. Bogs, savannas, and depression pond margins. Endemic to FL Panhandle and s. AL. [= FNA, GW, K, WH, X, Z]

Xyris jupicai L.C. Richard. Ditches, various wet habitats. July-September. NJ south to s. FL, west to TN, AR, se. OK (Singhurst, Bridges, & Holmes 2007), and TX; Mexico, Central America, South America, West Indies. Sometimes weedy and considered by some to be adventive from farther south. At least some populations in our area are native and may additionally be worthy of taxonomic recognition as distinct from "true" *X. jupicai* (P. McMillan, pers. comm., 2003). [= RAB, C, FNA, GW, K, W, WH, X, Z; = *X. caroliniana* – F, misapplied; > *X. elata* Chapman – G, S; > *X. communis* Kunth – S; > *X. caroliniana* – G, S, misapplied]

Xyris longisepala Kral. Depression pond margins. Endemic to FL Panhandle and s. AL. [= FNA, GW, K, WH, X, Z]

Xyris louisianica E.L. Bridges & Orzell. Pine savannas, bogs, ditches and disturbed areas. FL Panhandle and GA west to se. TX. [= K, WH, X; = *X. stricta* Chapman var. *obscura* Kral – FNA; < *X. ambigua* – GW, S, Z]



Xyris panacea L.C. Anderson & Kral, St. Marks Yellow-eyed Grass. Mucky depression ponds. Late June-early October. Endemic to FL Panhandle (Wakulla County). See Anderson & Kral (2008) for additional details.

Xyris platylepis Chapman. Sandhill seeps, savannas, ditches. July-September. Se. VA south to s. FL, west to se. LA; disjunct in sw. LA and se. TX. [= RAB, C, F, FNA, G, GW, K, S, WH, X, Z]

Xyris scabrifolia R.M. Harper, Roughleaf Yellow-eyed Grass. Sandhill seepage bogs and wet pine savannas. Sc. and se. NC south to Panhandle FL, west to s. AL and s. MS; disjunct in sw. LA-se. TX. *X. chapmanii* is a taxon distinct from *X. scabrifolia*. [= GW, S, WH, X; < *X. scabrifolia* – FNA, K, Z (also see *X. chapmanii*)]

Xyris serotina Chapman. Depression meadows, ultisol savannas (Lynchburg/Rains complex or Eulonia/Oketee), ditches. September. Se. NC south to c. peninsular FL, west to s. MS, in the Coastal Plain. [= RAB, FNA, GW, K, S, WH, X, Z]

Xyris smalliana Nash, Small's Yellow-eyed Grass. Pond margins, ditches. July-August. S. ME south to s. FL, west to s. MS; disjunct to se. TX; s. Mexico south into Central America; West Indies (Cuba). [= RAB, C, FNA, GW, K, S, W, WH, X, Z; > *X. congdonii* Small – F; > *X. smalliana* – F; > *X. smalliana* var. *smalliana* – G; > *X. smalliana* var. *olneyi* (Wood) Gleason – G]

Xyris spathifolia Kral & Moffett, Ketona Yellow-eyed Grass. Seeps over dolomite. See Kral & Moffett (2009) for additional information. {not yet keyed}

Xyris species 1. Wet savannas and pond margins. July-September. Currently known only from Sandhills Region and inner Coastal Plain of NC and SC, and outer Coastal Plain of NC.

Xyris stricta Chapman. Depression ponds, depression meadows, borrow pits, ultisol savannas and ditches. July-September. SC south to ne. FL and Panhandle FL, west to s. MS and se. LA. Reported for our area by Kral (1966b). P. McMillan (pers. comm.) reports this species from a number of locations in the outer Coastal Plain of NC and SC. [= GW, K, S, WH, X, Z; = *X. stricta* var. *stricta* – FNA]

Xyris tennesseensis Kral, Tennessee Yellow-eyed Grass. Seepy, fenlike areas over limestone. TN, AL, and nw. GA (Jones & Coile 1988). See Kral (1978b). [= FNA, K]

Xyris torta J.M. Smith, Mountain Yellow-eyed Grass. Mountain bogs, marshes, ditches. June-August. NH west to WI, south to e. VA, e. NC, w. SC, c. GA, LA, OK, and TX. This is our only species of *Xyris* not strongly associated with the Coastal Plain. [= RAB, C, FNA, GW, K, Pa, S, W, WV, Z; > *X. torta* var. *macropoda* Fernald – F, G; > *X. torta* var. *torta* – F, G]

95. ERIOCAULACEAE Palisot de Beauvois 1828 (Pipewort Family) [in POALES]

A family of about 10 genera and 1100 species, of tropical and warm temperate regions (few in cold temperate regions), especially America, and most diverse in n. South America. References: Kral in FNA (2000); Kral (1966c)=Z; Stützel in Kubitzki (1998b).

1 Scape glabrous, 10-110 cm tall at maturity; roots thickened, septate (not requiring magnification), unbranched; leaves with obvious air spaces; petals 2, fused below; stamens (3-) usually 4 (-6), the anthers black at maturity ..... ***Eriocaulon***
1 Scape pubescent (in our species, or very rarely nearly glabrous), 6-40 cm tall at maturity; leaves lacking obvious air spaces; roots fibrous or spongy, not septate; petals 3 or absent; stamens 2-3, the anthers yellow at maturity.
2 Scape pubescent with eglandular hairs; roots fibrous, branched, dark; heads white, gray, or brown; leaves bright green, tapering gradually through most of their lengths, herbaceous in texture ..... ***Lachnocaulon***
2 Scape pubescent with glandular hairs (or a mixture of glandular and eglandular hairs); roots spongy, unbranched, pale; heads yellowish-tan or gray; leaves bluish green, narrowly linear to the abruptly flared base, stiff in texture ..... ***Syngonanthus***

Eriocaulon Linnaeus 1753 (Pipewort)

A genus of about 400 species, of tropical and warm temperate regions (few in cold temperate areas). References: Kral in FNA (2000); Kral (1966c)=Z; Gomes de Andrade et al. (2010); Stützel in Kubitzki (1998b). Key based on Kral in FNA (2000).

1 Receptacle and/or base of flowers copiously hairy; some or most of perianth parts with chalk white hairs; heads overall appearing white, 5-20 mm in diameter when in full flower or fruit.
2 Heads hard (little compressed by a plant press and feeling hard and knotty when squeezed between finger and thumb); leaves dark green, the tip acute to obtuse; scape sheaths shorter than most leaves; involucral bracts straw-colored, the apex acute; receptacular bracteoles pale, the apex narrowly acuminate; pistillate flower petals adaxially glabrescent; terminal cells of club-shaped hairs of the perianth whitened, the basal cells often uncongested and transparent.
3 Leaves to 1 cm wide, with acute to rounded tip; heads 7-15 mm in diameter; [widespread in our area] ..... ***E. decangulare*** *var.* ***decangulare***
3 Leaves to 2 cm wide, with rounded tip; heads 13-20 mm in diameter; [of the East Gulf Coastal Plain, known from Panhandle FL and s. AL] ..... ***E. decangulare*** *var.* ***latifolium***
2 Heads soft (much flattened by a plant press, and easily compressed when fresh between finger and thumb); leaves pale green, the tip attenuate-subulate; scape sheaths longer than most leaves; involucral bracts gray or dark, the apex rounded or obtuse; receptacular bracteoles gray to dark gray, the apex acute; pistillate flower petals adaxially villous; all cells of club-shaped hairs on perianth white.
4 Mature heads 10-20 mm in diameter; leaves 5-30 cm long; petals of staminate flowers conspicuously unequal; [plants primarily of seasonally flooded ponds] ..... ***E. compressum***
4 Mature heads 5-10 mm in diameter; leaves (1-) 2-5 (-7) cm long; petals of staminate flower nearly equal ..... ***E. texense***
1 Receptacle and/or base of flowers glabrous or sparingly hairy; receptacular bracteoles and/or perianth parts glabrous or hairy, the hairs club-shaped, clear or white; heads dark gray or white, 3-4 mm (*E. koernickianum*, *E. parkeri*, and *E. ravenelii*), or 4-10 mm (*E. aquaticum* and *E. lineare*) in diameter when in full flower or fruit.
5 Stamens 6; pistil 3-carpellate ..... ***E. cinereum***
5 Stamens 4; pistil 2-carpellate.
6 Heads 4-10 mm in diameter when in full flower or fruit; outer involucral bracts usually reflexed, obscured by bracteoles and flowers.
7 Inner involucral bracts, receptacular bracts, and sepals darkened, usually gray to nearly black; young heads dark; seeds very faintly reticulate, not papillate; [of ne. North America] ..... ***E. aquaticum***
7 All bracts of staminate and pistillate flowers straw-colored or pale with grayish midzone, sepals of pistillate flowers basally pale, darkening toward the tip to grayish, gray-green, or gray-brown; heads (young and mature) pale; seeds faintly rectangular-reticulate, often papillate in lines; [of the se. Coastal Plain] ..... ***E. lineare***
6 Heads 3-4 mm in diameter when in full flower or fruit; outer involucral bracts neither reflexed nor obscured by bracteoles and flowers.
8 Bracts straw-colored, greenish, or light gray to gray, dull, the margins often erose or lacerate, the apex blunt to obtuse; [of tidal waters and large natural lakes of the outer Coastal Plain] ..... ***E. parkeri***
8 Bracts dark, gray to blackish, very shiny, the margins all nearly entire, the apex acute; [of moist acidic sites].
9 Bracts orbicular or broadly oblong, the apex rounded or apiculate; bract margins and apex hairy; perianth hairy; seed not pale-reticulate ..... ***E. koernickianum***
9 Bracts narrowly ovate to oblong or spatulate, the apex acute; bracts and perianth parts (except sometimes the petals) glabrous; seed conspicuously pale-reticulate ..... ***E. ravenelii***

Eriocaulon aquaticum (Hill) Druce, Seven-angled Pipewort. Ponds, lakes. July-October. NB and NL (Newfoundland) west to ON and MN, south to e. NC, VA, AL, and IN; also Great Britain and Ireland. The name *E. septangulare* is invalid. *E. aquaticum* is the correct name if the species is interpreted to include both northern European and northeastern North American plants. If North American plants are distinct from European, the correct name is *E. pellucidum*. [= C, FNA, K, Pa; > *E. pellucidum* Michaux – RAB; = *E. septangulare* Withering – F, G, GW, W, Z, invalid name]

* ***Eriocaulon cinereum*** R. Brown, Ashy Pipewort. Drawdown shore of manmade lake; native of Australasia. See Kilpatrick & McMillan (2003). [= FNA, GW, K, Z]

Eriocaulon compressum Lamarck. Ponds, lakes, other depressions, wetter places in pine flatwoods and pine savannas. April-October. NJ south to s. FL, west to e. TX. [= C, F, FNA, G, GW, K, RAB, S, W, WH, Z]

Eriocaulon decangulare Linnaeus *var.* ***decangulare***, Common Ten-angled Pipewort. Wet savannas and pine flatwoods, bogs, seasonally flooded ponds. June-October. NJ south to s. FL, west to sw. AR and e. TX; Mexico, Central America. [= FNA, K; < *E. decangulare* – C, F, G, GW, Pa, RAB, S, W, WH, Z]

Eriocaulon decangulare Linnaeus *var.* ***latifolium*** Chapman ex Moldenke, Panhandle Pipewort. Seepage bogs. Restricted to Panhandle FL, s. AL, and s. MS. It appears to warrant taxonomic status, but needs additional study. [= FNA, K; < *E. decangulare* – GW, S, WH, Z]

Eriocaulon koernickianum van Heurck & Müller of Aargau, Dwarf Pipewort. Seepage areas on granite flatrocks. W. AR and e. OK south to e. TX; disjunct in c. GA. See Watson et al. (2002) for information on variation within the species. [= FNA, K; = *E. kornickianum* – GW, orthographic variant]

Eriocaulon lineare Small. Seepage bogs. Sw. GA south to c. peninsular FL, west to s. AL. It has been reported for NC (Kral in FNA 2000), but this is apparently in error. Kral & Sorrie (1998) proposed the conservation of the name *E. lineare* with a conserved type, as the designated type actually represents *E. texense*; this course was accepted by Brummitt (2005). [= FNA, GW, K, S, WH]

Eriocaulon nigrobracteatum E.L. Bridges & Orzell, Dark-headed Hatpins. Seepage bogs. Endemic to the FL Panhandle (Bay, Calhoun, and Gulf counties). [= FNA, K, WH] {not yet keyed]

Eriocaulon parkeri B.L. Robinson, Estuary Pipewort. Natural lakes, tidal marshes. ME and QC south to e. NC. [= C, F, FNA, G, GW, K, Pa, Z]

Eriocaulon ravenelii Chapman. Wet pine savannas. July-September. SC south to s. peninsular and Panhandle FL. [= RAB, FNA, GW, K, S, WH, Z]

Eriocaulon texense Körnick, Texas Hatpins. Sandhill seepage bogs, Altamaha Grit outcrops. Sc. NC south to w. Panhandle FL, west to e. TX. [= FNA, GW, K, WH, Z]

Lachnocaulon Kunth 1841 (Bogbuttons)

A genus of 7 species, herbs, of se. North America and Cuba. Based on work of Gomes de Andrade et al. (2010), *Lachnocaulon* is likely to be included in the large and primarily neotropical genus *Paepalanthus* Martius. References: Kral in FNA (2000); Kral (1966c)=Z; Gomes de Andrade et al. (2010); Stützel in Kubitzki (1998b).

1 Trichomes at the tips of the receptacular bracts milky white, opaque, the head therefore appearing gray to white, obscuring the brown color of the bractlets.
  2 Mature heads 4-7 mm across; seeds obviously longitudinally striate (as seen at 10× magnification) ..... ***L. anceps***
  2 Mature heads 3.5-4.0 mm across; seeds not obviously longitudinally striate, the striations obscure and very fine (not visible at 10× magnification) ..... ***L. beyrichianum***
1 Trichomes at the tips of the receptacular bracts translucent, the head therefore showing the brown color of the bractlets.
  3 Scape with ascending hairs ..... ***L. minus***
  3 Scape glabrous.
    4 Leaves 0.5-1 (-2) cm long; head light brown, usually globose; carpels 2 ..... ***L. digynum***
    4 Leaves 2-3 cm long; head reddish- or dark brown, usually elongate-cylindric; carpels 3 ..... ***L. engleri***

Lachnocaulon anceps (Walter) Morong, Common Bogbuttons. Moist to dry sands, moist peats, in pinelands, sometimes locally abundant in open disturbed areas where competition has been removed. May-October. S. NJ south to s. FL, west to se. TX; disjunct in ec. TN; West Indies (Cuba). [= RAB, C, F, FNA, G, GW, K, WH, Z; > *L. anceps* – S; > *L. floridanum* – S; > *L. glabrum* Körnick – S]

Lachnocaulon beyrichianum Sporleder ex Körnick, Southern Bogbutton. Upper margins of Coastal Plain doline ponds (sometimes under scrub oaks), flatwoods. May-September. Se. NC south to Panhandle FL and s. peninsular FL. [= RAB, FNA, GW, K, S, WH, Z]

Lachnocaulon digynum Körnick, Pineland Bogbutton. Pine savannas, bogs. Panhandle FL and s. AL west to TX. [= FNA, GW, K, S, WH, Z]

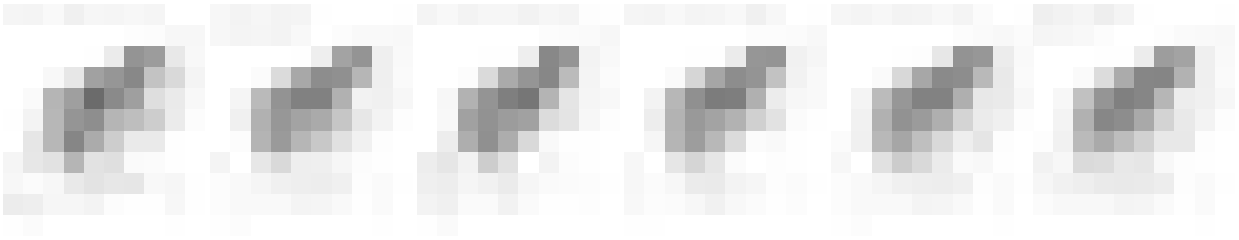
Lachnocaulon engleri Ruhland, Engler's Bogbutton. Pondshores, pine savannas. N. FL peninsula south to s. FL; Panhandle FL and s. AL. [= FNA, GW, K, S, WH, Z]

Lachnocaulon minus (Chapman) Small, Brown Bogbutton. Upper margins of Coastal Plain doline ponds, other pineland situations. May-October. E. NC south to s. peninsular FL, west to Panhandle FL and se. AL. [= RAB, FNA, GW, K, WH, Z; > *L. minus* – S; > *L. eciliatum* Small – S]

Syngonanthus Ruhland 1900 (Yellow Hatpins)

A genus of about 200 species, primarily of tropical America, but some in Africa and Madagascar; ours is the only temperate species. References: Kral in FNA (2000); Kral (1966c)=Z; Gomes de Andrade et al. (2010); Stützel in Kubitzki (1998b).

Syngonanthus flavidulus (Michaux) Ruhland, Yellow Hatpins, Bantam-buttons. Pine savannas, pine flatwoods, borders of pineland ponds, and adjacent ditches. May-October. Se. NC south to s. FL, west to s. MS. [= RAB, FNA, GW, K, S, WH, Z]



96. MAYACACEAE Kunth 1840 (Bogmoss Family) [in POALES]

A family of a single genus and 4-10 species, of tropical to warm temperate America and Africa. References: Faden in FNA (2000); Thieret (1975); Stevenson in Kubitzki (1998b).

Mayaca Aublet 1775 (Bogmoss)

A genus of 4-10 species, of tropical to warm temperate America and Africa. References: Thieret (1975)=Z; Faden in FNA (2000); Stevenson in Kubitzki (1998b).

Mayaca fluviatilis Aublet, Bogmoss. Cp (FL, GA, NC, SC): marshes, streams, swamp forests, shores of natural lakes, seepage areas, in saturated soil or variously submersed; common. May-July. Se. NC south to c. peninsular FL, west to se. TX; West Indies; Central America to South America. The two species previously recognized appear to be only different growth forms, induced by different hydrologic conditions. [= FNA, GW, K, WH, Z; > *M. aubletii* Michaux – RAB, S; > *M. fluviatilis* – RAB, S]

98. JUNCACEAE A.L. de Jussieu 1789 (Rush Family) [in POALES]

A family of about 8 genera and 350-440 species, herbs (and a few shrubs), largely of temperate regions of the Old and New World. References: Brooks & Clemants in FNA (2000); Balslev in Kubitzki (1998b); Drábková et al. (2003).

1 Leaves terete or flat, glabrous (or scabrous); capsule with > 3 seeds; [often in wetlands] ..... ***Juncus***
1 Leaves flat, pubescent; capsule with 3 seeds; [rarely in wetlands]..... ***Luzula***

Juncus Linnaeus 1753 (Rush)
(by B.A. Sorrie and W.M. Knapp)

A genus of about 250-300 species, herbs, of cosmopolitan distribution. Drábková et al. (2003) indicate that *Juncus trifidus* may not be part of *Juncus*, and may be as closely related to *Luzula*. References: Brooks & Clemants in FNA (2000); Kirschner et al. (2002b, 2002c)= Y; Bridges & Orzell (2008); Clemants (1990); Balslev in Kubitzki (1998b); Zika (2003)=Z; Drábková et al. (2003); F; GW; RAB. The key based, in part, on those references.

subgenus *Juncus*, section *Juncus*: *acutus ssp. leopoldii, roemerianus*
subgenus *Juncus*, section *Graminifolii*: *filipendulus, marginatus, biflorus, longii, repens*
subgenus *Juncus*, section *Iridifolii*: *polycephalus*
subgenus *Juncus*, section *Ozophyllum*: *acuminatus, brachycephalus, brevicaudatus, caesariensis, canadensis, megacephalus, militaris, nodosus, paludosus, pelocarpus, subcaudatus, torreyi, trigonocarpus, validus var. validus*
subgenus *Agathryon*, section *Tenageia*: *bufonius var. bufonius*
subgenus *Agathryon*, section *Steirochloa*: *gerardii, coriaceus, [brachyphyllus], georgianus, secundus, dichotomus, tenuis, anthelatus, interior, dudleyi*
subgenus *Agathryon*, section *Juncotypus*: *gymnocarpus, [filiformis], inflexus, effusus var. solutus, pylaei, balticus*
UNCERTAIN placement (perhaps not even a *Juncus*): *trifidus*

Identification Notes: For identification of most rushes, it is important to collect plants with mature capsules and seeds. Stamen number is often a diagnostic character and can be determined after anthesis by counting the number of persistent filaments located behind the tepals. Care must be taken to collect specimens with uninjured heads, especially for the group of rushes in Key D; the long beaks of the capsules are often fragile and easily broken off.

1 Inflorescence appearing lateral; inflorescence bract erect, appearing to be a continuation of the culm..... **Key A**
1 Inflorescence appearing terminal; inflorescence bract not appearing to be a continuation of the culm.
  2 Leaf blades non-septate ..... **Key B**
  2 Leaf blades septate (sometimes obscure in dried specimens; if so, rest leaf on hard surface and run fingernail over it lengthwise).

3 Mature seeds distinctly tailed with elongate appendages at each end (may be obscure in *J. subcaudatus*), seeds 0.7-2.5 mm long; [subgenus *Juncus*, section *Ozophyllum*]....**Key C**
3 Mature seeds without appendages, < 0.7 mm long.
4 Flowers solitary (rarely up to 3) along branches of inflorescence; flowers often aborted; inflorescence diffuse, with slender flexuous branches; [subgenus *Juncus*, section *Ozophyllum*] ....***J. pelocarpus***
4 Flowers in heads (glomerules) of 3 or more; flowers seldom aborted; inflorescence various.
5 Heads spherical or nearly so, usually 15-60 flowered ....**Key D**
5 Heads turbinate to hemispherical, 3-15 flowered; [subgenus *Juncus*, section *Ozophyllum*]....**Key E**

KEY A

1 Flowers borne in heads (glomerules) of 2-6 flowers per head; leaves spine-tipped; single bracteole subtending glomerule present at base of pedicel; [plants of brackish habitats]; [subgenus *Juncus*, section *Juncus*]
2 Capsule 3.5-5 mm long, obviously longer than the tepals ....***J. acutus*** *ssp.* ***leopoldii***
2 Capsule < 3.5 mm long, shorter than or nearly equaling the tepals ....***J. roemerianus***
1 Flowers borne singly on branches of inflorescence; leaves not spine-tipped; each flower subtended by two bracteoles in addition to bracteole at base of pedicel; [plants of various habitats].
2 At least a few sheaths at base of plant with well developed blades; inflorescence bract channeled on one side; [subgenus *Agathryon*, section *Steirochloa*]....***J. coriaceus***
2 Sheaths at base of plant bladeless; bract not channeled; [subgenus *Agathryon*, section *Juncotypus*].
3 Culms well spaced along creeping rhizomes.
4 Anthers shorter than filaments.
5 Rhizomes 1.5-2 mm diameter; culms 1 mm diameter; inflorescence 3-12 flowered; [boreal, south to ne. WV]..... ***J. filiformis***
5 Rhizomes 2-4 mm diameter; culms 1.5-2.5 mm diameter; inflorescence 8-30+ flowered; [rare montane plant in NC and SC]..... ....***J. gymnocarpus***
4 Anthers longer than filaments....***J. balticus*** *var.* ***littoralis***
3 Culms cespitose or tufted on short branching rhizomes.
6 Perianth much shorter than capsule (about ½ as long); stamens 6; [rare montane plant in NC and SC] ....***J. gymnocarpus***
6 Perianth > 3/4 length of capsule; stamens 6 or 3.
7 Capsules 3-4 mm long; stamens 6; [rare alien in piedmont and mountains of VA]....***J. inflexus***
7 Capsules 1.5-3.2 mm long; stamens 3; [widespread native].
8 Stems coarsely grooved, with 10-20 ridges just below inflorescence, firm; perianth 2.7-3.6 mm long, sepals slightly exceeding petals and capsule....***J. pylaei***
8 Stems finely grooved, with 25-30 striations just below inflorescence, soft, easily compressed; perianth 1.9-2.8 mm long, sepals equaling petals....***J. effusus*** *ssp.* ***solutus***

KEY B

1 Flowers borne in heads (glomerules) of 2 or more, individual flowers not subtended by two bracteoles (in addition to the bracteole at the base of the pedicel); [subgenus *Juncus*, section *Graminifolii*].
2 Perianth 6-10 mm long; plant aquatic, submersed and sterile or emersed/stranded and fertile; stems weak, creeping, mat-forming..... ....***J. repens***
2 Perianth < 6 mm long; plant of uplands or wetland margins, never submersed; stems erect, never creeping or mat-forming.
3 Heads 1-5 (-10) per culm; [calcareous glades inland, east to GA and TN]....***J. filipendulus***
3 Heads >9 per culm; [collectively widespread].
4 Infructescence usually congested, (1.8-) 2.4-4.7 (-6.4) cm long; greatest distance between adjacent rhizome cataphylls (5.3-) 6.3-10.5 (-13.0) mm; rhizome width (measured between adjacent cataphylls) (0.8-) 1.0-1.4 (-1.9) mm ....***J. longii***
4 Infructescence usually loose, (1.4-) 17.9-103.9 (-145) cm long; greatest distance between adjacent rhizome cataphylls (0.1-) 0.4-3.0 (-4.6) mm; rhizome width (measured between adjacent cataphylls) (0.4-) 1.0-3.5 (-4.5) mm.
5 Widest leaf blade (2.6-) 3.1-4.5 (-7.0) mm wide; sheath of lowest leaf (3.2-) 4.3-7.8 (-9.7) cm long; tallest culm (27.2-) 50.8-81.2 (-100.7) cm; anthers (0.5-) 0.6-1.0 (-1.3) mm long, exserted; stem base (3.4-) 5.8-9.6 (-12.0) mm wide ....***J. biflorus***
5 Widest leaf blade (1.3-) 1.6-2.6 (-3.5) mm wide; sheath of lowest leaf (1.7-) 2.2-3.8 (-4.7) cm long; tallest culm (19.2-) 26.0-44.0 (-56.8) cm; anthers (0.2-) 0.3-0.5 (-0.7) mm long, concealed by tepals; stem base (0.4-) 2.0-4.4 (-6.0) mm wide.....***J. marginatus***
1 Flowers borne singly on branches of inflorescence, individual flowers subtended by two bracteoles (in addition to the bracteole at the base of the pedicel).
6 Plants annual, without coarse roots or persistent leaf bases; [subgenus *Agathryon*, section *Tenageia*] ....***J. bufonius***
6 Plants perennial, with coarse roots or persistent leaf bases.
7 Leaves finely serrulate or scabrid; auricles deeply lacerate; [rare and local in high elevation "alpine" situations] ....***J. trifidus***
7 Leaves entire; auricles not lacerate; [subgenus *Agathryon*, section *Steirochloa*].
8 Auricles 3-6 mm long at summit of leaf sheath.
9 Capsules < 3/4 length of perianth, borne widely spaced along the usually diffuse branches of the inflorescence..... ***J. anthelatus***
9 Capsules > 3/4 length of perianth, borne congested on branches with internodes about as long as perianth....***J. tenuis***
8 Auricles < 2 mm long or absent.
10 Cauline leaves present in addition to basal leaves; blades flat..... ***J. gerardii***
10 Cauline leaves absent.
11 Leaf blades terete or channeled....***J. dichotomus***
11 Leaf blades flat.
12 Perianth obtuse apically; capsule chestnut brown or darker; [alien, ranging south to MD] ....***J. compressus***
12 Perianth acute to acuminate; capsule light brown or tan; [native].
13 Inflorescence bract shorter than inflorescence; capsules 3-locular.
14 Perianth usually 2.5-3.5 mm long; flowers secund; capsules globose to ellipsoid..... ***J. secundus***
14 Perianth usually 4.0-5.5 mm long; flowers not secund; capsules ellipsoid or narrowly so; restricted to granite flatrocks.

.....***J. georgianus***

13 Inflorescence bract longer than inflorescence; capsules 1-locular to falsely 3-locular.
15 Auricles yellowish, glossy; perianth spreading in fruit.....***J. dudleyi***
15 Auricles whitish or straw colored, dull; perianth not spreading.
16 Mature capsules pale brown or darker; [of the Coastal Plain].....***J. dichotomus***
16 Mature capsules pale tan or darker; [of prairies and plains, east to KY, se TN].....***J. interior***

KEY C

1 Culms and leaves scabrid, gray-green or blue-green; seeds 2.0-2.5 mm long.....***J. caesariensis***
1 Culms and leaves smooth, green; seeds 0.7-2.2 mm long.
2 Seeds 1.2-2.2 mm long, seed body < ½ length of seed.
3 Mature capsules 3.0-4.0 mm long, < 1.5 mm longer than perianth, light reddish brown to light brown; heads 5-50 flowered .....
.....***J. canadensis***
3 Mature capsules 4.0-5.0 mm long, 2 mm longer than perianth, dark reddish purple; heads 3-7 flowered.....***J. trigonocarpus***
2 Seeds 0.7-1.2 mm long, seed body > ½ length of seed.
4 Perianth obtuse to subacute, with wide scarious margins.....***J. brachycephalus***
4 Perianth acuminate, with narrow scarious margins.
5 Inflorescence narrow, the branches erect; mature capsules dark brown; heads 2-7 flowered.....***J. brevicaudatus***
5 Inflorescence open, the branches widely spreading; mature capsules dark straw colored; heads 5-20 flowered.....***J. subcaudatus***

KEY D

1 Leaves flattened, narrowly elliptic in cross-section.
2 Leaves with incomplete septae; heads about 10 mm diameter; tips of dehisced capsules united; [subgenus *Juncus*, section *Iridifolii*] .....
.....***J. polycephalos***
2 Leaves with complete septae; heads about 12 mm diameter; tips of dehisced capsules split; [subgenus *Juncus*, section *Ozophyllum*].....
.....***J. validus*** *var.* ***validus***
1 Leaves terete, not at all flattened; [subgenus *Juncus*, section *Ozophyllum*].
3 Plants strictly cespitose, without any short, hard, knotty rhizomes; tepals lanecolate.....***J. acuminatus***
3 Plants with at least some short, hard, knotty rhizomes; tepals lanceolate-subulate.
4 Capsules shorter than the tepals, clearly included within the tepals at maturity.....***J. brachycarpus***
4 Capsules equaling or exceeding the tepals, exserted from or only barely included within the tepals at maturity.
5 Capsule valves separating at the apex at maturity; stamens 6.
6 Heads 6-20 flowered, 6-9 mm diameter; auricles cartilaginous, 0.5-1.0 mm long .....***J. nodosus***
6 Heads 25-100 flowered, 10-14 mm diameter; auricles membranous, 2.5-4.0 mm long.....***J. torreyi***
5 Capsule valves remaining united at the apex after dehiscence; stamens 3.
7 Culms 4-8 mm in diameter near the base, usually > 80 cm tall; inflorescences usually > 15 cm tall, with > 25 heads; largest leaf blades > 25 cm long and > 3 mm in diameter.....***J. paludosus***
7 Culms 1-3 mm in diameter near the base, usually < 80 cm tall; inflorescences usually < 10 cm tall, with < 25 heads; largest leaf blades < 25 cm long and 1-2 mm in diameter.
8 Uppermost cauline leaf blade non-septate, much shorter than its sheath; outer tepals significantly longer than the inner tepals....
.....***J. megacephalus***
8 Uppermost cauline leaf blade septate, longer than its sheath; outer tepals and inner tepals of similar length.
9 Heads lobulate; mature capsule 2.0-3.0 mm long.....***J. scirpoides*** *var.* ***compositus***
9 Heads spherical, not lobulate; mature capsule 3.0-4.5 mm long.....***J. scirpoides*** *var.* ***scirpoides***

KEY E

1 Mature capsules 2 mm or more longer than perianth, 4.0-5.2 mm long.....***J. diffusissimus***
1 Mature capsules < 1.5 mm longer than perianth, or subequal.
2 Stamens 6.
3 Proximal culm leaf overtopping inflorescence; culms well spaced along creeping rhizomes; plants often exceed 8 dm tall; [northeastern, south to DE, MD, disjuncts in ne. NC] .....***J. militaris***
3 Proximal culm leaf shorter than inflorescence; plants cespitose; plants < 8 dm tall.
4 Mature capsules slightly shorter than to slightly longer than perianth (< 0.5 mm longer); perianth 2.6-3.9 mm long; inflorescence 4-16 cm long; [widespread] .....***J. acuminatus***
4 Mature capsules exceeding perianth by about 1 mm (>0.5 mm longer); perianth 1.7-3.0 mm long; inflorescence 2-8 cm long; [northern, in our region montane].....***J. articulatus***
2 Stamens 3.
5 Mature capsules about 1/3 longer than perianth (roughly 1-1.5 mm longer).....***J. debilis***
5 Mature capsules equaling or barely exceeding perianth.
6 Heads 5-50; capsules 2.8-3.5 mm long.....***J. acuminatus***
6 Heads 30-250; capsules 1.9-2.9 mm long.
7 Capsules deep chestnut brown; roots with terminal tubers; inner tepals usually > 2.4 mm long; [southeastern].....***J. elliottii***
7 Capsules straw colored; roots without terminal tubers; inner tepals usually 1.7-2.3 mm long; [midwestern, east to w. Panhandle FL and se. TN].....***J. nodatus***

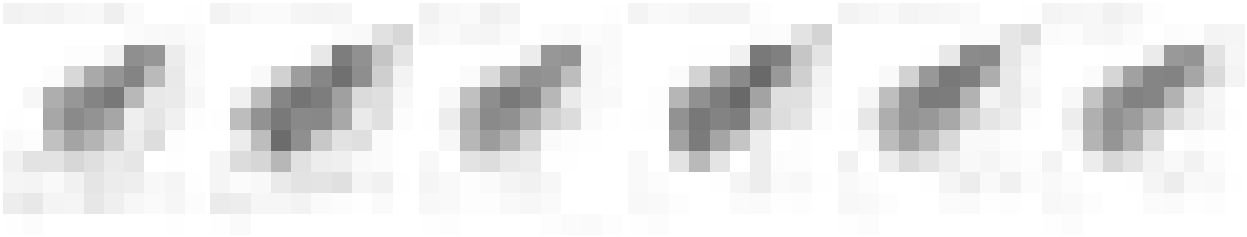
Juncus acuminatus Michaux. In damp soils. May-August. ME and NS to ON and MN, south to n. peninsular FL, TX, and n. Mexico; Honduras; BC to CA. [= C, F, FNA, G, GW, K, Pa, RAB, S, W, WH, WV, Y]

* ***Juncus acutus*** Linnaeus *ssp.* ***leopoldii*** (Parlatore) Snogerup. Sandy soil at edge of salt marsh. Reported for se. GA by Jones & Coile (1988) and Kartesz (1999), but not by FNA. The distribution in GA is documented by a correctly-identified specimen at Herbarium GA. [= FNA, K, Y] {not yet keyed}

Juncus anthelatus (Wiegand) R.E. Brooks. Moist or wet sites. July-September. NB and ME west to MN, south to GA and AR. [= FNA, Y; < *J. tenuis* Willdenow – G, GW, K, RAB, S, W; < *J. tenuis* var. *tenuis* – C, Pa; = *J. tenuis* var. *anthelatus* Wiegand – F, WV]

Juncus articulatus Linnaeus, Jointleaf Rush. Marshes, calcareous seepage wetlands, interdune swales, wet open ground. July-September. Nearly cosmopolitan; in North America from NL (Newfoundland) to AK, south to e. MD (Knapp et al. 2011), e. NC (Cape Hatteras, Dare County) (Sorrie & LeBlond 2008), s. WV, sw. VA, and CA. [= C, FNA, G, K, Pa, RAB, WV; > *J. articulatus* var. *articulatus* – F; > *J. articulatus* var. *obtusatus* Engelmann – F; = *J. articulatus* ssp. *articulatus* – Y]

Juncus balticus Willdenow *var*. ***littoralis*** Engelmann. Open calcareous wetlands. The species is circumboreal; var. *littoralis* is North American: NL (Labrador) west to BC, south to NY (Long Island), NJ, PA, w. VA, OH, IN, MO, and KS. [= F, G, K; = *J. arcticus* Willdenow var. *littoralis* (Engelmann) Boivin – C, Pa; < *J. arcticus* Willdenow var. *balticus* (Willdenow) Trautvetter – FNA; < *J. balticus* – WV; = *J. balticus* ssp. *littoralis* (Engelmann) Snogerup – Y]



Juncus biflorus Elliott. Pine savannas, pine flatwoods, mesic areas in sandhill-pocosin ecotones, roadsides, low fields in the Piedmont, wet meadows. June-October. MA to MO, south to FL, TX, Mexico and Central America, and disjunct in South America. See Knapp & Naczi (2008) for clarification of the *Juncus marginatus* complex. [= F, K, RAB, W, WV; < *J. biflorus* – C, G, Pa (also see *J. longii*); < *J. marginatus* – FNA, GW, WH, Y (also see *J. biflorus* and *J. longii*); = *J. aristulatus* Michaux var. *biflorus* (Elliott) Small– S]

Juncus brachycarpus Engelmann, Short-fruited Rush. Wet, sandy soil. June-September. MA to IL, south to SC, wc. GA, and TX. [= C, F, FNA, G, GW, K, Pa, RAB, S, WV, Y]

Juncus brachycephalus (Engelmann) Buchenau. Calcareous wetlands. NS west to ND, south to MA, OH, and IL; disjunct southward in VA, n. GA, TN, and CO. [= C, F, FNA, G, K, Pa, Y]

Juncus brachyphyllus Wiegand. Wet sandy areas. MO and KS, south to TX; MT, ID, and WA south to CA; disjunct in the Coastal Plain of w. TN. [= FNA, C, K, Y] {not yet keyed}

Juncus brevicaudatus (Engelmann) Fernald, Short-tailed Rush. Bogs and seeps, southward at high elevations. July-September. NL (Newfoundland) to MB south to MN, PA, and in mountains south to NC; scattered in w. North America. [= C, F, FNA, G, K, Pa, RAB, W, WV, Y]

Juncus bufonius Linnaeus, Toad Rush. Wet, open ground, roadsides, dried pools, drawdown shores. June-November. Cosmopolitan, and polymorphic; a number of varieties have sometimes been recognized, but need additional study. [= FNA, GW, Pa, RAB, S, W, WH, WV, Y; > *J. bufonius* var. *bufonius* – C, F, G, K]

Juncus caesariensis Coville, New Jersey Rush. Sphagnous seepages in the Coastal Plain of VA, seeps and bogs at low to moderate elevations in the Mountains of NC. July-October. Found in 1992 from a seepage bog in Clay County, NC, and in 1993 from a bog in Henderson County, NC, where associated with northern disjuncts. Rare throughout its range, it is known only from several sites in NJ, MD, VA, NC, and NS (Newell & Newell 1994). The scabrid leaf blades and large seeds quickly separate this species from the other long-tailed rushes. It should be looked for along seepage slopes and bogs in the fall-line sandhills and the outer Coastal Plain. [= C, F, FNA, G, K, Y]

Juncus canadensis J. Gay ex Laharpe, Canadian Rush. Lake, pond and stream margins, swamps, bogs, seepage slopes, wet meadows, ditches. July-October. NL (Newfoundland) to MN, south to c. peninsular FL, TN, and LA. *J. canadensis* is here treated as a single, polymorphic species. Fernald and others have described up to 5 forms and varieties of *J. canadensis*, based on variation in flower and capsule size (from 2.5 mm to nearly 4.0 mm), shape of the glomerules (densely flowered and subglobose to few-flowered and turbinate), and structure and size of the inflorescence (congested to open). Further study is necessary to determine whether any of these taxa should be recognized. [= RAB, C, FNA, G, GW, K, Pa, S, W, WH, WV, Y; > *J. canadensis* var. *canadensis* – F; > *J. canadensis* var. *euroauster* Fernald – F]

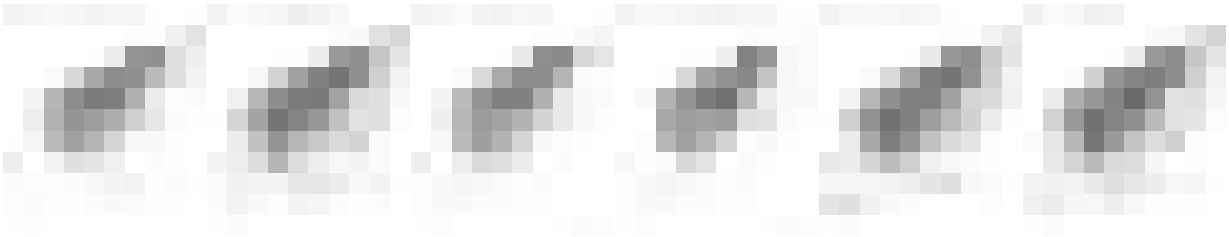
* *Juncus capitatus* Weigel. Native of Eurasia. Reported for n. AL (Kartesz 1999); rejected by Kral et al. (2010). [= FNA, K] {rejected; not keyed}

* ***Juncus compressus*** Jacquin. Disturbed ground, ditches, in saline or alkaline soils; native of Europe. NS to ON, south to MD, PA, w. NY, MI, WS, and sporadically distributed westward in high elevations. [= FNA, C, F, FNA, G, K, Y]

* ***Juncus conglomeratus*** Linnaeus. Low, marshy or peaty places; native of Europe. July-September. Reported for WV and northward. [= C, K; < *J. effusus* – FNA; = *J. effusus* Linnaeus var. *conglomeratus* (Linnaeus) Engelmann – F]

Juncus coriaceus Mackenzie. Stream and pond margins, swamps, flatwoods depressions, roadside ditches. June-September. S. NJ to c. peninsular FL, west to e. TX, north in the interior KY, AR, and OK. [= C, F, FNA, G, GW, K, RAB, W, WH, Y; = *J. setaceus* Rostkovius – S, misapplied]

Juncus debilis A. Gray, Weak Rush. Marshy shores, stream and pond margins, along puddles in wet, disturbed clearings, ditches. May-August. RI to MO, south to n. FL and e. TX; Honduras. [= C, F, FNA, G, GW, K, Pa, RAB, S, W, WH, Y]



Juncus dichotomus Elliott. Often in disturbed, open, wet areas, ditches, wet meadows. June-October. MA to c. peninsular FL, west to OK and TX; Central America. The character used to separate *J. platyphyllus* (Wiegand) Fernald from *J. dichotomus* (flat leaf blade vs. terete leaf blade) does not appear to be reliable; leaf blades from culms in the same clump may vary from flat to slightly involute to completely terete. [= FNA, GW, Pa, W, WV, Y; > *J. dichotomus* – F, RAB; > *J. platyphyllus* (Wiegand) Fernald – F, RAB; = *J. tenuis* var. *dichotomus* (Elliott) A. Wood – C; > *J. dichotomus* var. *dichotomus* – G, K, S; > *J. dichotomus* var. *platyphyllus* Wiegand – G, K, S]

Juncus diffusissimus Buckley, Diffuse Rush, Slim-pod Rush. Low, wet open areas, ditches, margins of ponds and streams. May-September. Mostly Coastal Plain from se. VA to c. peninsular FL, west to e. and nc. TX; also s. IN to MO, KA, OK, TN, and KY. [= C, F, FNA, G, GW, K, Pa, RAB, S, W, WH, WV, Y]

Juncus dudleyi Wiegand, Dudley's Rush. Calcareous seepages and fens, river-scours. NL (Labrador) to NU, YT and AK, south FL, TX, CA, and Mexico. First reported for South Carolina by Hill & Horn (1997) and for NC by Tom Govus (pers. comm., 2005). [= F, FNA, K, Pa, S, W, WV, Y; = *J. tenuis* Willdenow var. *dudleyi* (Wiegand) F.J. Hermann – C; < *J. tenuis* – G, GW]

Juncus effusus Linnaeus *ssp.* ***solutus*** (Fernald & Wiegand) Hämet-Ahti, Common Rush, Soft Rush. Moist soil, marshes, margin of streams, ponds, lakes and swamps, low meadows. June-September. NL (Newfoundland) to MN, south to s. FL and Mexico. Ssp. *effusus* is European, and also occurs (allegedly introduced) in the ne. United States. [= WH, Y, Z; < *J. effusus* – RAB, FNA, GW, S, W; = *J. effusus* Linnaeus var. *solutus* Fernald & Wiegand – C, Pa; > *J. effusus* Linnaeus var. *solutus* Fernald & Wiegand – F, K ; > *J. griscomii* Fernald – F, G; >< *J. effusus* Linnaeus var. *solutus* Fernald & Wiegand – G (also see *J. pylaei*); > *J. effusus* var. *compactus* – G, misapplied; > *Juncus effusus* Linnaeus var. *conglomeratus* (Linnaeus) Engelmann – K]

Juncus elliottii Chapman, Elliott's Rush. Margins of ponds and lakes, depressions in savannas and flatwoods, wet, disturbed clearings, roadside ditches. May-September. Coastal Plain, DE and e. MD (Knapp et al. 2011) to c. peninsular FL, west to se. TX. Capsules of *J. elliottii* are similar in shape to *J. acuminatus*, but the presence of tubiferous roots, shorter perianth (2.0-2.5 mm long vs. 2.5-3.5 mm) and fewer-flowered glomerules (3-8 flowered vs. 5-many flowered) clearly distinguishes *J. elliottii* from *J. acuminatus*. [= RAB, C, F, FNA, G, GW, S, WH, Y; > *J. elliottii* var. *elliottii* – K; > *J. elliottii* var. *polyanthemus* C. Mohr – K]

Juncus filiformis Linnaeus, Thread Rush. Bogs, wet acid areas. June-August. Circumboreal, south in North America to e. PA, w. PA, ne. WV, n. MI, and n. MN. [= C, F, FNA, G, K, Pa]

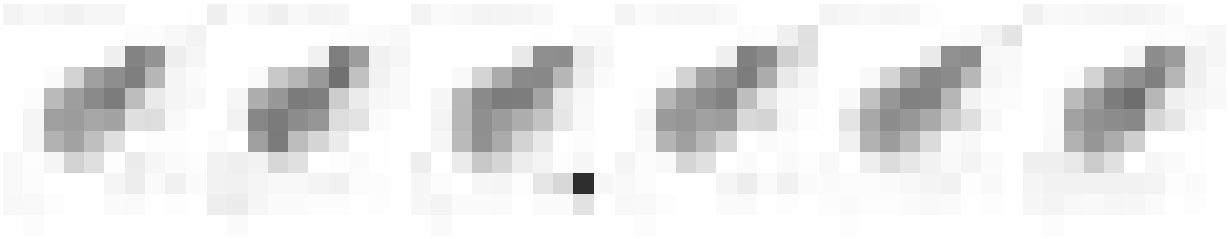
Juncus filipendulus Buckley, Texas Plains Rush. Prairies, limestone barrens. KY, TN, and AL west to OK and TX. [= FNA, GW, K, S, Y]

Juncus georgianus Coville. Shallow depressions in granitic outcrops. June-August. An endemic of the Southeastern Piedmont, restricted to granitic flatrocks of NC, SC, GA, and ec. AL. [= RAB, FNA, K, S, W, Y]

Juncus gerardii Loiseleur, Blackfoot Rush, Blackgrass. Brackish marshes, salt marshes. May-July. Circumboreal, in North America from Greenland and NL (Newfoundland) west to BC, south to VA, MO, OK, UT, and CA (some of the southern occurrences perhaps introduced). [= C, FNA, Pa, W; > *J. gerardi* var. *gerardi* – F; = *J. gerardi* – G, orthographic variant; > *J. gerardii* var. *gerardii* – K; > *J. gerardii* ssp. *gerardii* – Y]

Juncus greenei Oakes & Tuckerman, Greene's Rush. Pine barrens, other dry, open sandy sites. June-July. NB west to MN, south to s. NJ, n. OH, n. IN, n. IL, and IA. [= C, F, FNA, G, K, Pa]

Juncus gymnocarpus Coville, Seep Rush. Bogs, seeps, streambanks. July-September. Local, mountains of e. PA, w. NC, e. TN, nw. SC and ne. GA, Coastal Plain of se. AL, s. MS (Sorrie & Leonard 1999), and w. Panhandle FL. In the Appalachians, *J. gymnocarpus* is scattered in mountain bogs and seeps throughout the mountain region; it reaches its most general occurrence in the escarpment gorge region of Transylvania, Macon, and Jackson counties, NC, where it also occurs along streambanks, especially in the vicinity of waterfalls. [= RAB, C, F, FNA, G, GW, K, Pa, S, W, WH, Y]



* ***Juncus inflexus*** Linnaeus. Wet meadows, disturbed wet or moist ground; native of Eurasia. Introduced in VA (Virginia Botanical Associates 2006, Kartesz 1999). [= C, F, FNA, G, K, Pa, Y]

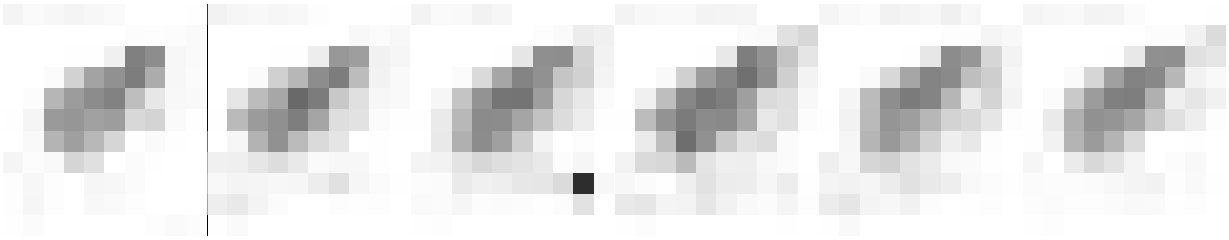
Juncus interior Wiegand. Prairies, disturbed sites. OH west to SK, south to e. TN, AL (Sorrie & LeBlond 2008), MS (Sorrie & LeBlond 2008), LA, TX, and NM. Also reported for VA and NC (Kartesz 1999); the NC report is based on a misidentified specimen. {further investigate} [= FNA, G, S, W, Y; > *J. interior* var. *interior* – K; < *J. tenuis* Willdenow var. *tenuis* – C; < *J. tenuis* – GW]

Juncus longii Fernald. Usually in very wet, often inundated sites, bogs, ditches, rooting in clay or peat. June-August. MD south through VA, NC, SC to s. MS, mainly in the Coastal Plain; disjunct inland in boggy sites, as in w. NC, nc. GA, TN, and n. AL (Knapp & Naczi 2008, more extensive distributions are based on misattribution). See Knapp & Naczi (2008) for clarification of the *Juncus marginatus* complex. [= F, K, RAB; < *J. biflorus* – C, G; < *J. marginatus* – FNA, GW, Y (also see *J. biflorus* and *J. longii*); = *J. aristulatus* Michaux var. *aristulatus* – S]

Juncus marginatus Rostkovius. Wet meadows, bogs, generally throughout in wet, sandy or peaty soil. June-September. NS to ON, MI, and NE, south to s. peninsular FL and TX; disjunct in CA and in South America. See Knapp & Naczi (2008) for clarification of the *Juncus marginatus* complex. [= RAB, C, G, K, Pa, RAB, S, W, WV; > *J. marginatus* var. *marginatus* – F; > *J. marginatus* var. *setosus* Coville – F; < *J. marginatus* – FNA, GW, WH, Y (also see *J. biflorus* and *J. longii*); > *J. marginatus* – G; > *J. setosus* (Coville) Small – G]

Juncus megacephalus M.A. Curtis, Large-headed Rush. Brackish and freshwater marshes, bogs, wet prairies, interdune swales, ditches, wet, open places. June-August. Coastal Plain, e. MD (Knapp et al. 2011) and VA to s. FL, west to se. TX. [= C, F, FNA, G, GW, K, RAB, S, WH, Y]

Juncus militaris Bigelow, Bayonet Rush. Lakeshores, shallow streams. NS to MD, DE, and ne. PA; inland near the Great Lakes; disjunct at Phelps Lake, Washington County, NC (Sorrie & LeBlond 2008). [= C, F, FNA, G, K, Pa, Y]



Juncus nodatus Coville. Shallow water, marshes, sloughs, savannas, bogs. KY west to KS, south to TN, AL, w. Panhandle FL, MS (Sorrie & LeBlond 2008), LA, and TX. [= FNA, C, G, GW, K, Y; ? *J. robustus*, preoccupied] {synonymy incomplete}

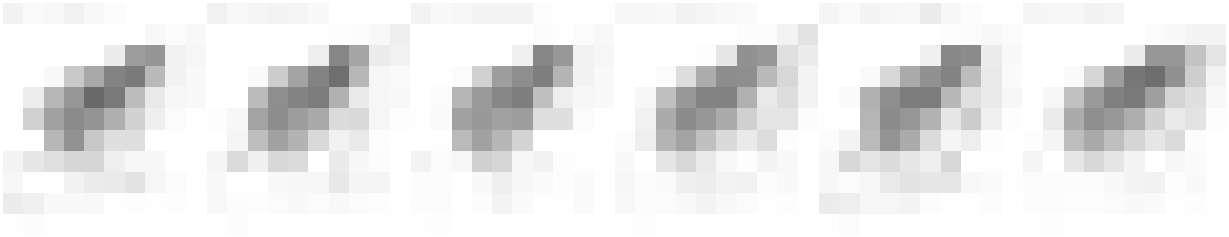
Juncus nodosus Linnaeus. Swamps, streamsides, often in calcareous soils. July-August. NL (Newfoundland) to BC, south to DE, w. VA, WV, IN, MO, TX, and CA. [= C, F, FNA, G, Pa, WV, Y; > *J. nodosus* var. *nodosus* – K]

Juncus paludosus E.L. Bridges & Orzell. Hardwood swamps, cypress swamps and stringers with seasonally flowing water, adjacent ditches. April-May; May-July. Ne. FL and e. FL Panhandle south to s. FL. See Bridges & Orzell (2008) for more detailed information.

Juncus pelocarpus E. Meyer. Ditches, along pond and stream margins, seepage slopes, disturbed open areas, sea-level fens, interdunal swales, Atlantic white-cedar swamps. July-October. NL (Labrador) west to MN, south to DE, e. VA, n. IN; se. VA to SC; FL Panhandle and s. AL. The septae along the narrow leaf blades of *J. pelocarpus* are often difficult to detect. More southern populations (from VA southward) are more robust and have sometimes been separated as *J. abortivus*, but variation appears to be clinal. [= FNA, Pa, WH, Y; > *J. pelocarpus* – K; > *J. pelocarpus* var. *pelocarpus* – C, F, G; > *J. abortivus* Chapman – F, GW, K, RAB, S; > *J. pelocarpus* E. Meyer var. *crassicaudex* Engelmann – C, F, G]

Juncus polycephalos Michaux, Many-headed Rush. Sandy pond margins, ditches, savannas. July-September. Coastal Plain, NC to s. FL, west to e. TX. [= WH; = *Juncus polycephalus* – F, FNA, GW, K, RAB, S, Y, orthographic variant]

Juncus pylaei Laharpe, Common Rush. Moist soil, marshes, margin of streams, ponds, lakes and swamps, low meadows(overlooked and probably more widespread and common than shown). June-September. Throughout eastern North America, south to NC and SC. [= C, K, Y, Z; < *J. effusus* – RAB, FNA, GW, S, W; > *J. effusus* var. *costulatus* St. John – F; > *J. effusus* Linnaeus var. *pylaei* (Laharpe) Fernald & Wiegand – F; < *J. effusus* Linnaeus var. *solutus* Fernald & Wiegand – G; = *J. effusus* Linnaeus var. *pylaei* (Laharpe) Fernald & Wiegand – Pa]



Juncus repens Michaux, Creeping Rush. Streams, ponds, lakes, ditches, wet depressions in flatwoods, cypress savannas. June-October. DE to s. FL, west to TX, north into OK and TN; Mexico (Tabasco); Cuba. This species commonly forms dense mats – a useful field character. [= RAB, C, F, FNA, G, GW, K, S, WH, Y]

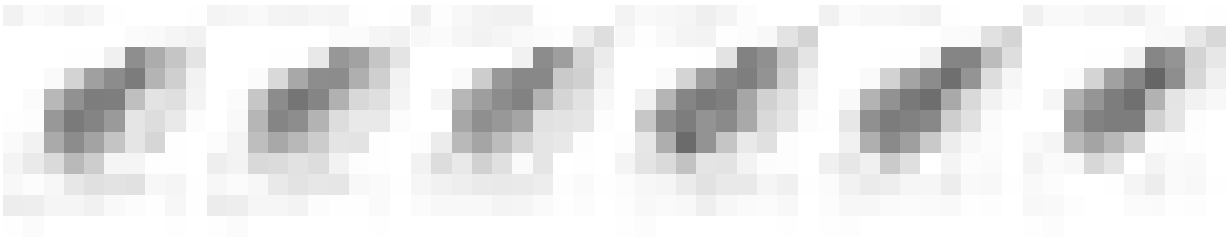
Juncus roemerianus Scheele, Black Needle Rush. Coastal tidal marshes, forming dense stands at and above mean high tide, above the *Spartina alterniflora* zone. January-June; May-October. MD to s. FL, west to se. TX. See Eleuterius (1977) for additional information on this species. [= RAB, C, F, FNA, G, GW, K, S, WH, Y]

Juncus scirpoides Lamarck *var*. ***compositus*** R.M. Harper, Lobe-headed Rush. Roadsides, wet, open, disturbed areas. June-October. Coastal Plain: NC, GA, FL, AL, MS, LA, SC, TX, VA. [= S; < *J. scirpoides* – FNA, GW, K, RAB, WH, Y; >< *J. scirpoides* – K; <? *J. scirpoides* var. *meridionalis* Buchenau – F, application uncertain; > *J. glomeratus* Batson – K, nomen nudum]

Juncus scirpoides Lamarck *var*. ***scirpoides***. Wet, open, disturbed areas, ditches, sandhill pocosin ecotones and seepage bogs, savannas and wet pine flatwoods, wet meadows. June-October. S. NY to s. FL, mostly Coastal Plain and Piedmont; west to TX; IN to MI, MO, OK. [= F, S; < *J. scirpoides* – C, FNA, G, GW, K, Pa, RAB, W, WH, WV, Y]

Juncus secundus Beauvois ex Poiret. Dry fields, rock outcrops. June-October. ME to IN, south to e. OK, n. AL, and n. GA. [= C, F, FNA, G, K, Pa, RAB, S, W, WV, Y]

Juncus subcaudatus (Engelmann) Coville & Blake, Somewhat-tailed Rush. Bogs, mossy woods and other wet places. July-October. NS to NY, southwest to MO and southeast to GA. *J. subcaudatus* is one of the more difficult rushes to identify. Although it is grouped with *J. canadensis*, *J. brevicaudatus*, and the other long-tailed rushes, its seeds lack distinct, long appendages. In general appearance it matches *J. acuminatus* quite well; mature seed size and mature capsule size (*J. subcaudatus* capsules are generally well exserted above the perianth, while *J. acuminatus* capsules are equal to only slightly exserted above the capsule) need to be examined in order not to confuse the two taxa. [= C, FNA, G, Pa, RAB, W, WV, Y; > *J. subcaudatus* var. *subcaudatus* – F, K]



Juncus tenuis Willdenow, Path Rush. Dry or moist soil along roadsides and paths, fields. June-September. NL (Labrador) west to AK, south to FL, TX, CA, and n. Mexico; Central and South America; introduced widely around the world. *J. tenuis* as it is here treated includes *J. tenuis* var. *williamsii* Fernald, which has a more congested inflorescence with arched to recurved inflorescence branches. [= FNA, Y; < *J. tenuis* – RAB, G, GW, K, S, W, WH; < *J. tenuis* var. *tenuis* – C, Pa; > *J. tenuis* var. *tenuis* – F, WV; > *J. tenuis* var. *williamsii* Fernald – F]

Juncus torreyi Coville, Torrey's Rush. Bogs, other sites with wet soil. June-September. NB west to BC, south to GA, TX, CA, and n. Mexico. [= FNA, C, F, G, GW, K, Pa, S, W, WV, Y]

Juncus trifidus Linnaeus, Highland Rush. Rock crevices at high elevations, on greenstone, mica schist, amphibolite, hornblende gneiss, and quartzitic sandstone. June-September. The species is circumboreal, occurring in arctic-alpine situations in n. Europe and n. North America where it ranges from NL (Newfoundland) to QC, south to s. New England and NY; disjunct in VA (Stony Man, Page County) and NC (Craggy Pinnacle, Craggy Dome, and Craggy Gardens, Buncombe County; Eagle Cliff, Mitchell County; Three Top Mountain, Ashe County), and WV (North Fork Mountain, Pendleton County). As with many circumboreal species of polymorphic nature, there is disagreement over the recognition of infraspecific taxa. Var. *monanthos* (Jacquin) Bluff & Fingerhuth or ssp. *monanthos* (Jacquin) Ascherson & Graebner has often been applied to e. North American *J. trifidus*, but should apply (if considered valid at all) only to *J. trifidus* of limestone areas of Europe. Although Hämet-Ahti (1980) correctly showed that Appalachian *J. trifidus* (from acidic and mafic gneisses and schists) does not belong to *J. monanthos* (*J. trifidus* ssp. *monanthos*, *J. trifidus* var. *monanthos)*, her treatment of Appalachian plants as ssp. *carolinianus* Hämet-Ahti has been controversial. This treatment follows Clemants (1990), who concludes that the primarily vegetative characters used to separate Appalachian plants from the European (blade lengths and relative positions) are too variable to warrant recognition of subspecies or varieties in the taxon. Further study is warranted. [= Y; < *J. trifidus* – FNA, S; > *J. trifidus* var. *monanthos* (Jacquin) Bluff & Fingerhuth – RAB, F, G, W, misapplied; > *J. trifidus* ssp. *carolinianus* Hämet-Ahti – C, K]

Juncus trigonocarpus Steudel. Seepage slopes, bogs, along stream margins, ditches. July-October. Coastal Plain, NC to FL Panhandle, west to e. TX. Young *J. trigonocarpus* and *J. canadensis* are often confused; once mature, however, the two can usually be separated by capsule color alone. Although *J. canadensis* capsules redden, they never approach the dark reddish-purple tone of *J. trigonocarpus*. Seed and capsule size are also distinct for the two taxa. [= RAB, FNA, GW, K, S, WH, Y]

Juncus validus Coville *var*. ***validus***, Vigorous Rush. Stream and pond margins, roadside ditches, wet, open, often disturbed ground. July-September. NC to n. FL, west to TX, OK and MO; apparently non-native on the Delmarva peninsula of e. MD and

s. DE (Knapp et al. 2011). Var. *fascinatus* M.C. Johnston is endemic to TX. [= FNA, K, Y; < *J. validus* – RAB, C, F, G, GW, S, W, WH]

Luzula A.P. de Candolle 1805 (Wood-rush)

A genus of about 75-115 species, cosmopolitan. References: Coffey Swab in FNA (2000); Kirschner et al. (2002a)=Z; Balslev in Kubitzki (1998b). Key adapted in part from Coffey Swab in FNA (2000), C, and F.

1 Flowers borne singly; inflorescences branched or unbranched; [subgenus *Pterodes*].
  2 Inflorescences simple, with an occasional pedicel branching from the base of a flower; apical appendages of seeds 0.6-1.5 (-2.1) mm long; seed/appendage length ratio 0.8-1.7 ..... ***L. acuminata*** *var.* ***acuminata***
  2 Inflorescences usually branching, the pedicels commonly paired; apical appendages of seeds 0.4-1.1 mm long; seed/appendage length ratio 1.0-2.8 ..... ***L. acuminata*** *var.* ***carolinae***
1 Flowers borne in dense glomerate clusters (glomerules); inflorescences spikelike or umbellate; [subgenus *Luzula*, section *Luzula*].
  3 Inflorescence branches divergent, at least some widely spreading; glomerules capitate to broadly ovoid, not cylindric..... ***L. echinata***
  3 Inflorescence branches erect, none widely spreading; glomerules often cylindric (less commonly merely capitate).
    4 Seeds 0.9-1.3 mm long; caruncle 0.5-0.7 mm long; plants producing several basal bulblets (white swollen leaf bases) ..... ***L. bulbosa***
    4 Seeds 1.1-1.7 mm long; caruncle 0.2-0.5 mm long; plants not producing basal bulblets ..... ***L. multiflora*** *var.* ***multiflora***

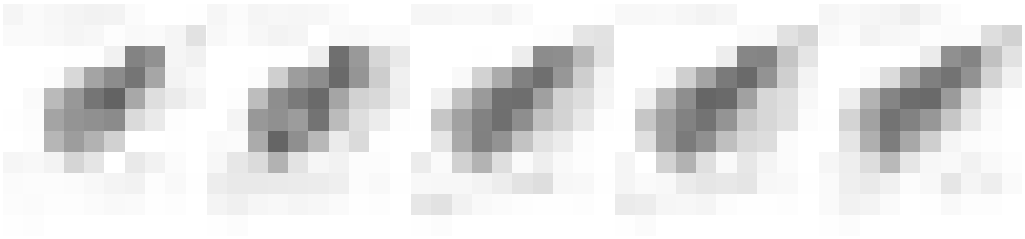
Luzula acuminata Rafinesque *var.* ***acuminata***. Moist forests. April-August. NL (Newfoundland) west to MB, south to SC and AR. [= RAB, C, F, FNA, G, GW, K; = *Juncoides saltuense* (Fernald) Small – S; < *L. acuminata* – Pa, W, WV; = *L. acuminata* ssp. *acuminata* – Z]

Luzula acuminata Rafinesque *var.* ***carolinae*** (S. Watson) Fernald. Moist forests. April-August. MA, NY, PA, and se. OH south to n. FL and AR. Perhaps better treated at the species level. [= RAB, C, F, FNA, G, GW, K; = *Juncoides carolinae* (S. Watson) Kuntze – S; < *L. acuminata* – Pa, W, WV; = *L. acuminata* ssp. *carolinae* (S. Watson) Z. Kaplan – Z]

Luzula bulbosa (Wood) Smyth & Smyth. Dry forests and fields. March-August. MA, PA, IN, and NE south to n. FL, LA, and c. TX. [= C, F, FNA, GW, K, Pa, RAB, WV, Z; = *L. campestris* (Linnaeus) A.P. de Candolle var. *bulbosa* Wood – G; = *Juncoides bulbosum* – S; < *L. multiflora* – W]

Luzula echinata (Small) F.J. Hermann, Spreading Wood-rush. Forests, bogs. Se. MA, se. NY PA, WV, and IA south to GA, AL, MS, and e. TX. March-August. [= C, FNA, GW, K, Pa, RAB, WV, Z; > *L. echinata* var. *echinata* – F; > *L. echinata* var. *mesochorea* F.J. Hermann – F; = *L. campestris* (Linnaeus) A.P. de Candolle var. *echinata* (Small) Fernald & Wiegand – G; = *Juncoides echinatum* Small – S; < *L. multiflora* – W]

Luzula multiflora (Ehrhart) Lejeune *var.* ***multiflora***. Forests. March-August. Circumboreal, in North America from NL (Newfoundland), ON, SK, and BC, south to NC, GA, AL, MS, MO, MT, and OR; Eurasia; Costa Rica. [= F, WV; < *L. multiflora* – C, Pa, RAB; = *L. campestris* (Linnaeus) A.P. de Candolle var. *multiflora* (Ehrhart) Celak – G; = *L. multiflora* ssp. *multiflora* var. *multiflora* – K; = *L. multiflora* ssp. *multiflora* – FNA, Z; < *L. multiflora* – W]



99. CYPERACEAE A.L. de Jussieu 1789 (Sedge Family) [in POALES]

A family of about 100 genera and 5000 species, mostly herbs, cosmopolitan. References: Ball, Reznicek, & Murray in FNA (2002b); Muasya et al. (2009); Tucker (1987); Goetghebeur in Kubitzki (1998b).

1 Achene enclosed in a perigynium (a sac-like structure); [subfamily *Caricoideae*, tribe *Cariceae*]..... ***Carex***
1 Achene not enclosed in a perigynium.
  2 Scales obviously and strongly distichously imbricate; spikelets aggregated into spikes or heads; [subfamily *Cyperoideae*].
    3 Inflorescence axillary; leaves predominantly cauline, conspicuously 3-ranked; perianth bristles subtending the achene 6-9; [tribe *Dulichieae*] ..... ***Dulichium***
    3 Inflorescence terminal, more-or-less scapose (though immediately subtended by leafy bracts); leaves predominantly basal, not 3-ranked; perianth bristles absent (*Cyperus* and *Kyllinga*) or present (*Schoenus*); [tribe *Cypereae*].
      4 Perianth bristles present..... ***Schoenus***
      4 Perianth bristles absent.

5 Inflorescences branched; spikelets 1-many-flowered; rachilla elongate; scales broadly rounded.....***Cyperus***
5 Inflorescences unbranched (the spikelets sessile); spikelets 1-2-flowered; rachilla not or only slightly elongate; scales conspicuously keeled .....***Kyllinga***
2 Scales spirally imbricate; spikelets not usually aggregated.
6 Achene (when ripe) bony and white; style base persistent on the summit of the achene, forming a differently-textured or differently-colored tubercle; spikelets all unisexual, the pistillate spikelets 1-flowered, the staminate spikelets several-flowered; [subfamily *Sclerioideae*, tribe *Sclerieae*] .....***Scleria***
6 Achene mostly brown, black, or tan; style base persistent as a differentiated tubercle (*Bulbostylis, Eleocharis, Rhynchospora*) or not (*Cladium, Eriophorum, Fuirena, Hemicarpha, Isolepis, Lipocarpha, Schoenoplectus, Scirpus, Trichophorum*); spikelets mostly or all bisexual; [subfamily *Cyperoideae*].
7 Style base persistent as a differentiated tubercle (this small and inconspicuous in *Bulbostylis* and some spp. of *Rhynchospora*).
8 Leaves consisting of bladeless sheaths; spikelet 1 per stem, terminal (very rarely proliferating and with > 1 spikelet); [tribe *Eleocharideae*].....***Eleocharis***
8 Leaves with well-developed blades; spikelets few to many per stem, usually subtended by foliaceous bracts.
9 Perianth bristles absent; spikelets several-many-flowered; leaves capillary; [tribe *Abildgaardieae*] ..... ***Bulbostylis***
9 Perianth bristles present (rarely absent in species without capillary leaves); spikelets 1-2-flowered (several-many-flowered in some species without capillary leaves); leaves capillary to broad; [tribe *Schoeneae*] .....***Rhynchospora***
7 Style base not persistent as a differentiated tubercle.
10 Achene not subtended by a modified perianth of bristles or scales (in addition to the scales of the spikelets).
11 Involucral bracts 1-3, the lowest erect, appearing like a continuation of the culm, the inflorescence therefore appearing lateral.
12 Achenes 0.5-0.7 mm long, 1.8-3× as long as wide, minutely papillose in longitudinal lines; [tribe *Cypereae*]..... ***Lipocarpha***
12 Achenes 1.2-1.5 mm long, 1-1.4× as long as wide, minutely pitted or transversely rugose.
13 Achenes transversely rugose; [tribe *Fuireneae*].....***Schoenoplectiella***
13 Achenes minutely pitted in longitudinal lines; [tribe *Cypereae*]
14 Spikelets in a loose cluster (not spherical).....***Isolepis***
14 Spikelets agregated into spherical glomerules ..... ***Scirpoides***
11 Involucral bracts 2-several, spreading, the inflorescence therefore appearing terminal.
15 Plants diminutive, to 5 dm tall; leaves 3-15 cm long, to 1 mm wide; [tribe *Abildgaardieae*] ..... ***Bulbostylis***
15 Plants moderate to very robust, 7-30 dm tall; leaves 30-150 cm long, 1.5-15 mm wide.
16 Flowers 1-2 per spikelet; [tribe *Schoeneae*] ..... ***Cladium***
16 Flowers several-many per spikelet.
17 Style fimbriate; leaves 0.5-5 mm wide; [tribe *Abildgaardieae*].....***Fimbristylis***
17 Style smooth; leaves (2-) 5-18 mm wide; [tribe *Scirpeae*].....***Scirpus georgianus***
10 Achene subtended by a modified perianth of either bristles, 3 stalked paddle-like scales, or 1-2 broad-based scales (in addition to the scales of the spikelets).
18 Achene subtended by stalked paddle-like scales or broad-based scales.
19 Achene subtended by a perianth of 3 stalked paddle-like scales; plants 2-7 dm tall; [tribe *Fuireneae*].....***Fuirena***
19 Achene lacking a perianth, but subtended by 1-2 broad-based scales; plants 0.5-3 dm tall; [tribe *Cypereae*] ..... ***Lipocarpha***
18 Achene subtended by bristles.
20 Bristles 10-many, > 5× as long as the achene, white to tawny, straight; [tribe *Scirpeae*] .....***Eriophorum***
20 Bristles 1-6, usually < 4× as long as the achene, brown, straight or conspicuously twisted (twisted if > 3× as long as the achene).
21 Involucral bracts lacking, or consisting only of the slightly modified basal scales of the solitary and terminal spikelet; [of hillsides, upland forests, or cliffs; never (in our area) in marshes, bogs, or streambeds]; [tribe *Scirpeae*] ..... ***Trichophorum***
21 Involucral bracts present, consisting either of a single, erect bract appearing as a continuation of the culm (the inflorescence thus appearing lateral) or of 2 or more spreading, foliaceous bracts (the inflorescence thus appearing terminal); [of marshes, bogs, streambeds, ditches, or (rarely) terrestrial or on rock outcrops].
22 Main involucral bract 1 (rarely 2), erect, appearing as a continuation of the culm (the inflorescence thus appearing lateral, though in some species the longer inflorescence branches may overtop the bract); [tribe *Fuireneae*]
23 Achenes rugulose; plants annual.....***Schoenoplectiella***
23 Achenes smooth; plants perennial.....***Schoenoplectus***
22 Main involucral bracts 2-8, spreading and foliaceous (the inflorescence thus appearing terminal).
24 Spikelets 10-40 mm long, 6-12 mm in diameter, 3-50 per culm; [tribe *Fuireneae*] .....***Bolboschoenus***
24 Spikelets 2.5-19 mm long, 2-4 mm in diameter, usually > 50 per culm; [tribe *Scirpeae*].....***Scirpus***

Bolboschoenus Palla 1905 (Bulrush)

A genus of about 10-16 species, herbs, cosmopolitan. Muasya et al. (2009) indicate that *Bolboschoenus* is in a clade with *Fimbristylis*, *Abildgaardia*, *Bulbostylis*, *Fuirena*, *Eleocharis*, and other genera not in our flora, and therefore not closely related to (or congeneric with) *Schoenoplectus* or *Scirpus*. References: Smith in FNA (2002b); Strong (1994)=Z; Goetghebeur in Kubitzki (1998b).

1 Ventral summit of leaf sheaths truncate or concave, the nerves destined for the leaf margins diverging gradually .....
.....***B. maritimus*** *ssp.* ***paludosus***
1 Ventral summit of leaf sheaths convex, the nerves destined for the leaf margins diverging abruptly, making a nearly right-angle bend.
2 Bristles mostly equaling to surpassing the distinctly trigonous achene ..... ***B. fluviatilis***
2 Bristles shorter than to equaling the lenticular or plano-convex achene.
3 Inflorescence relatively open, with (10-) 15-50 spikelets; bristles persistent .....***B. novae-angliae***
3 Inflorescence relatively congested, mostly with 5-20 spikelets; bristles more or less caducous.....***B. robustus***

Bolboschoenus fluviatilis (Torrey) Soják, River Bulrush. Tidal and river marshes. June-early July; July-August. NB west to SK, BC (Vancouver Island) and WA, south to VA, KY, TN, s. AL, OH, IN, KS, AZ, and CA; Asia; Australia and New Zealand. [= FNA; = *Scirpus fluviatilis* (Torrey) A. Gray – C, F, G; = *Schoenoplectus fluviatilis* (Torrey) M.T. Strong – K, Z]

Bolboschoenus maritimus (Linnaeus) Palla *ssp.* ***paludosus*** (A. Nelson) T. Koyama, Alkali Bulrush, Salt-marsh Bulrush. Marshes. Interruptedly circumboreal, south in North America to VA, NY, MN, MO, OK, TX, and Mexico. [= FNA; > *Scirpus maritimus* var. *maritimus* – C; < *Scirpus maritimus* var. *fernaldii* (Bicknell) Beetle – F (also see *Bolboschoenus novae-angliae*); = *Scirpus maritimus* var. *fernaldii* (Bicknell) Beetle – G; < *Scirpus maritimus* Linnaeus; < *Schoenoplectus maritimus* (Linnaeus) Lye – K, Z]

Bolboschoenus novae-angliae (Britton) S.G. Smith, Salt-marsh Bulrush. Fresh to brackish tidal marshes, ditches. Late June-July; July-September. ME to GA. Probably a hybrid derivative of *Bolboschoenus fluviatilis* and *B. robustus*, but its distinctiveness and ecological behavior suggest that it should be treated as a species; see Schuyler (1975) and Cronquist (1991) for additional discussion. [= FNA; = *Scirpus cylindricus* (Torrey) Britton – C, K, Beal (1977), illegitimate name; < *Scirpus maritimus* var. *fernaldii* (Bicknell) Beetle – F; = *Scirpus robustus* Pursh var. *novae-angliae* (Britton) Beetle – G; = *Schoenoplectus novae-angliae* (Britton) M.T. Strong – K, Z]

Bolboschoenus robustus (Pursh) Soják, Salt-marsh Bulrush. Brackish marshes. Late May-June (-September); late June-September. Along the coasts, from NS to s. FL, west to TX, and into tropical America; also in CA. [= FNA; = *Scirpus robustus* Pursh – RAB, C, F, GW, S, W, WH; = *Scirpus robustus* var. *robustus* – G; = *Schoenoplectus robustus* (Pursh) M.T. Strong – K, Z]

Bulbostylis Kunth (Hairsedge)

A genus of about 100 species, herbs, of tropical and warm temperate areas, concentrated especially in tropical Africa and tropical South America. References: Kral (1971)=Z; Kral in FNA (2002b); Goetghebeur in Kubitzki (1998b).

1 Spikelets sessile, the inflorescence therefore a capitate cluster (sometimes a few spikelets pedicellate, but the pedicels not generally longer than the spikelets, the inflorescence still appearing glomerate).
  2 Inflorescence bracts widened abruptly at its base, the widened portion prominently fimbriate-pectinate; perennial, culms 10-50 cm tall; achene 1-1.3 mm long, white or yellowish, the apex retuse (the three lobes projecting beyond and surrounding the tubercle) .....***B. warei***
  2 Inflorescence bracts not widened abruptly at its base, the membranous margins smooth or ciliate; annual, culms 5-35 cm tall; achene 0.5-1.2 mm long, pale brown or gray, the apex rounded or truncate (the three lobes not exceeding the tubercle).
    3 Inflorescence bracts numerous and conspicuous, several much exceeding the cluster of spikelets; achenes 0.8-1.2 mm long, transversely rugose; spikelet scales usually greenish or pale brown, dull, puberulent.....***B. stenophylla***
    3 Inflorescence bracts few and inconspicuous, none or sometimes one exceeding the cluster of spikelets (and then only slightly); achenes 0.5-0.6 mm long, finely reticulate; spikelet scales usually reddish-brown, lustrous, smooth or nearly so.....***B. barbata***
1 Spikelets mostly on slender pedicels, the inflorescence therefore open and umbel-like.
  4 Achenes finely transversely rugose, tan or brown (when ripe); spikelet scales 1.5-2.0 mm long, with truncate apices.....***B. capillaris***
  4 Achenes very finely papillose and waxy, gray or dark greenish-brown (when ripe); spikelet scales 0.7-1.8 mm long, with obtuse to rounded apices.
    5 Annual, to 1-2 (-3) dm tall; inflorescence a simple (rarely compound) umbel of few (3-9) lance-ovoid spikelets; longest involucral bract seldom exceeding the inflorescence; leaf margins usually hispidulous.....***B. ciliatifolia***
    5 Perennial, to 1.5-4 dm tall; inflorescence a compound (rarely simple) umbel of many (8-30) oblong or lance-linear spikelets; longest involucral bract commonly exceeding the inflorescence; leaf margins usually distinctly tuberculate-scabrid.....***B. coarctata***

* ***Bulbostylis barbata*** (Rottbøll) C.B. Clarke, Old World Hairsedge. Sandy fields; native of the Old World tropics. July-October. [= FNA, GW, K, RAB, W, WH, Z; = *Stenophyllus barbatus* (Rottbøll) Britton – S]

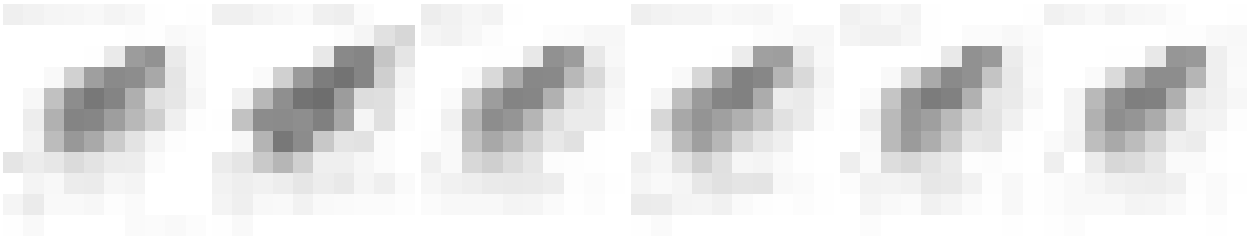
Bulbostylis capillaris (Linnaeus) Kunth ex C.B. Clarke, Common Hairsedge. Thin soils on rock outcrops, especially granite domes and granite flatrocks (but also on mafic rocks, such as diabase), sandy soils, fields, bogs (in FL). July-October. ME to MN, south to Panhandle FL and TX, and west to AZ and CA, also in Mexico, Central America, the West Indies, and s. Asia. This species frequently has a mixture of long and very short culms, the short culms only a few cm long and thus nearly hidden amongst the leaves. [= C, FNA, G, GW, Pa, RAB, W, WH, Z; > *B. capillaris* var. *capillaris* – F; > *B. capillaris* var. *crebra* Fernald – F; > *B. capillaris* var. *isopoda* Fernald – F; = *B. capillaris* ssp. *capillaris* – K; = *Stenophyllus capillaris* (Linnaeus) Britton – S]

Bulbostylis ciliatifolia (Elliott) Fernald, Savanna Hairsedge. Moist to wet sands of savannas, roadsides, disturbed areas. July-October. Se. VA south to s. FL and west to s. AL. Kral (1971) describes this plant as occurring in generally wetter habitats and being much weedier than *B. coarctata*. The sympatry of this taxon and *B. coarctata* suggests that they are best recognized as species. [= F, G; = *Bulbostylis ciliatifolia* (Elliott) Fernald *var. ciliatifolia* – C, FNA, GW, K, Z; < *B. ciliatifolia* – RAB, WH (also see *B. coarctata*); = *Stenophyllus ciliatifolius* (Elliott) C. Mohr – S]

Bulbostylis coarctata (Elliott) Fernald, Elliott's Hairsedge. Sandhills, usually associated with longleaf pine and wiregrass. July-October. Se. VA south to s. FL and west to e. TX, north in the interior to sw. TN; Cuba. [= F, G; = *Bulbostylis ciliatifolia* (Elliott) Fernald *var. coarctata* (Elliott) Kral – C, FNA, GW, K, W, Z; < *B. ciliatifolia* – RAB, WH; = *Stenophyllus coarctatus* (Elliott) Britton – S]

Bulbostylis stenophylla (Elliott) C.B. Clarke. Sandhills, dry savannas, and disturbed sandy areas. July-October. Se. NC south to s. FL, west to w. FL; Cuba. [= RAB, FNA, GW, K, WH, Z; = *Stenophyllus stenophyllus* (Elliott) Britton – S]

Bulbostylis warei (Torrey) C.B. Clarke, Ware's Hairsedge. Sandhills, dry pine flatwoods, dunes. July-October. Se. NC south to s. FL and west to s. AL. [= RAB, FNA, GW, K, Z; = *Stenophyllus warei* (Torrey) Britton – S]



Carex Linnaeus 1753 (Sedge)
(by Alan S. Weakley, with assistance from Bruce A. Sorrie)

A genus of about 2000 (or more) species, herbs, cosmopolitan, especially temperate and boreal. References: Mackenzie (1931-1935)=M; Ball & Reznicek in FNA (2002b); Goetghebeur in Kubitzki (1998b); Frye & Lea (2001). Key to sections adapted closely from FNA.

Key to the keys to the sections of *Carex*

1 Spike 1 per culm, all flowers attached to the main stem in a terminal spike ..... **Key A**
1 Spikes 2 or more per culm (some flowers in lateral spikes)
2 All flowers staminate ..... **Key B**
2 At least some flowers pistillate.
3 Stigmas 2; achenes flat or biconvex in cross-section (lenticular) ..... **Key C**
3 Stigmas (2-) 3 (-4); achenes trigonous or terete in cross-section.
4 Body of perigynium pubescent, scabrous, hispid, or papillose (if papillose, the papillae longer than wide) ..... **Key D**
4 Body of perigynium glabrous or papillose (if papillose the papillae shorter than wide).
5 Bracts sheathless or with sheath < 4 mm long (rarely longer, and then the sheath shorter than the diameter of the stem) ..... **Key E**
5 Bracts (at least the lower) with sheath > 4 mm long (and longer than the diameter of the stem).... **Key F** {not complete at this time}

Key A

1 Leaf blades 20-60 mm wide, without a midrib (with 40-100 parallel nerves all of equal prominence), leathery, the apex obtuse; leaf margin scarious, minutely crisped-ruffled (feeling scaberulous to the touch) ..... ***C. fraseriana***
1 Leaf blades 0.5-25 (-52) mm wide, with a midrib, herbaceous, the apex acute; leaf margin various (smooth or scabrous, but not as described below).
2 Spike entirely staminate.
3 Culms distinctly red or purple at the base ..... ***C. picta*** in **Section 41: *Pictae***
3 Culms yellow to brown or black, without red or purple coloration.
4 Culms shorter than the leaves; widest leaf blades > 2 mm wide ..... **Section 44: *Phyllostachyae***
4 Culms longer than the leaves; widest leaf blades < 2 mm wide ..... ***C. exilis*** in **Section 11: *Stellulatae***
2 Spike pistillate or with both pistillate and stamainate flowers.
5 Stigmas 2; achenes lenticular ..... ***C. exilis*** in **Section 11: *Stellulatae***
5 Stigmas 3; achenes trigonous.
6 Perigynia pubescent near the tip ..... ***C. picta*** in **Section 41: *Pictae***
6 Perigynia glabrous.
7 Spikes gynecandrous; beak of perigynium with apical teeth > 0.3 mm long ..... ***C. squarrosa*** in **Section 34: *Squarrosae***
7 Spikes androgynous or entirely pistillate; beak of perigynium with apex entire, emarginate, or with teeth < 0.2 mm long.
8 Lower pistillate scales > 10 mm long ..... **Section 44: *Phyllostachyae***
8 Lower pistillate scales < 10 mm long.
9 Perigynium beak > 2 mm long, as long as or longer than the perigynium body ..... **Section 44: *Phyllostachyae***
9 Perigynium beak < 2 mm long, or if more, thentapering to the perigynium body and shorter than the body.
10 Perigynia > 4× as long as wide ..... ***C. pauciflora*** of **Section 38: *Leucoglochin***
10 Perigynia < 4× as long as wide ..... **Section 46: *Leptocephalae***

Key B

1 Widest leaves 4-8 mm wide; inflorescences more-or-less capitate (occasionally with the lowermost 1 or 2 spikes separated ..... ***C. kobomugi*** in **Section 8: *Macrocephalae***
1 Widest leaves 1-4 mm wide; inflorescences ovoid to cylindric ..... **Section 10: *Divisae***

Key C

1 Perigynia pubescent, not papillose ..... **Section 39: *Acrocystis***
1 Perigynia glabrous, papillose or not.
2 Lateral spikes usually pedunculate; lowermost inflorescence bracts sometimes with sheath; peduncles with prophyll at base.
3 Pistillate scales (at least the lower) long-awned ..... **Section 13: *Phacocystis***

3 Pistillate scales obtuse to acuminate or cuspidate.
4 Perigynia smooth; style persistent on the achene ..... **Section 30: *Vesicariae***
4 Perigynia often papillose over most of the surface; style deciduous ..... **Section 13: *Phacocystis***
2 Lateral spikes sessile; bracts sheathless; peduncles without (or rarely with) a prophyll
5 Perigynia papillose (visible at 20× magnification).
6 Terminal spike staminate, androgynous, or gynecandrous (if gynecandrous, the staminate flowers more numerous than the pistillate); lateral spikes at least 2× as long as wide ..... **Section 13: *Phacocystis***
6 Terminal spike staminate or gynecandrous (if gynecandrous, the pistillate flowers more numerous than the pistillate); lateral spikes not much longer than wide ..... **Section 9: *Glareosae***
5 Perigynia smooth.
7 Terminal spike gynecandrous; lateral spikes gynecandrous or pistillate.
11 Margins of perigynia flat, at least in the upper ½, flat portion (measured at the tip of the achene and base of beak) > (0.1-) 0.2 mm wider
12 Achenes rounded at apex (style dehiscing at the surface of the achene); style conspicuously enlarged at the base ..... **Section 10: *Deweyanae***
12 Achenes with short apiculus formed by the persistent base of the style; style not conspicuously enlarged at base ..... **Section 12: *Ovales***
11 Margins of perigynia rounded, or with flat portion < 0.1 mm wide.
13 Margins of perigynia rounded or with a very narrow rounded edge; achenes nearly filling the perigynium bodies ..... **Section 9: *Glareosae***
13 Margins of perigynia sharply edged or narrowly winged; achenes distinctly smaller than the perigynium bodies.
14 Inflorescences in fruit 1-1.5× as long as wide ..... **Section 12: *Ovales***
14 Inflorescences in fruit 1.5-2 (or more)× as long as wide.
15 Lowermost perigynia in each spike spreading ..... **Section 11: *Stellulatae***
15 Lowermost perigynia in each spike ascending or erect.
16 Perigynium serrulate on the margins of the upper body and lower beak ..... **Section 10: *Deweyanae***
16 Perigynium entire on the margins of the upper body and the lower beak ..... **Section 12: *Ovales***
7 Terminal spike androgynous (rarely entirely staminate or entirely pistillate); lateral spikes androgynous, staminate, or pistillate.
8 Sheath fronts of lower cauline leaves transversely rugose.
9 Perigynia mostly > 2× as long as wide, widest near the base ..... **Section 1: *Vulpinae***
9 Perigynia mostly < 2× as long as wide, widest near middle.
10 Inflorescence usually branched, at least at the base, usually with > 15 spikes; pistillate scales usually yellow or brown, sometimes with hyaline margins, 3-veined ..... **Section 3: *Multiflorae***
10 Inflorescence unbranched or with 1 or 2 short branches at the base, with < 15 spikes; pistillate scales greenish hyaline, 1-veined ..... **Section 4: *Phaestoglochin***
8 Sheath fronts of lower cauline leaves smooth (or very weakly and indistinmctly transversely rugose).
17 Fronts of leaf sheaths dotted red, brown, or yellow.
18 Perigynia widest near the base; culms usually > 1 mm wide ..... **Section 1: *Vulpinae***
18 Perigynia widest near the middle; culms usually < 1 mm wide.
19 Plants densely cespitose, with short rhizomes; pistillate scales acute to acuminate ..... **Section 2: *Heleoglochin***
19 Plants loosely cespitose, sometimes with long rhizomes; pistillate scales (at least the upper) obtuse ..... **Section 3: *Multiflorae***
17 Fronts of leaf sheaths not dotted red, brown, or yellow.
20 Upper leaves of culms with front of sheaths green-veined, not differentiated from the rest of the sheath ..... **Section 5: *Holarrhenae***
20 Upper leaves of culms with front of sheaths with at least a narrow hyaline or whitish-hyaline band extending at least ½ the length of the sheath.
21 Perigynia with flat, winglike margins > 0.1 mm wide; plants long-rhizomatous, not cespitose, sometimes forming large colonies ..... **Section 7: *Ammoglochin***
21 Perigynia without a flat margin, or with a flat margin < 0.1 mm wide; plants short-rhizomatous or inconspicuously rhizomatous, cespitose or not, sometimes forming large colonies.
22 Plants colonial from long rhizomes ..... **Section 6: *Divisae***
22 Plants cespitose.
23 Spikes not consistently androgynous, the terminal either entirely staminate or pistillate, the lateral spikes irregularly pistillate, or staminate, or mixed ..... **Section 11: *Stellulatae***
23 Spikes consistently androgynous, occasionally some of the lateral spikes entirely pistillate.
24 Perigynium widest near the base, tapering from base to beak ..... **Section 1: *Vulpinae***
24 Perigynium widest above the base, often abruptly beaked ..... **Section 4: *Phaestoglochin***

Key D

1 Pistillate spikes all from the base of the plant ..... **Section 39: *Acrocystis***
1 Pistillate spikes all or in part borne on the elongate, aboveground stem.
2 Bracts of the lowermost non-basal spike with well-developed sheath > 4 mm long.
3 Beak of perigynium with distinct teeth > 0.6 mm long ..... **Section 29: *Carex***
3 Beak of perigynium entire, notched, or with indistinct teeth < 0.6 mm long.
4 Bracts of the lowermost non-basal spike bladeless, or with a blade < 2 mm long.
5 Perigynia 2.0-2.9 mm long; leaf blades 0.9-3.3 mm wide ..... ***C. richardsonii*** in **Section 40: *Clandestinae***
5 Perigynia 4-5 mm long; leaf blades 4-8 mm wide ..... ***C. baltzellii*** in **Section 41: *Pictae***
4 Bracts of the lowermost non-basal spike with blade > 3 mm long (and often much longer).
6 Achene tip with persistent, enlarged, circular style base ..... ***C. caryophyllea*** in **Section 42: *Mitratae***
6 Achene tip with at most a short apiculus.
7 Leaves pubescent or pilose ..... **Section 23: *Hymenochlaenae***

7 Leaves usually glabrous.
8 Bases of plants brown ..... ***C. tenax*** in **Section 26: *Hallerianae***
8 Bases of plants distinctly red or purple.
9 Lowermost pistillate scales awned; leaves somewhat septate-nodulose; plants usually long-rhizomatous and forming large clonal colonies ..... **Section 28: *Paludosae***
9 Lowermost pistillate scales obtuse to acuminate; leaves not septate-nodulose; plants cespitose, short-rhizomatous ..... **Section 23: *Hymenochlaenae***
2 Bracts of the lowermost non-basal spike sheathless or with sheath < 4 mm long.
10 Perigynia > 10 mm long.
11 Pistillate spoikes globose, about as long as wide; staminate spikes usually 1 ..... **Section 31: *Lupulinae***
11 Pistillate spikes cylindric, much longer than wide; staminate spikes 1-8 ..... **Section 29: *Carex***
10 Perigynia < 10 mm long.
12 Perigynium beak with 2 teeth > 0.6 mm long ..... **Section 29: *Carex***
12 Perigynium beak entire or with teeth < 0.6 mm long.
13 Terminal spike gynecandrous or pistillate ..... **Section 24: *Porocystis***
13 Terminal spike staminate (or rarely androgynous).
14 Leaf sheaths (and usually the blades as well) pubescent.
15 Pistillate scales sometimes pubescent; pistillate spikes with 40-200 perigynia ..... **Section 28: *Paludosae***
15 Pistillate scales glabrous; pistillate spikes with < 40 (-50) perigynia.
16 Perigynia usually < 3.2 mm long, the apex rounded and beakless, or abruptly beaked ..... **Section 24: *Porocystis***
16 Perigynia > 3.5 mm long, the tip tapering or abruptly beaked.
17 Longer peduncles of pistillate spikes > 1 cm long; perigynia > 3× as long as wide, tapering gradually to the base ..... **Section 23: *Hymenochlaenae***
17 Longer peduncles of pistillate spikes 0-1 cm long; perigynia < 3× as long as wide, abruptly contracted to a short stipe at the base.
18 Perigynia distinctly 20-30-veined; beak < 0.5 mm long ..... **Section 26: *Hallerianae***
18 Perigynia veinless except for 2 marginal veins; beak > 0.7 mm long ..... **Section 27: *Hirtifoliae***
14 Leaf sheaths and blades glabrous.
19 Achene tip with persistent, enlarged, circular style base ..... ***C. caryophyllea*** in **Section 42: *Mitratae***
19 Achene tip with at most a short apiculus.
20 Leaf blades scabrous on the upper surface; beak of perigynium recurved ..... ***C. scabrata*** in **Section 25: *Anomalae***
20 Leaf blades glabrous on the upper surface, often with rough margins or tip; beak of perigynium straight.
21 Fronts of sheaths of lower leaves ladder-fibrillose; leaves and sheaths septate-nodulose (sometimes obscurely so) ..... **Section 28: *Paludosae***
21 Fronts of leaf sheaths not ladder-fibrillose, sometimes breaking into longitudinal fibers; leaves and sheaths not septate-nodulose.
22 Perigynia strongly 12-30-veined.
23 Leaf blades, at least toward the tip, M-shaped in cross-section when young, the upper surface usually with 2 marginal veins more prominent than the midvein; staminate spikes 1-4 ..... **Section 28: *Paludosae***
23 Leaf blades V-shaped in cross-section when young, the upper surface lacking 2 marginal veins more prominent than the midrib; staminate spike 1 ..... **Section 39: *Acrocystis***
22 Perigynia 0-12-veined.
24 Plants with at least some pistillate spikes basal; culms much shorter than the leaves ..... **Section 39: *Acrocystis***
24 Plants with most pistillate spikes on obvious elongated stems; culms shorter than or longer than the leaves.
25 Upper leaves with blades > 2 cm long, longer than the sheaths ..... **Section 39: *Acrocystis***
25 Upper leaves bladeless or with blades < 1 cm long and also shorther than the sheaths ..... **Section 40: *Clandestinae***

[26a] Section 1: *Vulpinae*

A section of ca. 15 species, of North America, temperate Eurasia, Africa, and Australia. References: Jones & Reznicek (1995); Standley in FNA (2002b). Key 2 adapted from Jones & Reznicek (1995).

Key 1a

1 Leaf sheath fronts yellow, thickened, and not fragile at the top; leaf blades papillose adaxially (at 25× magnification) ..... ***C. laevivaginata***
1 Leaf sheath fronts green or whitish, thin, and fragile at the top; leaf blades not papillose adaxially.
2 Leaf sheath fronts smooth.
3 Larger perigynia 6-8 mm long; leaves to 12 mm wide ..... ***C. crus-corvi***
3 Larger perigynia 3-5 mm long; leaves to 7 mm wide.
4 Perigynia smoothly rounded at base, not distended; perigynium veins 3-5 abaxially, 0 adaxially ..... ***[C. alopecoidea]***
4 Perigynia cordate at base, distended; perigynium veins 10-12 abaxially, 7 adaxially ..... ***C. oklahomensis***
2 Leaf sheath fronts rugose.
5 Perigynia broadly rounded at base, not distended; perigynium veins 3-5 abaxially, 0 adaxially ..... ***C. conjuncta***
5 Perigynia cordate or truncate at base, distended; perigynium veins 15 abaxially, 7 adaxially.
6 Perigynia (5-) avg. 5.4 (-6) mm long, the beak > 3 mm long; larger leaves mostly 8-17 mm wide; perigynium scales cuspidate to short-awned; [mostly of the Coastal Plain and lower Piedmont] ..... ***C. stipata*** *var*. ***maxima***
6 Perigynia (4-) avg. 4.7 (-5) mm long, the beak < 2.5 mm long; larger leaves mostly 4-10 mm wide; perigynium scales acuminate to cuspidate; [widespread in our area] ..... ***C. stipata*** *var*. ***stipata***

Key 1b

1 Beak of the perigynium shorter than the body.
  2 Perigynia somewhat abruptly contracted into a beak ca. 0.5 × as long as the perigynium body; ventral surface of the perigynium with several incomplete veins basally; culms sharply triangular and narrowly winged, somewhat spongy and easily crushed; dorsal leaf sheaths green; ventral leaf sheaths with scattered red dots, and transversely rugose; [normally of shaded locations]..... ***C. conjuncta***
  2 Perigynia tapering into a beak, much shorter than the perigynium body; ventral surface of the perigynium with several inconspicuous complete veins; culms inconspicuously triangular to roundish, not winged, neither spongy nor easily crushed; dorsal leaf sheaths dark blue-green with conspicuous white dots; ventral leaf sheaths without scattered red dots, not transversely rugose; [nomally of sunny locations]..... ***C. oklahomensis***
1 Beak of the perigynium as long as, or longer than, the body.
  3 Ventral leaf sheath margins with orange-red dots; achene ovate-lanceolate; perigynium wall adhering to achene ..... ***C. crus-corvi***
  3 Ventral leaf sheath margins without orange-red dots; achene broadly ovate to ovate-orbicular; perigynium wall not adhering to the achene (or only slightly so).
    4 Ventral leaf sheaths not transversely rugose, more or less concave at the apex and not prolonged upward past the base of the blade, thickened, not friable ..... ***C. laevivaginata***
    4 Ventral leaf sheaths transversely rugose, more or less convex at the apex and prolonged upward past the base of the blade, friable.
      5 Perigynia (5-) avg. 5.4 (-6) mm long, the beak > 3 mm long; larger leaves mostly 8-17 mm wide; perigynium scales cuspidate to short-awned; [mostly of the Coastal Plain and lower Piedmont] ..... ***C. stipata*** *var.* ***maxima***
      5 Perigynia (4-) avg. 4.7 (-5) mm long, the beak < 2.5 mm long; larger leaves mostly 4-10 mm wide; perigynium scales acuminate to cuspidate; [widespread in our area] ..... ***C. stipata*** *var.* ***stipata***

[26b] Section 2: *Heleoglochin (Paniculatae)*

A section of 11-12 species, of temperate North America, Eurasia, n. Africa, and Australasia. References: Cochrane in FNA (2002b).

1 Inflorescence 7-15 cm long, the basal 3-9 branches well-separated from one another; perigynia broadly obovoid, 1.3-1.5× as long as wide; sheaths concave at the mouth; leaves 3-8 mm wide; [of swamps of the Coastal Plain and lower Piedmont] ..... ***C. decomposita***
1 Inflorescence 2-8 cm long, the basal 1-5 branches indistinct to slightly separated; perigynia ovoid to lance-ovoid, ca. 2× as long as wide; sheaths prolonged beyond the blade; leaves 1-3 mm wide; [of Mountain wetlands in VA (and TN?) and northward].
  2 Inner band of leaf sheath whitish (and red-dotted); basal branches of inflorescence overlapping; perigynia not concealed by the scales..... ..... ***C. diandra***
  2 Inner band of leaf sheath strongly copper-colored (and also red-dotted); basal branches of inflorescence often weakly separated; perigynia nearly or completely concealed by the scales ..... ***C. prairea***

[26c] Section 3 – section *Multiflorae*

A section of 7 species, of North America (including Mexico). References: Standley in FNA (2002b). Key based on FNA.

1 Perigynia red-dotted ..... ***C. triangularis***
1 Perigynia not red-dotted.
  2 Perigynia golden yellow or yellowish-brown at maturity ..... ***C. annectens***
  2 Perigynia dull yellow-green or pale brown at maturity.
    3 Leaves longer than the flowering stem; perigynia 2.0-3.2 mm long, 1.3-1.8 mm wide, the beak 1/3-1/2 the length of the body..... ..... ***C. vulpinoidea***
    3 Leaves shorter than the flowering stem; perigynia 3.2-4.0 mm long, 2.0-2.6 mm wide, the beak ca. 1/3 as long as the body.
      4 Awn of pistillate scales 1-3 mm long; adaxial surface of perigynia with 3-5 nerves; [native, of wet pine savannas of se. SC, GA southward ..... ***C. fissa*** *var.* ***aristata***
      4 Awn of pistillate scales 0.5-1.5 mm long; adaxial surface of perigynia lacking nerves; [introduced in our area from sc. United States, of disturbed sites] ..... ***C. fissa*** *var.* ***fissa***

[26d] Section 4 – section *Phaestoglochin (Bracteosae)*

A section of ca. 27 species, mainly of temperate North America. References: Ball in FNA (2002b); Webber & Ball (1984). Key adapted from FNA, C, M, and Webber & Ball (1984).

1 Sheaths loose, membranaceous, and fragile on the ventral side, septate-nodulose and usually mottled or striped with green and white on the dorsal side.
  2 Bodies of pistillate scales 1.5-2.5 mm long, 1.1-1.8 mm wide, mostly < ½ as long as the perigynia, apex obtuse to acuminate to shortly awned.
    3 Basal intermodes of the inflorescence usually < 1 cm long, and usually < 2× as long as the spikes; bodies of perigynia with wing < 0.1 mm wide ..... ***C. cephaloidea***
    3 Basal internodes of the inflorescence usually >2 cm long, at least 2× as long as the spikes; bodies of perigynia with wing 0.1-0.2 mm wide ..... ***C. sparganioides***
  2 Bodies of pistillate scales 2.2-4.4 mm long, 1.2-2.4 mm wide, mostly > ½ as long as the perigynia, apex acuminate to awned.
    4 Fronts of leaf sheaths yellow or brownish, thick, firm, the back often white-spotted..... ***C. aggregata***
    4 Fronts of leaf sheaths white, hyaline, fragile, the backs not white-spotted.
      5 Perigynia 4-5 mm long, 2× as long as wide; perigynia nerveless or very obscurely nerved on the dorsal face... ***C. gravida*** *var.* ***gravida***
      5 Perigynia 3-4.5 mm long, 1.3-1.5× as long as wide; perigynia strongly few-nerved on the dorsal face..... ***C. gravida*** *var.* ***lunelliana***
1 Sheaths tight on the ventral side, neither septate-nodulose nor mottled with green and white on the dorsal side.
  6 Perigynia corky-thickened in the lower 1/3 to 1/2 (and not > 4.0 mm long); perigynia spreading or reflexed at maturity; perigynia (2-) 3-12 (-20) per spike; leaves 0.5-3 mm wide.
    7 Beak of perigynium smooth; pistillate scales acuminate, early deciduous.

8 Average perigynium width ≥ 1.3 mm; average spongy portion of the perigynium ≥ 1.1 mm long; perigynium base distinctly nerved, bulging on the ventral surface, making the perigynium biconvex in cross-section; perigynium 2-2.5× as long as wide; perigynium gradually narrowed to a short beak; leaves 1-3 mm wide ..... ***C. retroflexa***

8 Average perigynium width < 1.3 mm; average spongy portion of the perigynium < 1.1 mm long; perigynium base nerveless, flattened on the ventral surface, making the perigynium planoconvex in cross-section; perigynium ca. 3× as long as wide; perigynium narrowed to a conspicuous beak; leaves 0.75-1.5 mm wide ..... ***C. texensis***

7 Beak of perigynium serrulate; pistillate scales obtuse, persistent.

9 Plants with creeping rhizomes, the culms arising scattered along the rhizome; perigynia 4-5× as long as wide..... ***C. socialis***

9 Plants densely cespitose, the culms arising from the center of clump; perigynia 2-3× as long as wide.

10 Widest leaves 0.9-1.7 mm wide; base of fertile culm 0.7-1.4 mm wide.

11 Base of perigynium cuneate to rounded; distance from base of perigynium to base of achene 0.1-0.5 mm; [primarily of the Mountains in our area]..... ***C. appalachica***

11 Base of perigynium rounded to truncate; distance from base of perigynium to base of achene 0.5-0.9 mm; [widespread in our area]..... ***C. radiata***

10 Widest leaves 1.7-3.0 mm wide; base of fertile culm 1.4-2.2 mm wide.

12 Stigmas 0.03-0.06 mm thick, straight to slightly twisted; widest leaves < 2.0 mm wide; perigynia 3-7 (-8) per spike ... ***C. radiata***

12 Stigmas 0.07-0.10 mm thick, mostly coiled; widest leaves > 1.7 mm wide; perigynia (6-) 7-14 (-20) per spike..... ***C. rosea***

6 Perigynia not conspicuously corky-thickened at base (except corky-thickened in the rare alien, *C. spicata*, which has perigynia 4.0-5.5 mm long); perigynia ascending to spreading at maturity; perigynia (3-) 8-40 per spike; leaves 1-5 mm wide.

13 Inflorescence ovoid in outline, the spikes densely aggregated, nearly indistinguishable except by the projecting setaceous bracts which subtend each spike.

14 Perigynia 1.3-1.7× as long as wide, widest near the broadly rounded, truncate, or even subcordate base ..... ***C. leavenworthii***

14 Perigynia 1.6-2.5× as long as wide, widest just below the middle, the base broadly cuneate to rounded.

15 Pistillate scales (excluding the awns) shorter than the perigynium body; culms not greatly exceeding the leaves ... ***C. cephalophora***

15 Pistillate scales (excluding the awns) as long as or exceeding the perigynium body; culms much exceeding the leaves .... ***C. mesochorea***

13 Inflorescence spicate-racemose, the individual spikes readily distinguishable (often separated by an exposed internode of the axis).

16 Pistillate scales brown or reddish-purple; [alien, sparsely naturalized in our area].

17 Roots and basal sheaths brown to black; perigynia not corky-thickened at base; ligule blunt, wider than long ..... ***C. divulsa***

17 Roots and basal sheaths purplish-tinted; perigynia corky-thickened at base; ligule acute, longer than wide..... ***C. spicata***

16 Pistillate scales green, hyaline, or pale tan; [native in our area (except *C. austrina* and *C. muricata* ssp. *lamprocarpa*), common and widespread in our area].

18 Spikes with 5-10 perigynia; pistillate scales brown with green-veined center..... ***C. muricata*** *ssp.* ***lamprocarpa***

18 Spikes with 8-20 perigynia; pistillate scales scarious-white (rarely brown) with green-veined center.

19 Perigynia ascending, nerveless on the ventral surface; scales awned, the awns 1.5-4 mm long; lowest inflorescence bract elongate, the free portion 1-5 cm long ..... ***C. austrina***

19 Perigynia spreading, either nerved or nerveless on the upper (ventral) surface; scales acuminate or with an awn to 1.5 (-2.0) mm long; lowest inflorescence bract short, delicate, the free portion 0.5-2 cm long.

20 Perigynia 3.0-3.5 mm long, nerveless on the upper (ventral) face..... ***C. muehlenbergii*** *var.* ***enervis***

20 Perigynia 3.5-4.0 mm long, nerved on both faces ..... ***C. muehlenbergii*** *var.* ***muehlenbergii***

[26h] Section 5 – section *Holarrhenae (Intermediae)*

A section of 2 species, of temperate Northern Hemisphere. References: Reznicek & Catling in FNA (2002b).

One species ..... ***C. sartwellii***

[26i] Section 6 – section *Divisae*

A section of 14 species, subcosmopolitan. References: Reznicek & Catling in FNA (2002b).

1 Beak of the perigynium 1/5 to 1/3 as long as the body; spikes 2-7; [alien, naturalized primarily in brackish to salty coastal habitats] .. ***C. divisa***

1 Beak of the perigynium 1/3 to 1/2 as long as the body; spikes 5-15; [alien, naturalized primarily inland along highways treated with salt]..... ..... ***C. praegracilis***

[26j] Section 7 – section *Ammoglochin (Arenariae)*

A section of 14 species, of temperate Northern Hemishere. References: Reznicek in FNA (2002b). Key based closely on FNA

1 Perigynia thin-margined and prominently winged at base of beak; pistillate scales usually longer than perigynia; terminal spike usually staminate; [alien in maritime situations] ..... ***C. arenaria***

1 Perigynia thin-margined, lacking a prominent, expanded wing; pistillate scales shorter than to nearly equaling the perigynia; terminal spike usually pistillate or androgynous; native, inland]..... ***C. siccata***

[26k] Section 8 – section *Macrocephalae*

A section of 2 species, of maritime e. Asia and nw. North America. References: Mastrogiuseppe in FNA (2002b).

One species ..... ***C. kobomugi***

[26m] Section 9 – section *Glareosae (Heleonastes)*

A section of 20-25 species, circumboreal, but extending in montane areas to South America, New Zealand, and Australia. References: Toivonen in FNA (2002b).

1 Spikes (1-) 2 (-3); perigynia 1-5 per spike, 2.5-4 mm long.
  2 Leaves 0.3-0.8 mm wide, filiform-involute; ligules 0.3-0.8 (-1.2) mm long; inflorescences 14-32 mm long; spikes 2-3 per inflorescence; terminal spike with 1-3 perigynia per spike; [south to PA and s. NJ] ..... ***C. billingsii***
  2 Leaves 0.8-1.9 mm wide, flat or thinly M-shaped; ligules 0.5-1.9 mm long; inflorescences (14-) 23-55 mm long; spikes (2-) 3-4 per inflorescence; terminal spike with (1-) 2-6 perigynia per spike; [south to w. NC] ..... ***C. trisperma***
1 Spikes 4-9; perigynia 5-30 per spike; 1.7-2.5 mm long.
  3 Perigynia (10-) 15-30 per spike; perigynium without ventral nerves (or the nerves very obscure); spike at maturity somewhat bristly appearing in silhouette because of the perigynium beaks ..... ***C. brunnescens*** *var.* ***sphaerostachya***
  3 Perigynia 5-10 (-15) per spike; perigynium ventrally nerved; spike at maturity nearly smooth in silhouette (the perigynium beaks strongly appressed)
    4 Culms 15-60 cm tall; inflorescence 3-5 (-7) cm long, all but the lowest spikes approximate, the lowest spikes 0.5-2.5 cm apart ..... ***C. canescens*** *var.* ***canescens***
    4 Culms 30-90 cm tall; inflorescences 6-12 (-15) cm long, the lower and middle spikes well-spaced, the lowest spikes 2-5 cm apart ..... ***C. canescens*** *var.* ***disjuncta***

[26n] Section 10 – section *Deweyanae*

A section of 8 species, of North America and e. Asia. References: Naczi (1990); Naczi in FNA (2002b).

1 Widest leaf (1.3-) 1.5-2.9 (-3.1) mm wide; culms (0.5-) 0.6-1.0 (-1.1) mm thick at mid-height; plant densely to loosely cespitose, the rhizome internodes 0.2-20 mm long; [of swamp forests and other wetlands, widespread in our area] ..... ***C. bromoides*** *ssp.* ***bromoides***
1 Widest leaf 2.8-4.4 mm wide; culms 1.0-1.6 mm thick at mid-height; plants densely cespitose, the rhizome internodes 0.2-1.0 (-8.5) mm long; [of seeps and bogs in the Blue Ridge and Blue Ridge Escarpment region] ..... ***C. bromoides*** *ssp.* ***montana***

[26o] Section 11 – section *Stellulatae*

A section of ca. 15 species, semicosmopolitan (except Africa). References: Reznicek & Ball (1980); Reznicek in FNA (2002b). Key based on Reznicek & Ball (1980).

1 Spikes usually solitary; leaves involute; anthers 2.0-3.6 mm long; [rare disjuncts in Coastal Plain bogs] ..... ***C. exilis***
1 Spikes 2-8; leaves flat or folded; anthers 0.6-2.2 (-2.4) mm long.
  2 Perigynium beak smooth-margined (use at least 10× magnification) ..... ***C. seorsa***
  2 Perigynium beak serrulate on margin (use at least 10× magnification).
    3 Widest leaves 2.8-5.0 mm wide.
      4 Lower perigynia of spikes mostly 1.1-1.6× as long as wide; perigynia mostly 2.1-3.0 mm wide ..... ***C. atlantica***
      4 Lower perigynia of spikes (1.5-) 1.7-3× as long as wide; perigynia mostly 1.2-2.0 mm wide ..... ***C. ruthii***
    3 Widest leaves 0.8-2.7 mm wide.
      5 Terminal spikes entirely staminate; anthers (1.0-) 1.2-2.2 (-2.4) mm long ..... ***C. sterilis***
      5 Terminal spikes partly or entirely pistillate; anthers 0.6-2.2 (-2.4) m long.
        6 Terminal spikes without a distinct narrowed base of staminate scales, the staminate portion < 1 mm long ..... ***C. sterilis***
        6 Terminal spikes with a distinct narrowed base of staminate scales 1.0-16.5 mm long.
          7 Lower perigynia 2.0-3.0 mm wide ..... ***C. atlantica***
          7 Lower perigynia 0.9-2.0 mm wide.
            8 Lower perigynia mostly 2.8-4.8 mm long; lower perigynia (1.7-) 1.8-3.6× as long as wide; perigynia beaks 0.95-2.0 mm long, mostly 0.45-0.85× as long as the perigynium body ..... ***C. echinata*** *ssp.* ***echinata***
            8 Lower perigynia mostly 1.9-3.0 mm long; lower perigynia 1.0-2.0 (-2.2)× as long as wide; perigynia beaks 0.4-0.95 mm long, mostly 0.2-0.5× as long as the perigynium body.
              9 Perigynia mostly nerveless over the achene on the adaxial surface; beak of perigynia conspicuously setulose-serrulate; perigynia often more-or-less convexly tapered from widest point to the beak, thus forming a weak shoulder; [of calcareous sites, in our area restricted to the Mountains of VA] ..... ***C. interior***
              9 Perigynia mostly 1-10-nerved over the achene on the adaxial surface; beak of perigynia more sparsely serrulate, with definite spaces between the often single teeth; perigynia more-or-less cuneate or concavely tapered from widest point to the beak, not forming a shoulder; [of a variety of situations, not generally calcareous].
                10 Widest leaves 1.6-2.7 mm wide; infructescence mostly 18-45 mm long; [widespread in our area] ..... ***C. atlantica***
                10 Widest leaves 0.6-1.6 mm wide; infructescence mostly 8-20 mm long; [primarily of the Coastal Plain in our area, widely scattered elsewhere] ..... ***C. howei***

[26q] Section 12 – section *Ovales*

A section of ca. 85 species, largely North American, but also occurring in Central and South America and Eurasia. References: Mastrogiuseppe et al. in FNA (2002b); Rothrock, Reznicek, & Hipp (2009); Rothrock, Reznicek, & Ganion (1997). Key closely adapted from FNA.

1 Pistillate scales uniformly as long as or longer than the mature perigynia, usually concealing the beaks (though not necessarily the bodies), apex obtuse to acuminate, not awned.
  2 Perigynium beak cylindric, unwinged, lacking serrations for ca. 0.4 mm below the apex ..... ***C. ovalis***

2 Perigynium beak flattened, ciliate-serrulate all the way to the apex.
3 Principal leaves stiff, more-or-less glaucous, often bearing auricles at the base, the summit of the sheaths truncate, prolonged 1-4 mm beyond the collar; flat margins of perigynia 0.5-0.8 mm wide; achenes 1.0-1.2 mm wide; [of maritime dunes and shores]..... ***C. silicea***
3 Principal leaves pliable, green, almost always without auricles, the summit of the sheaths U-shaped, only slightly prolonged beyond the collar; flat margins of perigynia 0.2-0.6 mm wide; achenes 1.0-1.7 mm wide; [of inland, non-maritime habitats].
4 Perigynia ascending to spreading, strongly and evenly veined on the adaxial face, finely granular-papillose; spikes (3-) 7-15, the uppermost usually densely aggregated .....***C. argyrantha***
4 Perigynia erect-ascending, often veinless on the adaxial face or with a few veins of unequal strength, smooth; spikes 3-7 (-11), the uppermost often more-or-less separated .....***C. foenea***

1 Pistillate scales (excluding the awns, if present) shorter than the perigynia at least in the middle portions of the spikes, the apical portion of the pistillate scales narrower than the perigynia braks and not completely covering them, the apex awned in some species.
5 Pistillate scales in middle or lower portions of spikes with apex acuminate with subulate or awned tip.
6 Perigynia 2.6-4.0 × as long as wide, the bodies lanceolate, 1.2-2.0 mm wide.....***C. scoparia*** *var.* ***scoparia***
6 Perigynia < 2.5 × as long as wide, the bodies lance-ovate, ovate, broadly elliptic, orbiculate, or obovate, 1.8-3.9 mm wide.
7 Perigynium body obovate, often with conspicuous “shoulders;” leaves 2.5-6 mm at widest.....***C. alata***
7 Perigynium body elliptic, suborbiculate, or weakly obovate; leaves 1-3 (-4.2) mm at widest.
8 Perigynium body cuneately tapered to the base, the body of the perigynium more-or-less diamond-shaped; inflorescences dense, stiffly erect, with 3-5 spikes.....***C. suberecta***
8 Perigynium body convexly tapered to the base (the base rounded), the body of the perigynium ovate, elliptic, orbiculate, or weakly obovate; inflorescences dense and erect or open and nodding, with 3-11 spikes.
9 Scales with white-hyaline or pale yellowish margins; perigynia greenish to straw-colored or pale brown, (2.3-) 2.5-4.0 (-4.2) mm long, often indistinctly 0-4 (-6) veined on the outer side .....***C. festucacea***
9 Scales with reddish-brown margins; perigynia reddish-brown, (3.8-) 4.0-5.5 mm long, conspicuously veined on the outer side with 5 or more veins.
10 Beaks ascending, < ½ the length of the lance-ovate to weakly obovate perigynium body; lateral spikes with acute staminate bases mostly < 2 mm long; [of tidal marshes].....***C. hormathodes***
10 Beaks widely spreading, > ½ the length of the suborbicular perigynium body; lateral spikes with tapered staminate bases 2-6 mm long; [of freshwater wetlands].....***C. straminea***
5 Pistillate scales with apex obtuse, acute, or acuminate (but not subulate or awned).
11 Perigynia < 2 mm wide.
12 Perigynia thin, often not winged to the base; leaf sheaths somewhat expanded toward the apex, bearing narrow wings continuous with the midvein and the edges of the leaf blade; leaves 3-7.5 mm wide; vegetative shoots tall, conspicuous, with numerous leaves spaced along the upper half of the culm.
13 Lower perigynia of each spike spreading or recurved (at an angle of > 80 degrees); spikes globose; pistillate scales hidden, 1.6-2.3 mm long.....***C. cristatella***
13 Lower perigynia of each spike appressed-ascending to somewhat spreading (at a 30-75 degree angle); spikes subglobose to ovate-oblong; pistillate scales evident, 2.0-3.0 mm long.
14 Inflorescences usually flexible, nodding at the tip, the lower spikes usually separated; perigynia usually 15-40, spreading at a 40-75 degree angle to the spike axis; leaf sheaths firm or friable at the summit .....***C. projecta***
14 Inflorescences straight and stiff, the lower spikes overlapping; perigynia usually > 40, appressed-ascending at a 30-40 degree angle to the spike axis; leaf sheaths firm at the summit.
15 Perigynia 3.0-4.0 mm long, 2.2-2.8 (-3) × as long as wide..... ***C. tribuloides*** *var.* ***sangamonensis***
15 Perigynia (3.3-) 3.6-5.4 mm long, 3-5 × as long as wide.....***C. tribuloides*** *var.* ***tribuloides***
12 Perigynia thick, winged to the base; leaf sheaths with more-or-less rounded edges, not distinctly expanded toward the apex; leaves 1-4.5 mm wide (except in *C. normalis*); vegetative shoots usually inconspicuous, with relatively few leaves clustered at the tip.
16 Perigynia (2.5-) 2.6-4 × as long as wide, the body lanceolate, distance from beak tip to top of achene 2.2-5 mm.....***C. scoparia*** *var.* ***scoparia***
16 Perigynia < 2.5 × as long as wide, the body obovate, orbiculate, or ovate; distance from beak tip to top of achene 0.8-2.2 mm.
17 Perigynium body obovate, widest toward the tip (excluding the beak).
18 Perigynium beak spreading, slender; pistillate scales acute; styles sinuous at base.....***C. albolutescens***
18 Perigynium beak appressed-ascending, triangular; pistillate scales obtuse; styles straight.....***C. longii***
17 Perigynium body ovate, elliptic, or orbiculate, widest toward the base or near the middle (excluding the beak).
19 Inflorescences on tallest culms compact, 1.5-3 × as long as wide, erect, the spikes overlapping, the lowest internode of the inflorescence 1-6 (-7.5) mm, ½ to 1/5 (-¼) the length of the inflorescence
20 Achenes 0.6-0.9 mm wide; perigynia veinless or 1-3 veined on the inner face, these faint or basal only; inflorescences < 3.0 cm long.....***C. bebbii***
20 Achenes 0.9-1.3 mm wide; perigynia often 3-veined on the inner face; inflorescences 12-60 mm long.
21 Perigynia broadly elliptic or nearly orbiculate, the wing margin 0.4-0.8 mm wide, 0-6 veined on the inner face .....***C. molesta***
21 Perigynia ovate to broadly ovate, the wing margin 0.25-0.45 mm wide, 4-7 veined on the inner face.....***C. normalis***
19 Inflorescences on tallest culms elongate, more-or-less open toward the base, (2.5-) 3.0-5.1 × as long as wide, often arching or nodding at the tip; spikes more-or-less separate; lowermost internode (5-) 7-19 mm long, mostly 1/5-⅓ (-½) the length of the inflorescence.
22 Perigynium orbiculate, widest at mid-body.....***C. festucacea***
22 Perigynium narrowly to broadly ovate, widest below mid-body.
23 Sheaths smooth, often whitish-mottled; perigynium beak spreading, exceeding the pistillate scales by 0.7-1.6 mm; beak and shoulders of perigynia greenish to yellowish or greenish brown at maturity .....***C. normalis***
23 Sheaths, at least some, papillose near the collar (at magnification of 30 ×), not prominently whitish-mottled; perigynium beak appressed or ascending in spikes, exceeding the pistillate scales by 0.0-0.8 mm; beak and shoulders of perigynia straw-colored to reddish-brown at maturity.....***C. tenera*** *var.* ***tenera***
11 Perigynia > 2 mm wide.
24 Spikes 12-28 mm long, with tapered base and acute tip; perigynium body lanceolate, 6-9 mm long; vegetative culms conspicuous .....***C. muskingumensis***

24 Spikes **either** shorter than 12 mm **or** longer and with either rounded bases or tips or both; perigynium body ovate, elliptic, orbicular, or obovate, or lanceolate (if lanceolate, then shorter than 6 mm long); vegetative culms conspicuous or not.
25 Perigynium bodies obovate, widest toward the tip; leaf sheaths green-veined adaxially nearly to the summit, or with a narrow Y-shaped hyaline area.
26 Achenes 1.3-1.8 mm wide ..... ***C. opaca***
26 Achenes 0.75-1.2 (-1.3) mm wide.
27 Inflorescences erect, 1-4.5 cm long; spikes slightly separated to congested ..... ***C. albolutescens***
27 Inflorescences arching or nodding, 2.3-8.4 cm long; spikes widely separated..... ***C. silicea***
25 Perigynium bodies lanceolate, ovate, elliptic, orbicular, or reniform, widest at the middle or toward the base; leaf sheaths various, some with prominent hyaline band near the apex adaxially.
28 Plants colonial,from creeping rhizomes; vegetative culms numerous, conspicuous, strongly 3-ranked, with 15-35 leaves when fully-developed; achenes 1.6-2 × as long as wide; larger spikes with 5-25 (-30) perigynia ..... ***[C. hyalina]***
28 Plants clumping; vegetative culms few, inconspicuous, usually with fewer than 15 leaves, not strikingly 3-ranked; achenes 1-1.6 (-1.7) × as long as wide; larger spikes with 15-80 perigynia.
29 Perigynia finely granular-papillose (as seen with 30× magnification), the body reniform to orbiculate, 0.6-0.9 ×as long as wide, 3.5-4.5 (-4.9) mm wide; lowermost pistillate scale obtuse-rounded..... ***C. reniformis***
29 Perigynia smooth, the body broadly ovate, elliptic, orbicular, or slightly obovate, (0.7-) 0.9-1.7 × as long as wide, 1.5-6.1 mm wide; lowermost pistillate scales obtuse to acuminate-awned.
30 Leaf sheaths green-veined adaxially neral to the summit; inflorescences dense to somewhat open, erect, the lowermost internode usually < 8 (-12) mm long
31 Perigynia with acute bases, 2.0-2.8 mm wide; beak appressed, > 2/5 × the length of the body; broadest leaves 1.5-2.5 mm wide; [of sw. VA northward]..... ***C. suberecta***
31 Perigynia with rounded bases, 3.0-4.4 mm wide; beak spreading, ca. ⅓ × the length of the body; broadest leaves 2-5 mm wide; [of FL] ..... ***C. vexans***
30 Leaf sheaths with white-hyaline area adaxially; inflorescences open or dense.
32 Perigynium body narrowly to broadly ovate, greenish; pistillate scales with green midstripe, hyaline or pale margins (rarely brown tinged); leaves 2.5-6.5 mm wide, the sheaths green mottled, with mouth truncate, and prolonged to 2 mm distal to base of the leaf blades ..... ***C. normalis***
32 Perigynium body broadly ovate, broadly elliptic, or orbiculate, yellowish to tan brown; pistillate scales greenish or dark brown; leaves 1.5-4 (-5) mm wide, the sheaths usually evenly colored, with mouth concave.
33 Leaf sheaths finely papillose (at magnification of 30-40 ×), especially near the leaf base.
34 Perigynia strongly and evenly 4-8-veined over the achene adaxially, (4.5-) 5.1-5.5 mm long; pistillate scales usually (1.0-) 1.4-2.3 mm shorter than the perigynia; anthers (2.4-) 2.8-4.2 mm long..... ***C. bicknellii***
34 Perigynia veinless or faintly and irregularly 0-4 (-6)-veined over the achene adaxially, 2.5-4.2 mm long; pistillate scales 0.2-1.3 mm shorter than the perigynia; anthers 1.0-2.1 mm long ..... ***C. festucacea***
33 Leaf sheaths smooth.
35 Spikes on larger culms (3-) 5-7 (-11), tapered at the base, the terminal spike with a conspicuous staminate base; inflorescences typically open, 2.5-4.5 (-6.5) cm long, the lowermost internode (3-) 4-13 (-23) mm long; perigynium body (0.7-) 0.9-1.3 × as long as wide.
36 Achenes 1.2-1.8 mm long, 1.0-1.3 mm wide; perigynia 2.5-4.2 mm long, 1.5-2.3 (-2.5) mm wide, mostly 2-4 (-6)-veined adaxially ..... ***C. festucacea***
36 Achenes (1.6-) 1.7-2.2 mm long, (1.2-) 1.4-1.8 mm wide; perigynia 3.2-5.5 mm long, 2.5-3.6 mm wide, veinless or faintly 1-5 (-7)-veined adaxially.
37 Perigynia 3.2-4.8 (-5.2) mm long; beak 0.8-1.5 mm long; pistillate scales 3.3-4.0 (-4.3) mm long, acute; achenes 1.0-1.3 (1.4) × as long as wide ..... ***C. brevior***
37 Perigynia (5.6-) 6.0-7.1 mm long; beak (1.2-) 1.5-2.1 (-2.3) mm long; pistillate scales (3.6-) 3.9-5.0 mm long, obtuse to acute ..... ***C. opaca***
35 Spikes on larger culms 2-4 (-5), rounded at the base, the terminal spike usually lacking a conspicuous staminate base; inflorescences compact, 1.2-3.0 (-3.6) cm long, the lowermost internode 1.5-7 (-13) mm long; perigynium body (0.7-) 0.9-1.6 × as long as wide.
38 Achenes of larger perigynia ellipsoid to narrowly oblong, 0.9-1.3 mm wide, 1.3-1.6 × as long as wide; perigynia (25-) 30-80 per spike, squarrose-spreading at maturity, 1.8-3.0 mm wide..... ***C. molesta***
38 Achenes of larger perigynia broadly oblong to nearly orbicular, 1.35-1.8 mm wide, 1-1.3 × as long as wide; perigynia (10-) 15-40 (-45) per spike, appressed-ascending at maturity, (2.1-) 2.5-3.4 (-3.5) mm wide.
39 Perigynia veinless or faintly and irregularly 1-5-veined over the achene adaxially, more-or-less orbicular, the bodies (2-) 2.3-3.2 mm long, (0.7-) 0.9-1.1 (-1.3) × as long as wide; pistillate scales mostly acute, about as long as to 0.7 (-0.9) mm shorter than the subtended perigynium (flattened and measured separately) ..... ***C. brevior***
39 Perigynia strongly 4-6-veined over the achene adaxially, broadly ovate to broadly elliptic, (or rarely nearly orbicular), the bodies (2.7-) 3-4 mm long, (0.9-) 1.0-1.6 × as long as wide; pistillate scales mostly obtuse, 0.7-1.7 mm shorter than the subtended perigynium (flattened and measured separately) ..... ***C. molestiformis***

{add *C. cumulata, C. hyalina*}

[26r] Section 13 – section *Phacocystis* (*Cryptocarpae* and *Acutae*)

A section of 70-90 species, cosmopolitan. References: Standley, Cayouette, & Bruederle in FNA (2002b); Standley (1983); Bruederle & Fairbrothers (1986); Bruederle, Fairbrothers, & Hanks (1989). Key based in part on C.

1 Lowest spike erect or ascending.
2 Lower sheaths scabrous, reddish-brown, the sheath fronts (ventral faces) with prominent veins forming a persistent network; lower sheaths usually bladeless ..... ***C. stricta***
2 Lower sheaths glabrous, the sheath fronts (ventral faces) not forming a persistent network; lower sheaths usually with leaf blades.
3 Perigynia evidently nerved on both faces..... ***C. emoryi***

3 Perigynia not nerved, or very faintly nerved.
4 Longest bracts overtopping the spikes; perigynia flattened, elliptic to obovate; pistillate scales acute to obtuse, generally shorter than the perigynia.....***C. aquatilis***
4 Longest bracts shorter than the spikes; perigynia inflated, obovate; pistillate scales acuminate, longer than the perigynia.....***C. haydenii***

1 Lowest spike pendent.
5 Pistillate scales awnless, the sides black or deep purple-brown.....***C. torta***
5 Pistillate scales awned, the sides medium brown.
6 Sheath backs glabrous [prickles 0-1 (-5) per mm^2 of sheath surface 5 cm from base]; perigynia somewhat inflated, obovoid, rounded above to an abrupt beak; lowest bract of the infructescence 1.7-6.2 dm long.
7 Perigynia strongly obovoid, 3-4.5 mm long, 2-3 mm wide; achene symmetrical .....***C. crinita*** *var.* ***brevicrinis***
7 Perigynia ellipsoid to slightly obovoid, 2-3 (-3.5) mm long, 1-2 mm wide; achene usually shortened on one side, therefore asymmetrical .....***C. crinita*** *var.* ***crinita***
6 Sheath backs scabrous [prickles (1-) 5-54 per mm^2 of sheath surface 5 cm from base]; perigynia flattened, elliptic to ovoid, tapering from near or below the middle to a minute beak; lowest bract of the infructescence 0.7-3.5 dm long.
8 Perigynia smooth to slightly papillate toward the apex, the papillae mostly < 10 μm long; lower pistillate scales usually acute or acuminate, tapering into the awn; sheaths strongly scabrous; [mainly distributed in our area in the Mountains] .....***C. gynandra***
8 Perigynia densely granular-papillate throughout, the papillae mostly > 13 μm long; lower pistillate scales usually truncate or retuse, abruptly awned; sheaths finely scabrous; [mainly distributed in our area in the Coastal Plain and Piedmont] .....***C. mitchelliana***

[26s] Section 14 – section *Racemosae (Atratae)*

A section of ca. 60 species, of North America and Eurasia. References: Murray in FNA (2002b).

One species .....***C. buxbaumii***

[26u] Section 15 – section *Limosae (including Scitae)*

A section of 6 species, in cool temperate parts of North America, Eurasia, and s. South America. References: Ball in FNA (2002b).

1 Pistillate scales 1.2-2.0 mm wide, narrower than the perigynia .....***C. barrattii***
1 Pistillate scales 2.0-3.8 mm wide, wider than the perigynia.....***C. limosa***

[26w] Section 16 – section *Rhynchocystis*

A section of 5 species, of Europe, w. Asia, and Europe. References: Reznicek in FNA (2002b).

One species .....***C. pendula***

[26x] Section 17 – section *Glaucescentes (Pendulinae)*

A section of 3 species, of se. North America. References: Standley in FNA (2002b).

1 Awn of the pistillate scale tapering gradually into the scale; perigynium 2-ribbed, and also distinctly and evenly nerved between the ribs; [of swamps and marshes] .....***C. joorii***
1 Awn of the pistillate scale emerging from a retuse notch in the apex of the scale; perigynium 2-ribbed, obscurely nerved between the ribs; [generally of acid seepages, pocosins, and blackwater situations, often associated with *Pinus serotina*].
2 Lowest pistillate spike drooping, on a peduncle 1-4 cm long; perigynia reddish-glaucous, lacking nerves; achenes slightly longer than wide .....***C. glaucescens***
2 Lowest pistillate spike erect, sessile or with a peduncle up to 1 cm long; perigynia white-glaucous, rather distinctly 6-8 nerved; achenes as wide as long .....***C. verrucosa***

[26aa] Section 18 – section *Paniceae*

A section of 14 species, of temperate parts of North America and Eurasia, and montane Central America and South America. References: Rothrock & Reznicek in FNA (2002b).

1 Perigynia with a distinct beak, 1.0-2.2 mm long.
2 Basal leaves with well-developed blades; basal sheaths brown; perigynia glabrous; [of moist, usually calcareous habitats of the Coastal Plain].....***C. chapmanii***
2 Basal leaves reduced to bladeless sheaths; basal sheaths strongly purple; [of dry, acidic habitats of the Mountains]..... ***C. polymorpha***
1 Perigynia beakless, or with an indistinct beak < 0.5 mm long.
3 Basal sheaths with well-developed blades; basal sheaths brown to strongly purple.
4 Pistillate spike 5-7 mm in diameter, with ca. 6 vertical rows of perigynia; perigynia 3.3-4.2 mm long, 2.0-2.5 mm wide; leaves 3-7 mm wide, blue green.....***C. meadii***
4 Pistillate spike 3-4 mm in diameter, with ca. 2-3 vertical rows of perigynia; perigynia 2.5-3.5 mm long, 1.5-2.0 mm wide; leaves 2-4.5 mm wide, pale green.....***C. tetanica***
3 Basal sheaths bladeless, or with blades to 3 cm long; basal sheaths strongly purple.

5 Culms to 10 dm tall, (2-) 3-5 mm in diameter near base; larger leaves ca. 5 mm wide; plants forming large clumps; [plants of shallow soils on sloping rock outcrops] ..... ***C. biltmoreana***
5 Culms to 5 dm tall, ca. 1-2 mm in diameter near the base; larger leaves ca. 2-4 mm wide; plants forming small, spaced clumps, interconnected by long-creeping rhizomes; [plants of mountain slopes in more-or-less deep soils] ..... ***C. woodii***

{add *C. livida* to key}

[26bb] Section 19 – section *Laxiflorae*

A section of ca. 16 species, of North America and Central America. References: Bryson & Naczi in FNA (2002b); Naczi, Kral, & Bryson (2001). Key based in part on Naczi, Kral, & Bryson (2001).

1 Perigynia with 8-18 veins, 2-3 conspicuous, narrowly cuneate basally; perigynium beak short and usually abruptly bent; foliage dark green; bracts surpassing the staminate spike..... ***C. leptonervia***
1 Perigynium with (22-) 25-32 veins, all of which are conspicuous (the central one slightly more distinct); perigynium beak various; foliage various; bracts various.
2 Perigynium with a short, bent beak, usually abruptly bent to one side.
3 Spikes loosely flowered, most perigynia not overlapping.
4 Bracts very broad, 8-20 mm wide; basal leaves very wide, up to 40 mm wide; plant glaucescent; basal sheaths purple or brown..... ***C. albursina***
4 Bracts narrow, 2.5-6 mm wide; basal leaves narrow, 3-8 mm wide; plant green; basal sheaths purple, often weathering to brown..... ***C. ormostachya***
3 Spikes densely flowered, the perigynia overlapping.
5 Basal sheaths purple when fresh, weathering to brown; uppermost bract rarely overtopping the staminate spike; staminate spike usually long-stalked..... ***C. gracilescens***
5 Basal sheaths brown; uppermost bract overtopping the staminate spike; staminate spike sessile or short-stalked
6 Widest bract of the uppermost lateral spike 0.5-3.4 mm wide..... ***C. blanda***
6 Widest bract of the uppermost lateral spike (2.9-) 3.2-8.3 mm wide..... ***C. kraliana***
2 Perigynium tapering to a straight or slightly curved beak (or a long, curved beak in *C. radfordii*) (note: some beaks may curve in pressing).
7 Perigynium beaks long (to 1.5 mm long) and excurved; basal sheaths green, white, and brownish striped; [endemic to the escarpment gorge area near the SC-NC-GA tricorner]..... ***C. radfordii***
7 Perigynium beaks straight or slightly curved; basal sheaths either purple, wine-red, or brownish, not prominently green-and-white striped; [collectively widespread in our area].
8 Basal sheaths purple or wine-red (may weather to brown in *C. gracilescens*).
9 Spikes densely flowered, the perigynia overlapping ..... ***C. gracilescens***
9 Spikes loosely flowered, the spikelets not overlapping.
10 Mature leaf blades of sterile shoots 4-5 (-6) mm wide, green; culms green, chalky red at base (best seen in fresh material); pistillate spikes (3-) 5-7 (-8) flowered; staminate spike on a peduncle 0-1 cm long ..... ***C. manhartii***
10 Mature leaf blades of sterile shoots (6-) 7-10 mm wide, glaucous; culms glaucous, bright red at base (best seen in fresh material); pistillate spikes (4-) 7-11 (-15) flowered; staminate spike on a peduncle 2-3 (-6) cm long ..... ***C. purpurifera***
8 Basal sheaths brown, not purple or wine-red.
11 Mature perigynia obovoid.
12 Spikes overlapping, densely flowered; staminate spike more-or-less obscured; plant green..... ***C. crebriflora***
12 Spikes scattered, loosely flowered; staminate spike prominently exserted; plant usually glaucescent..... ***C. laxiflora***
11 Mature perigynia fusiform.
13 Spikes overlapping, the staminate more-or-less obscured and overtopped by the uppermost bract ..... ***C. crebriflora***
13 Spikes scattered, the staminate prominent and exceeding the uppermost bract.
14 Spikes densely flowered; perigynium beaks curved; lowest spike exserted on a long, arching, peduncle..... ***C. styloflexa***
14 Spikes loosely flowered; perigynium beaks straight; lowest spike on a short, erect or ascending, peduncle..... ***C. striatula***

[26cc] Section 20 – section *Granulares*

A section of ca. 6 species, of temperate North America south through Mexico to Central America. References: Cochrane & Naczi in FNA (2002b). Key based on FNA.

1 Plants with long-creeping rhizomes, the culms therefore mostly solitary; terminal spike and uppermost lateral spike usually separated.
2 Staminate scales with apex rounded to obtuse; widest leaves 1.8-3.0 (-4.4) mm wide; perigynium beak 0.1-0.3 mm long; [widespread]..... ***C. crawei***
2 Staminate scales with apex acute to awned; widest leaves 2.8-8.3 mm wide; perigynium beak 0.3-0.9 mm long; [of Panhandle FL and AL westward]..... ***C. microdonta***
1 Plants with short rhizomes, the culms therefore clumped; terminal and uppermost lateral spike usually overlapping.
3 Leaves green; longest bract blade of uppermost lateral spike 1.6-4.6 (-7.1) cm long; perigynia (1.6-) 1.9-3× as long as thick; [of the Coastal Plain]..... ***C. gholsonii***
3 Leaves glaucous (rarely green); longest bract blade of uppermost lateral spike 4.1-15.8 cm long; perigynia 1.4-2.2 (-2.4)× as long as thick; [widespread]..... ***C. granularis***

[26dd] Section 21 – section *Careyanae*

A section of 8 species, of temperate e. North America. References: Bryson & Naczi in FNA (2002b).

1 Basal sheaths purplish, sometimes mixed with brown.
2 Widest leaf blade 3-6 mm wide; peduncles of lateral spikes usually drooping..... ***C. austrocaroliniana***

2 Widest leaf blade 10-25 mm wide; peduncles of lateral spikes usually erect or spreading.
3 Bracts of middle and basal portions of culms with blades 2.1-9.2 cm long; perigynia 5.0-6.6 mm long; longest (per plant) lateral spike with 4-9 perigynia ..... ***C. careyana***
3 Bracts of middle and basal portions of culms bladeless, or with blades 0.1-1.9 cm long; perigynia 3.7-4.9 mm long; longest (per plant) lateral spike with 9-13 perigynia ..... ***C. plantaginea***

1 Basal sheaths brownish, lacking any purple coloration.
4 Widest leaf blade 11-25 mm wide; leaf blades of vegetative shoots 3.8-9.0 × as wide as bract leaves; bract blades from middle and basal portions of the culms 2.0-6.2 cm long; foliage glaucous ..... ***C. platyphylla***
4 Widest leaf blade 2-14 mm wide; leaf blades of vegetative shoots 1.0-3.5 × as wide as bract leaves; bract blades from middle and basal portions of the culms 4.5-24 cm long; foliage green or glaucous.
5 Basalmost scale of each lateral spike sterile (lacking a perigynium) or subtending a staminate flower.
6 Foliage usually bright green; longest (per plant) terminal spike 0.6-2.0 (-2.3) cm long; widest leaf blade 5.3-8.3 mm wide ..... ***C. laxiculmis*** *var.* ***copulata***
6 Foliage usually glaucous; longest (per plant) terminal spike (1.0-) 1.2-2.5 cm long; widest leaf blade 6.4-11.8 mm wide ..... ***C. laxiculmis*** *var.* ***laxiculmis***
5 Basalmost scale of each lateral spike subtending a perigynium.
7 Terminal spikes (1.0-) 1.2-2.7 mm wide; staminate scales acute, those from the middle region of the staminate spike 3.6-5.5 mm long; vegetative shoots shorter than or slightly taller than the culms, the tallest vegetative shoot 0.5-1.3 (-1.8) × as tall as the tallest culm.
8 Terminal spike usually surpassing the bract blade of the distalmost lateral spike; longest (per plant) peduncle of terminal spike (6.3-) 8.1-15.9 cm long; widest leaf blade 2.0-2.9 (-3.5) mm wide; each perigynium face 7-10-nerved .. ***C. digitalis*** *var.* ***macropoda***
8 Terminal spike usually surpassed by the bract blade of the distalmost lateral spike; longest (per plant) peduncle of terminal spike 0.9-7.2 (-11.4) cm long; widest leaf blade 2.7-4.5 (-5.3) mm wide; each perigynium face (8-) 11-15-nerved.
9 Perigynia 2.5-3.3 mm long, the apex barely excurved ..... ***C. digitalis*** *var.* ***digitalis***
9 Perigynia 3.2-4.2 mm long, the apex noticeably excurved ..... ***C. digitalis*** *var.* ***floridana***
7 Terminal spikes 0.6-1.4 (-1.6) mm wide; staminate scales obtuse, those from the middle region of the staminate spike 2.6-3.6 (-3.8) mm long; vegetative shoots much taller than the culms, the tallest vegetative shoot (1.4-) 1.7-3.7 (-4.9) × as tall as the tallest culm.
10 Perigynia 3.9-4.5 mm long; leaves strongly glaucous ..... ***C. magnifolia***
10 Perigynia 2.9-3.8 mm long; leaves green.
11 Perigynia spirally imbricate; longer lateral spikes with (6-) 8-13 perigynia; peduncles of proximal spikes usually erect, the longest (per plant) peduncle (7.0-) 15-42 (-49) mm long; bract blade of distalmost lateral spike 5.6-17 (-26) × as long as wide; loosely or densely cespitose; [primarily of the Coastal Plain in our area, though extending rarely into the Piedmont and Mountains] ..... ***C. abscondita***
11 Perigynia distichously imbricate; longer lateral spikes with 4-8 (-9) perigynia; peduncles of proximal spikes usually drooping or nodding, the longest (per plant) peduncle (28-) 44-84 (-91) mm long; bract blade of distalmost lateral spike (12-) 17-51 × as long as wide; densely cespitose; [primarily of the Mountains and Piedmont] ..... ***C. cumberlandensis***

[26ee] Section 22 – section *Griseae (Oligocarpae)*

A section of ca. 21 species, of North America (including Mexico). References: Naczi & Bryson in FNA (2002b); Naczi, Bryson, & Cochrane (2002); Naczi (1989, 1993, 1997). Key based on Naczi (1997), in part.

1Culm bases brown.
C. hitchcockiana
C. brysonii
C. flaccosperma
C. glaucodea
C. pigra
C. conoidea
C. impressinervia
C. grisea
C. amphibola

1Culm bases purple-red.
C. ouachitana
C. godfreyi
C. grisea
C. amphibola
C. corrugata
C. bulbostylis
C. paeninsulae
C. oligocarpa
C. calcifugens
C. edwardsiana
C. planispicata
C. thornei
C. paeninsulae

1 Perigynia tapering toward the base, obtusely trigonous in cross-section, usually pubescent proximally, the apex constricted to a distinct beak (nearly beakless in *C. planispicata*), the perigynia closely enveloping the achene at maturity.
2 Leaf-sheaths hispidulous; perigynia broadest well above the middle; basal sheaths brownish.

3 Leaves glaucescent, usually papillate abaxially; pistillate scale margins entire; perigynia 3.7-5.1 mm long, 1.5-1.8 mm wide; [of the Cumberland Plateau of n. AL] ..... ***C. brysonii***
3 Leaves deep green, abaxially smooth or sparsely scabrous on midrib; pistillate scale margins denticulate; perigynia 4.5-6.2 mm long, 1.9-2.3 mm wide; [of ne. United States, south in our area to w. NC and w. VA] ..... ***C. hitchcockiana***
2 Leaf-sheaths glabrous; perigynia broadest near the middle; basal sheaths purple, greenish-white, or light tan.
4 Basal sheaths greenish-white or light tan; old leaf bases persistent as brownish fibrils; perigynium beak obscure, essentially absent ..... ***C. impressinervia***
4 Basal sheaths purple; old leaf bases not persistent as fibrils; perigynium beak absent to well-developed, 0-1.0 mm long.
5 Perigynia 1.6-2.6× as long as wide; widest leaf 1.8-4.0 mm wide; achene beak 0.05-0.3 (-0.5) mm long; longest pistillate spikes with 4-8 (-10) perigynia ..... ***C. oligocarpa***
5 Perigynia (2.4-) 2.5-3.3× as long as wide; widest leaf (3.0-) 3.5-6.5 mm wide; achene beak (0.3-) 0.4-0.7 mm long; longest pistillate spikes with (5-) 7-14 perigynia ..... ***C. planispicata***
1 Perigynia convex-rounded basally, more-or-less terete in cross-section, glabrous, the apex tapered but not constricted, beakless or the beak obscure, the perigynia loosely enveloping the achene at maturity.
6 Widest leaf (5.1-) 6.2-11.1 (-13.5) mm wide; foliage glaucous; pistillate scales awnless or short-awned, the awns 0-0.9 (-1.9) mm long.
7 Perigynia (4.0-) 4.2-5.5 (-6.0) mm long, (2.0-) 2.1-2.7× as long as the achene bodies, spreading to ascending; achene stipes (0.2-) 0.3-0.5 (-0.6) mm long; pistillate spikes (5.0-) 5.9-8.0 (-9.6) mm wide; achene beaks vertical to slightly bent, usually bent 0-30º from the vertical ..... ***C. flaccosperma***
7 Perigynia 3.2-4.5 (-4.7) mm long, 1.6-2.0× as long as the achene bodies, usually ascending; achene stipes 0.05-0.3 (-0.5) mm long; pistillate spikes (3.3-) 4.2-6.1 (-7.3) mm wide; achene beaks slightly bent to recurved, usually bent 30-90º from the vertical.
8 Perigynia 3.2-4.0 (-4.1) mm long, (1.5-) 1.8-2.3 (-2.5)× as long as wide; longest pistillate spike with (14-) 19-45 (-65) flowers, densely flowered, with the ratio [mm of spike length/number of flowers] = (0.56-) 0.67-1.1 (1.3); longest peduncle of staminate spike 0.5-15 (-31) mm long ..... ***C. glaucodea***
8 Perigynia (3.7-) 3.9-4.5 (-4.7) mm long, (1.9-) 2.1-2.6 (-2.8)× as long as wide; longest pistillate spike with 11-25 (-28) flowers, rather loosely flowered, with the ratio [mm of spike length/number of flowers] = (0.97-) 1.0-1.3 (1.6); longest peduncle of staminate spike (1.5-) 7.5-37 (-62) mm long ..... ***C. pigra***
6 Widest leaf 2.0-6.8 (-9.1) mm wide; foliage green; pistillate scales relatively long-awned, the awns (0.2-) 1.1-8.3 (-13.7) mm long.
9 Axis of inflorescence and pistillate spike peduncles scabrous; perigynia 2.5-4 mm long ..... ***C. conoidea***
9 Axis of inflorescence and pistillate spike peduncles smooth; perigynia 3-6 mm long.
10 Plants densely to loosely cespitose; culm purple-red coloration extending (3.5-) 4.0-9.6 cm up from base; widest leaves 2.4-6.5 mm wide; perigynia either distichously or spirally imbricate; achene stipe either 0.2-0.4 or 0.6-0.8 (-0.9) mm long.
11 Purple-red coloration extending (3.4-) 4.0-7.3 cm up from base; widest leaves 2.4-4.0 (-5.3) mm wide; perigynia spirally imbricate; achene stipe 0.6-0.8 (-0.9) mm long ..... ***C. godfreyi***
11 Purple-red coloration extending (3.4-) 5.5-9.6 cm up from base; widest leaves 2.4-6.5 mm wide; perigynia distichously imbricate; achene stipe 0.2-0.4 mm long ..... ***C. planispicata***
10 Plants densely cespitose; culm purple-red coloration extending 0-3.6 (-3.9) cm up from base; widest leaves 3.3-6.8 (-9.1) mm wide; perigynia spirally imbricate; achene stipe (0.2-) 0.3-0.6 mm mm long.
12 Perigynia 1.5-1.9 (-2.2) mm wide, (2.2-) 2.5-3.1× as long as wide ..... ***C. amphibola***
12 Perigynia (1.7-) 1.8-2.6 mm wide, 1.8-2.4 (-2.6)× as long as wide.
13 Widest leaves 3.3-5.6 (-8.0) mm wide; achene stipe (0.3-) 0.4-0.6 mm long ..... ***C. corrugata***
13 Widest leaves (4.8-) 5.0-6.8 (-9.1) mm wide; achene stipe (0.2-) 0.3-0.4 (0.5) mm long ..... ***C. grisea***

{add *C. acidicola*, *C. thornei*}

[26ff] Section 23a – section *Hymenochlaenae (the "Longirostres" group)*

1 Perigynia several-nerved, the beak much shorter than the body; basal sheath not conspicuously fibrous ..... ***C. cherokeensis***
1 Perigynia 2-ribbed (otherwise nearly nerveless), the beak about as long as the body; basal sheath conspicuously fibrous ..... ***C. sprengelii***

[26ff] Section 23b – section *Hymenochlaenae (the "Gracillimae" group)*

A section of 50-60 species, semi-cosmopolitan. References: Waterway in FNA (2002b).

1 Lowest pistillate bract auriculate but not sheathing; terminal spike normally staminate (rarely with a few perigynia terminally); leaf blades 1-2 mm wide; basal sheaths purplish or red; [of cliffs and rock outcrops at moderate to high elevations in the Mountains] ..... ***C. misera***
1 Lowest pistillate bract sheathing (the sheath short in *C. prasina*); terminal spike normally gynecandrous, rarely merely staminate (often merely staminate in *C. prasina*); leaf blades 1.5-7 mm wide; basal sheaths purplish or red (brownish or greenish in *C. prasina*); [of various habitats, only rarely as above].
2 Perigynia strongly trigonous, the lateral ribs at the angles, broadest below the middle; basal sheaths brownish or greenish; leaf sheaths glabrous on the hyaline ventral portion ..... ***C. prasina***
2 Perigynia terete to obscurely trigonous, the lateral ribs not at the angles, broadest near the middle; basal sheaths purplish or red; leaf sheaths pubescent on the hyaline ventral portion (glabrous in *C. gracillima*).
3 Perigynia densely white-hirsute; achenes brown with dark red spots ..... ***C. roanensis***
3 Perigynia glabrous; achenes without dark red spots.
4 Leaf sheaths glabrous on the hyaline ventral portion; larger leaves 3-9 mm wide ..... ***C. gracillima***
4 Leaf sheaths pubescent on the hyaline ventral portion; larger leaves 1.5-6 mm wide.
5 Perigynia 2.5-3.0 mm long, 0.9-1.2 mm wide; perigynium beaks absent or very short, the orifice entire; leaf blades 1.5-2.5 mm wide ..... ***C. aestivalis***
5 Perigynia 3.0-4.6 mm long, 1.4-2.0 mm wide; perigynium beaks very short to short, the orifice bidentate; leaf blades 2-6 mm wide.
6 Perigynia 3.0-4.0 mm long, 1.5-1.75 mm wide; leaves 2-4 mm wide ..... ***C. aestivaliformis***
6 Perigynia 3.5-6 mm long, 1.75-2.0 mm wide; leaves 3-8 mm wide.
7 Upper pistillate scales awned; perigynia 4.5-6 mm long; leaves 4-8 mm wide ..... ***C. davisii***

7 Upper pistillate scales acuminate; perigynia 3.5-4.6 mm long; leaves 3-5 mm wide.....***C. oxylepis***

[26ff] Section 23c – section *Hymenochlaenae (the "Sylvaticae" group)*

1 Achene sessile in the base of the perigynium; perigynia 3.2-6 mm long; sterile shoots with leaves 5-10 mm wide; [**either** alien and rarely naturalized in our area, **or** native and rare].
2 Perigynia 3.2-4.8 mm long, abruptly narrowed to a short stipe; [native, of northern hardwoods forests in the Mountains of NC and VA] .....
.....***C. arctata***
2 Perigynia 5-6 mm long, sessile; [alien, rarely naturalized in our area].....***C. sylvatica***
1 Achene on a stipe 0.5-1.5 mm long; perigynia (4.5-) 5.6-8.0 (-10) mm long; sterile shoots with leaves 2-8 mm wide; [native, collectively common and widespread in our area].
3 Internodes between the perigynia mostly 1.0-1.5 mm; sheaths of the pistillate bracts puberulent at the mouth.
4 Perigynia glabrous, (5.2-) avg. 6.2 (-7.7) mm long.....***C. oblita***
4 Perigynia puberulent, (6.4-) avg. 7.2 (-8.1) mm long.....***C. venusta***
3 Internodes between the perigynia mostly 2.0-4.0 (-6.0) mm; sheaths of the pistillate bracts glabrous at the mouth.
5 Perigynia puberulent, (5-) avg. 7 (-9) mm long; pistillate scales usually with the midrib excurrent as a short awn .....***C. allegheniensis***
5 Perigynia glabrous, (4.5-) avg. 5.6-7 (-10) mm long; pistillate scales usually with the midrib terminating below the apex, not excurrent.
6 Perigynia (6-) 7.0 (-10) mm long, broadest below the middle, tapering with straight or slightly convex sides to a conspicuous beak with a hyaline tip; [of swamps, bogs, and other moist to wet habitats, nearly throughout our area] .....***C. debilis***
6 Perigynia (4.5-) 5.6 (-7) mm long, broadest near the middle, tapering with concave sides to a short beak lacking a hyaline tip; [of dry to moist upland forests and openings in the Mountains].....***C. flexuosa***

[26ii] Section 24 – section *Porocystis (Virescentes)*

A section of 10 species, of temperate North America, Central America, and South America. References: Ball in FNA (2002b).

1 Terminal spike staminate (rarely gynecandrous, with fewer than 25% of the flowers pistillate).....***C. pallescens***
1 Terminal spike gynecandrous (and with > 30% of the flowers pistillate).
2 Perigynia densely pubescent; larger lateral spikes 2-4 mm wide; ligules longer than wide.
3 Terminal spikes 5-15 (-20) mm long; anthers 0.7-1.3 (-1.6) mm long .....***C. swanii***
3 Terminal spikes (18-) 20-35 mm long; anthers (1.0-) 1.6-2.0 (-2.8) mm long.....***C. virescens***
2 Perigynia glabrous, or minutely papillose, or with few scattered hairs; larger lateral spikes (3.5-) 4-8 mm wide; ligules as wide as long.
4 Perigynia papillose, with a short but definite beak, 2.5-4.0 mm long; anthers 2.5-3.5 mm long; pistillate scales about equal to perigynia or slightly longer; pistillate spikes 6-10 mm wide.....***C. bushii***
4 Perigynia not papillose, beakless or with a short but definite beak [*C. caroliniana*], 2.0-3.5 mm long; anthers 1.3-2.5 mm long; pistillate scales usually much shorter than perigynia; pistillate spikes 4-7 mm wide.
2 Perigynia with a short but distinct beak, when mature more-or-less rounded in ×-section and with no faces flattish; blades glabrous or glabrate.....***C. caroliniana***
5 Perigynia beakless, when mature more-or-less triangular in ×-section (or hemispheric) and with the inner face flattish, blades glabrous or glabrate [*C. complanata*] or densely hirtellous [*C. hirsutella*].
6 Blades glabrous or glabrate, especially on lower surface, sheaths glabrate to pubescent (if so, pubescence dense only in summit region); [mostly Coastal Plain and Piedmont].....***C. complanata***
6 Blades and sheaths densely hirtellous throughout; [mostly Coastal Plain, Piedmont, and Mountains].....***C. hirsutella***

[26kk] Section 25 – section *Anomalae*

A section of ca. 20 species, of North America, e. Asia, and Australia. References: Cochrane in FNA (2002b).

One species .....***C. scabrata***

[26ll] Section 26 – section *Hallerianae*

A section of 5 or more species, s. North America to Central America, s. Europe, sw. Asia, and n. Africa. References: Ball in FNA (2002b); Jones & Jones (1993). Key adapted from Jones & Jones (1993).

1 Perigynia densely white-villous apically, glabrous basally; achene body 2.0-2.7 mm long, long-stipitate .....***C. dasycarpa***
1 Perigynia puberulent throughout; achene body 3.0-3.3 mm long, sessile.....***C. tenax***

[26nn] Section 27 – section *Hirtifoliae*

A monotypic section, of e. North America. References: Ball in FNA (2002b); Jones & Jones (1993).

One species .....***C. hirtifolia***

[26oo] Section 28 – section *Paludosae*

A section of about 35 species, mostly of temperate Asia and North America. References: Reznicek & Catling in FNA (2002b); Reznicek (1993).

Identification notes: All species of this section in our area form large clonal colonies by rhizomes.

1 Perigynium body pubescent.
  2 Culms central, with the withered remains of the previous year's leaves at the base; basal sheaths of fertile culms not at all or only slightly reddened; [of the Coastal Plain] ..... ***C. striata*** *var.* ***striata***
  2 Culms lateral, with bladeless sheaths at the base; basal sheaths strongly reddened; [collectively widespread in our area].
    3 Beak of the perigynium soft, translucent, the teeth obscure; peduncle of staminate spike 0.2-2 cm long; [of the Piedmont and Coastal Plain in our area]..... ***C. vestita***
    3 Beak of the perigynium stiff, opaque, the teeth well-developed; peduncle of staminate spike (0.8-) 2-9 cm long; [of the Mountains in our area].
      4 Leaves folded along the midrib, appearing 0.7-2.0 (-2.2) mm wide; culms obtusely trigonous, usually smooth; base of pistillate bracts often auriculate, forming a V-shaped mouth; middle staminate scales narrowly acute..... ***C. lasiocarpa*** *var.* ***americana***
      4 Leaves more-or-less flat or M-shaped, (1.8-) 2.2-4.5 (-6) mm wide; culms acutely trigonous, often scabrous on the angles; base of pistillate bract with a short, truncated process at mouth; middle staminate scales obtuse and short-awned, or acute ..... ***C. pellita***
1 Perigynium body glabrous.
  5 Widest leaves 1.5-5 (-6) mm wide; culms 8-90 cm tall; inflorescences 2.5-35 (45) cm long.
    6 Inflorescence rachis with rounded, smooth angles; lowermost pistillate spikes usually strongly overlapping; [introduced, in coastal sands]..... ***C. pumila***
    6 Inflorescence rachis with sharp, scabrous angles; lowermost pistillate spikes overlapping not at all or slightly; [native, in acidic Coastal Plain wetlands] ..... ***C. striata*** *var.* ***brevis***
  5 Widest leaves (4-) 5.5-15 (-21) mm wide; culms 40-135 cm tall; inflorescences 15-60 cm long.
    7 Perigynia 3.0-4.5 mm long; [exotic species]..... ***C. acutiformis***
    7 Perigynia 4.8-7.8 mm long; [native species].
      8 Longest ligules 2-10 (-12) mm long, < 2 × as long as wide; culms central, with the withered remains of the previous year's leaves at the base; perigynia obscurely 10-15-veined; [of the Coastal Plain]..... ***C. hyalinolepis***
      8 Longest ligules 13-40 (-56) mm long, much longer than wide; culms lateral, with bladeless sheaths at the base; perigynia usually strongly 14-28-veined; [of the Mountains in our area] ..... ***C. lacustris***

[26pp] Section 29 – section *Carex*

A section of about 10 species, of temperate North America and Eurasia. References: Reznicek & Catling in FNA (2002b).

1 Perigynia glabrous; leaf blades finely papillose on the lower surface (and also usually long-pubescent); vegetative culms hollow, spongy (flattened when pressed)..... ***C. atherodes***
1 Perigynia pubescent; leaf blades glabrous or pubescent abaxially, but not papillose; vegetative culms hard.
  2 Leaf blades pubescent; [rare introduction] ..... ***C. hirta***
  2 Leaf blades glabrous; [native] ..... ***C. trichocarpa***

[26qq] Section 30 – section *Vesicariae* [including 52 - *Pseudocypereae*]

A section of ca. 45 species, semicosmopolitan. Following Reznicek & Ford in FNA (2002b), this section is circumscribed to include the traditionally recognized section *Pseudocypereae*. References: Reznicek & Ford in FNA (2002b). Key adapted from Reznicek & Ford in FNA (2002b).

1 Pistillate scales with a prominent, scabrous awn (the body of the scale often ciliate as well).
  2 Plants extensively colonial from elongate, creeping rhizomes; staminate scales acute to acuminate, essentially smooth-margined except at the very tip; perigynia 7-11-nerved ..... ***C. schweinitzii***
  2 Plants densely to loosely cespitose, the rhizomes connecting individual culms in a clump < 10 cm long; staminate scales (at least some of them) with a distinct, scabrous awn; perigynia 6-25-nerved.
    3 Perigynia 6-12-nerved, the nerves separate nearly to the beak apex; perigynium bodies broadly ellipsoid to more or less globose, (1.8-) 2.0-4.2 mm wide; achenes rough-papillate.
      4 Spikes 9-14 (-15) mm thick; widest leaves 2.4-4.0 (-5) mm wide; spikes usually 2.5-3.5× as long as wide; perigynia 4.8-6.6 (-7.6) mm long, the beaks usually 0.7-1.3× as long as the body..... ***C. baileyi***
      4 Spikes (12-) 15-22 mm thick; widest leaves (4.0-) 4.5-13 mm wide; spikes usually < 2.5× as long as wide **if** < 15 mm thick; perigynia (6-) 6.5 (-10.8) mm long, the beaks 0.6-0.9× as long as the body..... ***C. lurida***
    3 Perigynia 12-25-nerved, the nerves (except for 2 prominent laterals) confluent at or below the middle of the beak; perigynium bodies ellipsoid to lance-ovoid, 1.1-2.2 mm wide; achenes smooth.
      5 Mature perigynia spreading or ascending when mature; perigynia round in cross-section; teeth of the perigynium beak 0.3-0.9 mm long, straight..... ***C. hystericina***
      5 Mature perigynia reflexed when mature; perigynia obscurely trigonous; teeth of the perigynium beak 1.3-2.1 (-2.8) mm long, strongly outcurved..... ***C. comosa***
1 Pistillate scales smooth-margined, obtuse to acuminate, awnless (rarely the lowermost scales awned in *C. utriculata*).
  6 Leaves filiform-involute, wiry, (0.5-) 1-3 (-3.2) mm wide; stems round or obtusely trigonous in cross-section, smooth; [rare, in high elevation bogs in the Mountains]..... ***C. oligosperma***
  6 Leaves flat, U-, V-, or W-shaped in cross-section, the widest 1.5-12 (-15) mm wide; stems round to trigonous, often scabrous-angled; [collectively widespread].
    7 Achenes asymmetrical, deeply indented or invaginated on one face; widest perigynia (4.0-) 4.5-7 mm wide; beaks 2.4-4.8 mm long, smooth ..... ***C. tuckermanii***
    7 Achenes symmetrical; widest perigynia (2-) 2.5-3.5 (-4.5) mm wide; beaks 1-4.2 (-4.8) mm long, scabrous or smooth.
      8 Perigynium beaks finely scabrous (at least near the tip and on the teeth), 2.4-4.2 (-4.8) mm long; widest leaves 1.8-4.3 (-5) mm wide. ..... ***C. bullata***
      8 Perigynium beaks smooth, 1-4.5 mm long; widest leaves 1.5-15 mm wide.

9 Pistillate spikes globose or short ovoid, ca. 3-20-flowered; [plants of the Coastal Plain from e. NC southward]..... ***C. elliottii***
9 Pistillate spikes cylindric, ca. 20-150-flowered; [plants collectively of the Mountains, from nw. NC northward].
10 Bract of lowest pistillate spike (excepting isolated spikes from long-sheathing bracts on the lower part of the stem) (2.5-) 3-9× as long as the inflorescence; staminate spike often 1, slightly (if at all) elevated above the summit of the crowded pistillate spikes; perigynia reflexed..... ***C. retrorsa***
10 Bract of lowest pistillate spike (excepting isolated spikes from long-sheathing bracts on the lower part of the stem) 0.5-2.5× as long as the inflorescence; staminate spikes 2-4 (-5), well elevated above the summit of the crowded pistillate spikes; perigynia spreading or ascending.
11 Plant colonial from long-creeping rhizomes; widest leaves (4.5-) 5-12 (-15) mm wide; ligules about as long as wide; basal sheaths usually spongy-thickened and only slightly or not red-tinged..... ***C. utriculata***
11 Plant cespitose; widest leaves 1.8-6.5 mm wide; ligules longer than wide; basal sheaths not spongy-thickened and often tinged with reddish-purple..... ***C. vesicaria***

[26rr] Section 31 – section *Lupulinae*

A section of 6 species, of e. North America. References: Reznicek & Ball (1974); Reznicek in FNA (2002b); Uttal (1971). Key adapted in part from Reznicek & Ball (1974) and Reznicek in FNA (2002b).

1 Sheath of uppermost leaf absent or <1.5 (-2.5) cm long; beak of perigynia 1.5-4.2 mm long; achenes with elliptic or obovate sides.
2 Perigynia rhombic-ovoid, cuneate to the base, 8-35 per spike, radiating in all directions and therefore forming a globular spike..... ***C. grayi***
2 Perigynia lanceoloid to ovoid, convex to the base, 1-12 (-20) per spike, ascending to spreading (the lowest sometimes slightly reflexed) and therefore forming an ovoid to obovoid spike.
3 Perigynia 3-5 mm wide at the widest point; achenes broadest above the middle, with a pronounced shoulder rounding abruptly to the tip; style of mature achene with a half to full coil in its lower portion; [of high elevations in our area, generally in spruce-fir or northern hardwoods forests]..... ***C. intumescens*** *var.* ***fernaldii***
3 Perigynia 5-8 mm wide at the widest point; achenes broadest at the middle, smoothly rounded to the tip; style of mature achene straight or arcuate; [widespread in our area]..... ***C. intumescens*** *var.* ***intumescens***
1 Sheath of uppermost leaf usually >1.7 cm long; beak of perigynia 4.5-10 mm long; achenes with rhombic or nearly triangular sides.
4 Achenes distinctly wider than long, widest above the middle; perigynia stiffly spreading at right angles to the rachis..... ***C. gigantea***
4 Achenes as wide as long or longer, widest near the middle; perigynia ascending.
5 Angles of the achenes pointed, often even knobbed, with nipple-like points; achenes (2.2-) 2.4-3.4 mm wide, often nearly as wide as long..... ***C. lupuliformis***
5 Angles of the achenes smoothly curved, not pointed or knobbed; achenes 1.7-2.6 (-2.8) mm wide, distinctly longer than wide.
6 Staminate peduncle (3-) 6-18 cm long, usually exceeding the uppermost spike by 2-12 cm; plants loosely colonial by long slender rhizomes..... ***C. louisianica***
6 Staminate peduncle 0.5-6 (-7) cm long, shorter than to exceeding the uppermost pistillate spike by < 2 cm; plants solitary or loosely cespitose in small clumps connected by stout, short rhizomes..... ***C. lupulina***

[26ss] Section 32 – section *Rostrales (Folliculatae)*

A section of 5 species, of e. North America and e. and se. Asia. References: Reznicek in FNA (2002b). Key based on FNA.

1 Perigynia 6.4-10.7 mm long, 2.6-3.9× as long as wide..... ***C. turgescens***
1 Perigynia (8.3-) 10.5-15.6 mm long, 4-7× as long as wide.
2 Widest leaf blades 1.6-3.5 (-4.2) mm wide; bract sheaths concave at the apex; [of MD northward]..... ***C. michauxiana***
2 Widest leaf blades (3.5-) 5-18 mm wide; bract sheaths truncate to convex at the apex; [collectively widespread in our area].
3 Pistillate scales usually awned (rarely merely cuspidate); pistillate scales (including the awn, if present) 0.5-1.2× as long as the perigynia; widest leaves of vegetative shoots 8-18 (-21) mm wide; pistillate spikes normally not staminate at apex (rarely with a few staminate flowers); [primarily of the Mountains and Piedmont]..... ***C. folliculata***
3 Pistillate scales acute or long-acuminate (rarely short-awned); pistillate scales (including the awn, if present) 0.3-0.6× as long as the perigynia; larger leaves mostly 4-12 mm wide; pistillate spikes normally staminate at apex; [primarily of the Coastal Plain]..... ***C. lonchocarpa***

[26tt] Section 33 – section *Collinsiae*

A monotypic section, of e. North America. References: Standley in FNA (2002b).

One species ..... ***C. collinsii***

[26uu] Section 34 – section *Squarrosae*

A section of 4 species, of e. and c. North America and temperate South America. References: Ford in FNA (2002b). Key based on FNA.

1 Terminal spike usually entirely staminate; pistillate scales with an awn equaling or surpassing the perigynium; achenes 1.2-2.1 mm long.
2 Pistillate scales 0.4-0.9 (-1.1) mm wide, the body wide and translucent; staminate scales 0.9-1.6 mm wide, tightly imbricate in the spike; plants colonial, long-rhizomatous..... ***C. aureolensis***
2 Pistillate scales 0.1-0.4 mm wide, the body narrow and indistinct; staminate scales 0.3-0.8 mm wide, irregularly imbricate with spreading tips; plant cespitose, short-rhizomatous..... ***C. frankii***
1 Terminal spike gynecandrous, mainly pistillate; pistillate scales awnless, or with a short awn not surpassing the perigynium; achenes 2.0-3.0 mm long.

3 Achene 1.9-2.5× as long as wide; style persistent, strongly kinked at the base; spikes 1-2 (-3) per stem ..... ***C. squarrosa***
3 Achene 1.2-1.9× as long as wide; style deciduous, straight or slightly curved; spikes (1-) 2-4 (-6) per stem ..... ***C. typhina***

[26vv] Section 35 – section *Shortianae*

A monotypic section, of e. North America. References: Cochrane in FNA (2002b).

One species ..... ***C. shortiana***

[26ww] Section 36 – section *Spirostachyae (Extensae)*

A section of ca. 15 species, of Eurasia. References: Crins & Reznicek in FNA (2002b).

1 Leaves of flowering stems flat, the widest 3.3-5.0 mm wide ..... ***C. distans***
1 Leaves of flowering stems channeled or involute, the widest 1.0-3.5 (-4.3) mm wide..... ***C. extensa***

[26xx] Section 37 – section *Ceratocystis*

A section of 7 species, in temperate North America, Eurasia, and Australia. References: Crins in FNA (2002b).

1 Pistillate scales coppery brown; terminal (staminate) spike 6-24 mm long; pistillate spikes 2-5 per culm; culms 1-8 dm tall; [of calcareous seepages in the Mountains of VA and northward] ..... ***C. flava***
1 Pistillate scales yellowish green; terminal (staminate) spike 12-39 mm long; pistillate spikes 1-5 per culm; culms 1-12.5 dm tall; [**either** of calcareous savannas of the Coastal Plain of NC, **or** of acid situations in NJ and northward]
  2 Pistillate scales yellowish-green; terminal (staminate) spike 12-21 mm long; pistillate spikes (1-) 2-5 per culm; culms 1-5 dm tall; [of acid situations in NJ and northward]..... ***C. cryptolepis***
  2 Pistillate scales yellowish green; terminal (staminate) spike (9-) 17-39 mm long; pistillate spikes 1-2 (-3) per culm; culms 5-12.5 dm tall; [of calcareous savannas of the Coastal Plain of NC] ..... ***C. lutea***

[26aaa] Section 38 – section *Leucoglochin (Orthocerates)*

A section of 5-6 species, of arctic, boreal, and alpine North America, Eurasia, and South America. References: Cochrane in FNA (2002b).

One species ..... ***C. pauciflora***

[26bbb] Section 39 – section *Acrocystis (Montanae)*
[by D.B. Poindexter & A.S. Weakley]

A section of ca. 35 species, sub-cosmopolitan in temperate and boreal regions. References: Crins & Rettig in FNA (2002b); Rettig (1988); Cusick (1992); Rettig & Crins (1996); Werier (2006); Sorrie et al. (2011); Poindexter et al. (in prep.). Key based in part on Rettig (1988), Werier (2006), C, and M.

1 Spikes borne above the middle of the primary culm, but also with pistillate spikes borne on short or elongate peduncles from the sheathed base of the culm (referred to as subradical or basal spikes).
  2 Culms usually delicate and flexuous; subradical pistillate spikes born on slender elongate peduncles, not densely aggregated at the base of the plant; terminal staminate spikes almost always with at least one approximate pistillate spike.
    3 Perigynia (2.2-) 2.6-3.1 (-3.2) mm long, subglobose to obovoid, occasionally papillate (view at 45x); pistillate scales often shorter than the body of mature perigynia; staminate spike 3.5-5.9 (-6.7) mm long: lowest proximal pistillate bract "flag-like", usually exceeding the staminate spike; leaves generally broader, 0.9-2.6 (-3.2) mm wide [north temperate, arctic-boreal] ..... ***C. deflexa*** *var*. ***deflexa***
    3 Perigynia (2.0-) 2.3-2.6 (-3.0) mm long, ovoid-ellipsoid to narrowly obovate (occasionally subglobose), distinctly papillate; pistillate scales often subequal to longer than the body of mature perigynia; lowest proximal pistillate bract shorter or longer than the staminate spike but very thin, not "flag-like"; staminate spike 3-11 (-16) mm long; leaves thin, delicate 0.4-2.0 (-2.4) mm wide.
      4 Terminal staminate spike 3-9 mm, always closely aggregated with (1-) 2 (-3) sessile pistillate spikes; perigynia elliptic or narrowly obovate; perigynium body glabrate, with large conspicuous papillae and rarely small trichomes confined to the beak and distal end; lowest proximal pistillate bract often exceeding the staminate spike; leaves greatly exceeding the culms; [of the se. Coastal Plain] ..... ***Carex species 1***
      4 Terminal staminate spike 6-11 (-16) mm, some culms with staminate spikes elevated above 1 (-2) sessile to subsessile pistillate spikes; perigynia ovoid-ellipsoid to subglobose; perigynium body pubescent with short trichomes and minute papillae; lowest proximal pistillate bract usually shorter than the staminate spike; leaves shorter than to exceeding the culms; [of the Southern Appalachian Mountains and ne. US] ..... ***Carex species 2***
  2 Culms thick and erect; subradical pistillate spikes born on rigid, often short peduncles and densely aggregated at the base of the plant; terminal staminate spikes often alone or associated with a pistillate spike.
    5 Perigynia (2.2-) 2.3-3.2 (-3.3) mm long, beaks (0.4-) 0.5-0.9 mm long; young leaves long, thin and flexuous ..... ***C. umbellata***
    5 Perigynia (3.0-) 3.1-4.7 mm long, beaks (0.9-) 1.0-2.1 mm long; young leaves variable.
      6 Perigynium body usually pubescent; young leaves long, thin and flexuous ..... ***C. rugosperma***
      6 Perigynium body essentially glabrous, with a few hairs on the angles of the beak; young leaves short, broad and rigid..... ***C. tonsa***
1 Spikes all borne close together above the middle of the primary culm (i.e., lacking additional basal spikes originating from the same sheaths); some taxa may exhibit naturally short individual culms (e.g., *C. emmonsii*, *C. nigromarginata*, *C. reznicekii*).
  7 Body of the perigynium (excluding the beak and the contracted base) subglobose to obovoid, usually about as wide as long.

8 Plants cespitose (often loosely so from thin rhizomes in *C. deflexa* var. *deflexa*); leaves 0.9-4.7 mm wide; perigynium body pubescent.
9 Perigynia occasionally papillate (mainly at the base of the beak); lowest proximal pistillate bract often exceeding the terminal staminate spike; widest leaves typically less than 3.0 mm wide ..... ***C. deflexa*** var. ***deflexa***
9 Perigynia distinctly papillate; lowest proximal pistillate bract usually shorter than the terminal staminate spike; widest leaves usually more than 3.0 mm wide.
10 Perigynium tooth (0.1-) 0.2-0.5 mm long; pistillate scales 3.4-4.8 mm long, (1.4-) 1.6-1.8 mm wide, conspicuously exceeding the perigynia; plants densely cespitose, the culms erect, arching at the tips; [of nw. SC, sw. NC, and adjacent GA] ..... ***C. amplisquama***
10 Perigynium tooth 0.1-0.2 (-0.3) mm long; pistillate scales 2.5-4.1 mm long, (1.2-) 1.4-1.6 (-2.0) mm wide, about as long as the perigynia; plants loosely cespitose, the culms prostrate; [widely distributed] ..... ***C. communis***
8 Plants with long rhizomes, forming clonal patches; leaves 1.0-3.0 (-3.5) mm wide; perigynium body pubescent to nearly glabrous.
11 Beak of perigynium (0.2-) 0.6-1.0 (-1.2) mm long; perigynium body 1.0-1.8 mm wide, pubescent and papillate; [widely distributed in our area] ..... ***C. pensylvanica***
11 Beak of perigynium (1.0-) 1.2-1.6 (-2.6) mm long; perigynium body 1.0-1.3 (-1.5) mm wide, pubescent or nearly glabrous, with or without papillae; [of the Mountains of sw. VA, w. NC, and nw. SC northward].
12 Beak of the perigynium averaging 1.5 mm long, the orifice often oblique; leaves mostly 1.1-1.3 mm wide; perigynium pubescent primarily near the summit, at the base of the beak, glabrate to sparsely pubescent over the body, papillae usually not distinguishable; male spikes <15 mm long; [of WV southward] ..... ***C. lucorum*** *var.* ***austrolucorum***
12 Beak of the perigynium averaging 1.3 mm long, the beak split more-or-less equally; leaves mostly 1.5-2.8 mm wide; perigynium often moderately pubescent over the body, papillae usually distinguishable; male spikes > 15 mm long; [of MD, NJ, and PA northward] ..... ***C. lucorum*** *var.* ***lucorum***
7 Body of the perigynium (excluding the beak and the contracted base) ellipsoid, distinctly longer than wide or thick, often also wider than thick, and slightly trigonous.
13 Plants with conspicuously long rhizomes, forming clonal patches; perigynia typically papillate [collectively of the Coastal Plain and, less commonly, Piedmont].
14 Achene body (1.4-) 1.5-1.7 (-2.0) mm long, biconvex, trigonous, or both; fertile culms 7-17 cm tall, usually much shorter than the leaves; basal sheaths usually very fibrillose; pistillate scales (2.7-) 3.0-3.7 (-4.2) mm long ..... ***C. floridana***
14 Achene body (1.1-) 1.2-1.3 (-1.4) mm long, trigonous; fertile culms 20-43 cm tall, equaling or exceeding the leaves; basal sheaths usually not fibrillose; pistillate scales (2.3-) 2.6-3.0 (-3.4) mm long ..... ***C. physorhyncha***
13 Plants cespitose (sometimes loosely so from slender rhizomes in *C. novae-angliae*); perigynia papillae not evident to rather conspicuous [collectively widespread in our area].
15 Pistillate scales usually shorter than the body of the mature perigynia they subtend, perigynia without easily discernible papillae, lowermost 2 pistillate spikes remote, several separated by > 7 mm, staminate spike often elevated above pistillate spikes; leaves thin, delicate 0.7-1.5 mm wide ..... ***C. novae-angliae***
15 Pistillate scales mostly longer than the body of the mature perigynia they subtend, perigynia with discernible papillae, lowermost 2 pistillate spikes overlapping, usually separated by < 7 mm, staminate spike often closely associated with pistillate spikes; leaves various.
16 Achene body (1.3-) 1.4-1.6 (-1.7) mm long; fertile culms mostly 2-20 cm tall.
17 Culms usually variable in length, (4.5-) 6.6-38 (-51) cm tall; widest leaf (1.9-) 2.3-4.5 mm wide; at least some pistillate scales often with reddish to purplish/black color below the distal tip extending laterally from near the margin to the green or brown longitudinal mid-stripe on either side of midvein ..... ***C. nigromarginata***
17 Culms subequal in length, height 1.9–9.9 (–13.7) cm tall, widest leaf 1.2–2.2 (–2.5) mm wide; any reddish color on pistillate scales below the distal tip not extending laterally from near the margin to the green or brown longitudinal mid-stripe on either side of midvein ..... ***C. reznicekii***
16 Achene body (0.9-) 1.2-1.3 (-1.5) mm long; fertile culms mostly 17-35 cm tall; pistillate scales (2.0-) 2.5-3.1 (-3.2) mm long.
18 Scales of the median portion of the staminate spike with a weak to moderately prominent midrib usually not extending to the tip, and minute teeth rarely present on the midrib (visible at 15× or greater); perigynium teeth mostly 0.2-0.3 mm long; staminate spike 8.4-11.1 mm long; culms erect to ascending, equaling or exceeding the leaves, the inflorescence typically conspicuous; pistillate scales with green midrib, hyaline margins, and usually reddish-tinged; [mostly of loamy or clayey soils of the Piedmont and Mountains] ..... ***C. albicans***
18 Scales of the median portion of the staminate spike either with a strong, prominent midrib extending to the tip (or even aristate), and with minute teeth usually present on the midrib (visible at 15× or greater); perigynium teeth mostly 0.15-0.25 mm long; staminate spike 5.0-8.5 mm long; culms lax or weakly ascending, often shorter than, curving under, and more-or-less hidden by the leaves; pistillate scales with green midrib, hyaline margins, and only rarely reddish-tinged; [mostly of acid, sandy soils of the Coastal Plain] ..... ***C. emmonsii***

[26ccc] Section 40 – *Clandestinae (Digitatae)*

A section of ca. 20 species, circumboreal. References: Crins in FNA (2002b).

1 Pistillate scales short-awned ..... ***C. pedunculata***
1 Pistillate scales acute ..... ***C. richardsonii***

[26ddd] Section 41 – section *Pictae*

A section of 2 species, of e. North America. References: Ball in FNA (2002b).

1 Plants monoecious, with 3-8 spikes per stem; leaf blades 4-8 mm wide, glaucous on the upper surface; [of the East Gulf Coastal Plain, east to sw. GA and Panhandle FL] ..... ***C. baltzellii***
1 Plants dioecious, with a single unisexual spike per stem; leaf blades 2-4.5 mm wide, green on the upper surface; [of areas west of area, east to c. TN and nc. GA] ..... ***C. picta***

[26fff] Section 42 – section *Mitratae (Praecoces)*

A section of ca. 20 species, of Europe, e. Asia, and Australia. References: Standley in FNA (2002b).

1 Plant cespitose; lowest inflorescence bract longer than the inflorescence ..... ***C. breviculmis***
1 Plant from creeping rhizomes; lowest inflorescence bract much shorter than the inflorescence ..... ***C. caryophyllea***

[26ggg] Section 43 – section *Albae*

A section of 4 species, north temperate. References: Ball in FNA (2002b).

One species ..... ***C. eburnea***

[26kkk] Section 44 – section *Phyllostachyae*

A section of ca. 10 species, of North America. References: Crins, Naczi, Reznicek, & Ford in FNA (2002b); Naczi, Reznicek, & Ford (1998); Ford et al. (1998); Naczi & Ford (2001); Ford & Naczi (2001). Key adapted in part from Naczi, Reznicek, & Ford (1998), Catling, Reznicek, & Crins (1993), and Naczi & Ford (2001).

1 Achenes subglobose, 1-1.5× as long as wide; staminate scales more or less truncate.
  2 Tallest culm 3.2-9.1 cm high, 15-32% of plant height; terminal spike with 4-8 perigynia; wider leaves with hyaline margins 0.05-0.2 mm wide; hyaline margins of distal pistillate scales 0.05-0.3 mm wide; perigynium beak 30-38% (-43%) of perigynium length; [of calcareous glades in w. VA and north and west of our area] ..... ***C. juniperorum***
  2 Tallest culm 9.0-41 cm high, 39-86% of plant height; terminal spike with 1-4 perigynia; wider leaves with green margins; hyaline margins of distal pistillate scales 0.3-0.7 mm wide; perigynium beak 34-53% of perigynium length; [of rich forests or rocky calcareous glades and woodlands].
    3 Longest (per plant) staminate portion of terminal spike (4.9-) 5.8-13.5 mm long; proximalmost staminate scale in terminal spike 1.1-1.8 (-2.1) mm long, 13-26 (-35)% of length of staminate portion of terminal spike; perigynium beaks (1.9-) 2.3-3.9 mm long, 39-53% of perigynium length; shoot bases lacking red-purple; [of rich mesic forests widespread in our area, especially VA] ..... ***C. jamesii***
    3 Longest (per plant) staminate portion of terminal spike 3.4-5.6 (-6.2) mm long; proximalmost staminate scale in terminal spike (1.9-) 2.1-3.3 mm long, (35-) 44-77% of length of staminate portion of terminal spike; perigynium beaks 1.4-2.3 (-2.5) mm long, 34-44% of perigynium length; shoot bases tinged with reddish-purple; [of c. TN and c. KY and westward] ..... ***C. timida***
1 Achenes ellipsoid, 1.5-2.0× as long as wide; staminate scales obtuse to acute.
  4 Tallest culm 0.18-0.38× as tall as plant; perigynia (7.0-) 7.5-10.8 mm long; perigynium beaks (3.6-) 4.1-6.4 mm long; culms erect; peduncles usually erect to spreading ..... ***C. superata***
  4 Tallest culm 0.41-0.87× as tall as plant; perigynia 4.5-8.0 mm long; perigynium beaks 1.7-4.3 mm long; culms erect to spreading; peduncles usually widely spreading to nodding.
    5 Longest staminate portion of terminal spikes 12.7-25.6 mm long; perigynia 5.8-8.0 mm long; perigynium beaks 2.5-4.3 mm long; achenes (2.4-) 2.6-3.4 mm long ..... ***C. basiantha***
    5 Longest staminate portion of terminal spikes 4.9-5.7 (-6.5) mm long; perigynia 4.5-5.7 (-6.5) mm long; perigynium beaks 1.7-2.6 (-2.8) mm long; achenes 1.8-2.6 mm long ..... ***C. willdenowii***

[26mmm] Section 46 – section *Leptocephalae (Polytrichoidae)*

A monotypic section, of North America and the West Indies. References: Cochrane in FNA (2002b).

1 Perigynia 3.4-4.9 (-5.4) mm long; pistillate scales whitish ..... ***C. leptalea*** *var.* ***harperi***
1 Perigynia 2.5-3.5 mm long; pistillate scales pale brown, with green midrib ..... ***C. leptalea*** *var.* ***leptalea***

Section 47 – "*Cymophyllus*"

One species ..... ***C. fraseriana***

Carex abscondita Mackenzie. Rich bottomlands and other forests. April-June. MA south to Panhandle FL, west to TX and OK, and scattered inland. See *C. magnifolia* for discussion of the two taxa. Naczi (1999b) reports a chromosome number of n = 24. [< *C. abscondita* – RAB, K (also see *C. cumberlandensis* and *C. magnifolia*); < *C. abscondita* – C, G, M, S, W (also see *C. cumberlandensis*); < *C. abscondita* – FNA, Pa, WH (also see *C. magnifolia*); >< *C. abscondita* var. *abscondita* – F; > *C. abscondita* var. *rostellata* Fernald – F]

Carex acidicola Naczi (section *Griseae*). Mesic forests. Nc. GA and c. AL south to sw. GA (Naczi, Bryson, & Cochrane 2002). [= FNA] {not yet keyed; *Griseae*}

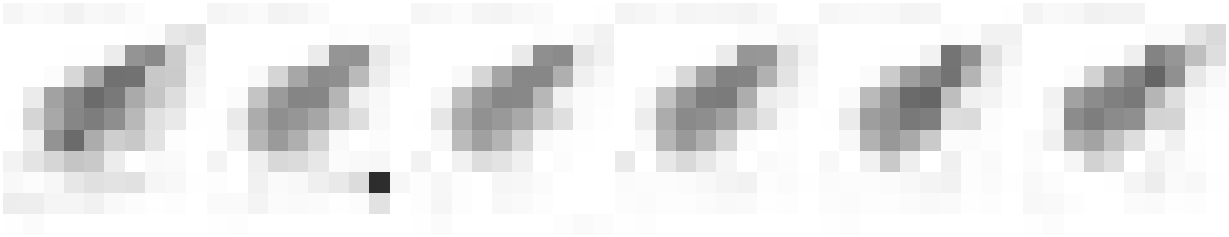
* ***Carex acutiformis*** Ehrhart. Introduced in MD, native of Eurasia (FNA, Kartesz 1999). [= FNA, K]

Carex aestivaliformis Mackenzie. Wet meadows (VA), upland submesic forests (GA). Considered by some to be a hybrid, but with little known documentation or evidence for or against its alleged hybrid status; further study is needed. [= C, G, M; = *C.* ×*aestivaliformis* – F, FNA, K]

Carex aestivalis M.A. Curtis ex A. Gray, Summer Sedge. Dry-mesic to mesic forests, moist rock outcrops at medium to high elevations. May-June. VT south to GA and AL, in or near the Appalachians. [= RAB, C, F, FNA, G, K, M, Pa, S, W]

Carex aggregata Mackenzie. Rich forests and woodlands. May-June. NY, ON, MN, and SD, south to nc. NC, n. AL, s. MS, and OK. Other useful characters include: culms relatively smooth; pistillate scales sharp-pointed, the tip reaching to about

the base of the perynium; and perigynia nerveless. [= F, FNA, K, M, Pa; = *C. sparganioides* Muhlenberg ex Willdenow var. *aggregata* (Mackenzie) Gleason – C, G]



Carex alata Torrey. Bottomland forests, marshes. May-June. NH, MI, and MO south to c. peninsular FL and TX. [= RAB, C, F, FNA, G, GW, K, Pa, W, WH; < *C. alata* – S (also see *C. vexans*)]

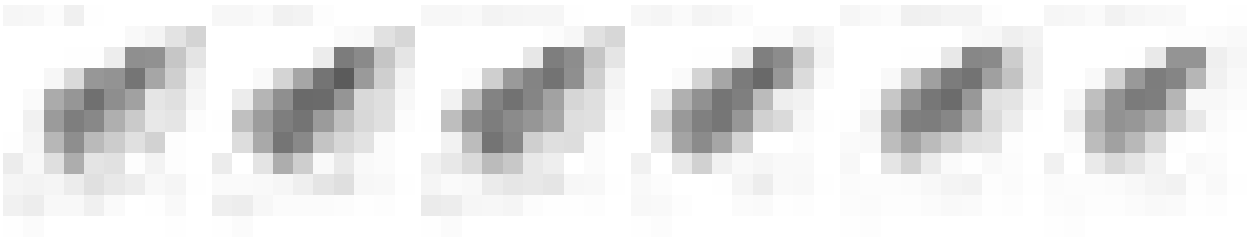
Carex albicans Willdenow ex Sprengel. Dry woodlands and forests. April-May. ME west to IL, and OK, south to DE, NC, SC, n. GA (Jones & Coile 1988), TN, and MO. [= Pa; = *C. artitecta* Mackenzie – RAB, M, W; = *C. albicans* var. *albicans* – C, FNA, K; > *C. artitecta* var. *artitecta* – F; > *C. artitecta* var. *subtilirostris* F.J. Hermann – F; = *C. nigro-marginata* Schweinitz var. *muhlenbergii* (A. Gray) Gleason – G; < *C. varia* Muhlenberg ex Willdenow – S]

Carex albolutescens Schweinitz. Low fields, bottomlands. May-June. MA, NY, WI, and MO, south to Panhandle FL and TX. [= C, F, FNA, K, Pa, WH; < *C. albolutescens* – RAB, G, GW, W (also see *C. longii*); *C. straminea* misapplied]

Carex albursina Sheldon, White Bear Sedge. Nutrient-rich cove forests, over mafic or calcareous rocks. April-June. VT and s. QC west to MN, south to SC (P. McMillan pers. comm. 2003, specimen at CLEMS), nw. GA, and AR. Naczi (1999b) reports a chromosome number of n = 22. [= RAB, C, F, FNA, K, M, Pa, S, W; = *C. laxiflora* var. *latifolia* F. Boott – G]

Carex allegheniensis Mackenzie. Swamps, bogs, streamhead pocosins, other moist to wet habitats, boggy pools in floodplains. May-June. PA south to n. GA, mostly in the Appalachian Mountains. [= M, S; = *C. debilis* Michaux var. *pubera* A. Gray – RAB, C, G; < *C. debilis* var. *rudgei* L.H. Bailey – FNA, Pa; > *C. debilis* var. *pubera* – F, K; > *C. debilis* var. *intercursa* Fernald – F, K; < *C. debilis* – GW, W]

Carex alopecoidea Tuckerman. Seasonally saturated situations, typically over calcareous substrates. NS west to SK, south to DC, MD, WV, KY, TN, and IA (Standley in FNA 2002b). [= FNA, K] {synonymy incomplete; not yet keyed; *Vulpinae*}



Carex amphibola Steudel. Moist loamy forests, bottomlands, slopes, uplands. {distribution and abundance in our area needing additional herbarium investigation} May-June. MA, s. ON, MI, IL, MO, and OK, south to GA, AL, MS, LA, and TX. [= RAB, FNA, G, M, Pa, S; = *C. amphibola* var. *amphibola* – F, K; < *C. amphibola* – GW]

Carex amplisquama F.J. Hermann. Dry, open woodlands. July-August. Endemic to n. GA, nw. SC, and sw. NC (Rabun, Towns, White, Union, Lumpkin, Fannin, Murray, and Gilmer counties, GA, Oconee and Greenville counties, SC, and Polk County, NC) (Rettig 1988, Hill & Horn 1997, Gaddy, pers. comm.). Following Rettig's (1988) determination that *C. amplisquama* is better treated as a variety of *C. communis*, the combination was made by Rettig & Crins (1996). The two taxa differ in achene micromorphology, flavonoid chemistry, and minor morphological characters (Rettig 1988). [= W; = *C. communis* L.H. Bailey var. *amplisquama* (F.J. Hermann) J. Rettig – FNA, K; = *C. amplisquama* F.J. Hermann – W]

Carex annectens (Bicknell) Bicknell, Yellowfruit Sedge. Marshes, bottomland forests. July-August. S. ME west to MN, south to FL and TX. See Cusick (1996). [= RAB, FNA, K, Pa, S, W; = *C. vulpinoidea* var. *ambigua* – C; > *C. annectens* var. *annectens* – F, G; > *C. annectens* (Bicknell) Bicknell var. *xanthocarpa* (Kükenthal) Wiegand – F, G; < *C. vulpinoidea* – GW, WH; > *C. annectens* – M; > *C. brachyglossa* Mackenzie – M]

Carex appalachica J. Webber & P.W. Ball, Appalachian Sedge. Dry to mesic forests, rock outcrops. May-June. ME and ON south to w. SC, n. GA, and e. TN. First reported for South Carolina by Hill & Horn (1997). [= C, FNA, K, Pa; < *C. rosea* – RAB, G, W; = *C. radiata* – F, M, S, misapplied]

Carex aquatilis Wahlenberg, Aquatic Sedge. Mountaintop ponds (with *Dulichium arundinaceum*, *Vaccinium macrocarpon*, *Juncus canadensis*, and *Utricularia sp.*), mafic fens at high elevation. NL (Newfoundland) west to ND, south to NJ, s. PA, OH, IN, IA, and NE; disjunct in w. VA (Augusta County) and nw. NC (Bluff Mountain, Ashe County, NC); n. Eurasia. First reported for VA by Wieboldt et al. (1998). [= G; > *Carex aquatilis* Wahlenberg var. *substricta* Kükenthal – C, FNA, Pa; > *C. aquatilis* var. *altior* (Rydberg) Fernald – F; *?*> *C. aquatilis* var. *aquatilis* – K; > *C. substricta* (Kükenthal) Mackenzie – M]

Carex arctata W. Boott, Black Sedge, Drooping Woodland Sedge. Northern hardwood and spruce forests, bog edges. NL (Newfoundland) west to MN, south to PA, w. VA, nw. NC (Long Hope Valley, Ashe County, NC), and OH. First reported for VA (Highland County) by Fleming & Ludwig (1996). [= C, F, FNA, G, K, M, Pa]

* ***Carex arenaria*** Linnaeus, Sand Sedge. Moist to dry sandy hammocks; probably introduced from Europe. May-June. Fernald (1950) considers this plant native in se. VA, and populations of it in Carolina Beach State Park, New Hanover County, NC, certainly appear native. In North America, known from DE south to se. NC; also on ballast in OR (Mackenzie 1931-1935). [= RAB, C, F, FNA, G, K, M]

Carex argyrantha Tuckerman, Silvery-flowered Sedge, Hay Sedge. Wet meadows or dry soils. NB west to ON, south to w. NC, e. TN (Unicoi County), and OH. June-August. [= RAB, C, F, G, K, Pa, W; *C. aenea*, misapplied]

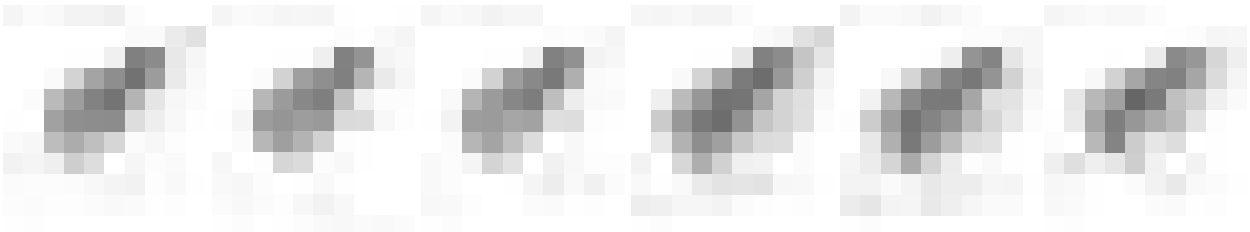
Carex arkansana (L.H. Bailey) L.H. Bailey, Arkansas Sedge. Seasonally wet meadow in former railroad yard. June. Native range from s. IL, n. MO, and e. KS south through AR and OK to e. TX. See Simmons, Strong, & Parrish (2008) for additional information on the Virginia occurrence. [= FNA] {not yet keyed}

Carex atherodes Sprengel, Awned Sedge. Marl fens. Circumboreal, south in North America to NY, n. VA, n. WV, MO, CO, UT, and OR. [= C, F, FNA, G, K, M, Pa]

Carex atlantica L.H. Bailey. Bogs and seepages. May-June. NS west to MI and nw. IN, south to ne. FL, Panhandle FL, and e. TX. Reznicek & Ball (1980) found the distinction of *C. incomperta* from *C. atlantica* to be untenable. Intermediates between *C. atlantica* and *C. howei* (often treated as *C. atlantica* ssp. *capillacea*) occur in portions of their ranges, especially in the southern Coastal Plain. In most other areas they are sharply distinct, and sometimes grow together (as in the mountains of our area and farther north) with no evidence of intergradation or hybridization. I prefer to treat them at the species level. [= GW; > *C. atlantica* – RAB, F, G, M, S, W; = *C. atlantica* var. *atlantica* – C; > *C. incomperta* Bicknell – RAB, F, G, M, S, W; = *C. atlantica* ssp. *atlantica* – FNA, K, Pa, WH]

Carex aureolensis Steudel. Floodplain forests and marshes; uncommon. {separate from *C. frankii*} {Pd, Mt, Cp (NC, SC, VA): bottomland forests. May-July.} VA, KY, IL, and NE south to n. peninsular FL, Panhandle FL, TX, NM, Coahuila, and Nuevo León; South America. [= FNA; < *C. frankii* – RAB, C, F, G, GW, K, M, S, W, WH] {not yet mapped}

Carex austrina Mackenzie. Roadsides, apparently introduced with hay used for erosion control; native of sc. United States. May. Native from KY, IA, and NE south to AL and TX. First reported for areas farther east by Bryson et al. (1996). [= F, FNA, K, M; = *C. muhlenbergii* var. *australis* Olney – C, G; < *C. muhlenbergii* – S; = *C. muhlenbergii* var. *austrina* Small]



Carex austrocaroliniana L.H. Bailey, South Carolina Sedge. Nutrient-rich, moist coves in the sw. mountains of NC and adjacent SC, often with some seepage. April-May. Endemic to the southern end of the Southern Appalachians, in Blue Ridge of sw. NC, ne. SC, n. GA, and e. TN, extending west to the Cumberland Plateau of TN. Naczi (1999b) reports a chromosome number of n = 28-30. [= FNA, K, W; = *C. austro-caroliniana* – RAB, M, S, orthographic variant]

Carex austrodeflexa P.D. McMillan, Sorrie, & van Eerden, Canebrake Sedge. Canebrakes and acid swamps. February-May. Coastal Plain, from se. VA to Panhandle FL, west to s. AL; apparently disjunct in w. LA. See Sorrie et al. (2011) for additional information. [< *C. novae-angliae* Schweinitz – FNA]

Carex baileyi Britton, Bailey's Sedge. Bogs, seeps. June-July. NH south to KY, NC, and TN, primarily Appalachian. [= RAB, C, F, FNA, G, K, M, Pa, S; = *C. lurida* Wahlenberg var. *gracilis* (F. Boott) L.H. Bailey]

Carex baltzellii Chapman, Baltzell's Sedge. Steepheads, beech-magnolia slopes, and mesic to dry-mesic hammocks. Sw. GA and Panhandle FL west to s. AL and s. MS. [= FNA, K, M, S, WH]

Carex barrattii Schweinitz & Torrey, Barratt's Sedge. Peaty bogs and marshes. April-May. CT south to NC (at least formerly), on the Coastal Plain, and disjunct inland in places with many Coastal Plain affinities, as in w. VA (Augusta County), sw. NC (Henderson County, where now extirpated), nw. SC, sc. TN (Coffee County), n. GA, and n. AL. This species flowers and fruits rarely. Reported for South Carolina by Hill & Horn (1997) and Horn (1999). [= RAB, C, F, FNA, G, K, M, Pa, S, W]

Carex basiantha Steudel, Southern Willdenow's Sedge. Mesic forests, bottomlands, and lower slopes, over calcareous rocks or sediments. April-June. Se. NC south to n. peninsular FL, Panhandle FL, west to e. TX, and north to nw. GA, c. TN, and c. AR. [= FNA, K, WH; < *C. willdenowii* Schkuhr ex Willdenow – RAB; < *C. willdenovii* – S (also see *C. superata* and *C. willdenowii*) and

orthographic variant; *? C. willdenowii* var. *pauciflora* Olney ex L.H. Bailey in J.M. Coulter; < *C. willdenowii* Schkuhr ex Willdenow var. *megarrhyncha* Hermann, misapplied]

Carex bebbii Olney ex Fernald. Calcareous wetlands. NL (Newfoundland), NL (Labrador) and AK south to NJ, nw. VA (Big Meadows, VA; Townsend, pers. comm. 2004), OH, IN, IL, NE, CO, and OR. [= C, F, FNA, G, K, Pa]

Carex bicknellii Britton. Prairie-like openings and barrens over gabbro. ME west to SK, south to DE, OH, MO, OK, and NM; disjunct in nc. SC. First reported for South Carolina by Hill & Horn (1997). [= FNA, Pa; = *C. bicknellii* var. *bicknellii* – K; < *C. bicknellii* – C, F, G, M (also see *C. opaca*)]

Carex billingsii (O.W. Knight) C.D. Kirschbaum. Wet, boggy areas. NL (Newfoundland) and ON south to s. NJ (Ocean County), PA, and MI. See Kirschbaum (2007). [= *C. trisperma* Dewey var. *billingsii* O.W. Knight – C, F, FNA, G, K, M]

Carex biltmoreana Mackenzie, Biltmore Sedge. In thin soils on medium to high elevation granitic domes and other sloping rock outcrops, often dominant in thin-soil herbaceous mats, but also occurring in adjacent woodlands under open to nearly closed canopy of *Quercus* spp., *Fraxinus americana*, *Carya glabra*, and *Juniperus virginiana var. virginiana*. May-June. Endemic to sw. NC, nw. SC, and ne. GA (Rabun and Towns counties). This distinctive endemic sedge may be recognized by its robust size (culms to a meter tall, to 5 mm in diameter at the base), habit (large clumps on sloping rock outcrops), and restricted habitat (in periodic seepage on exfoliation domes). Once considered very rare, *C. biltmoreana* proves to be limited to a narrow range and distinctive habitat, but regularly present and even locally dominant on the 50-100 granitic domes within 100 km of Brevard, NC. It often occurs with other endemic species, such as *Houstonia longifolia* var. *glabra*, *Krigia montana*, *Pycnanthemum montanum*, and *Packera millefolium*. An excellent illustration appears in Massey et al. (1983). [= RAB, FNA, K, M, S, W]

Carex blanda Dewey. Cove forests, bottomlands, and other mesic, nutrient-rich forests. April-June. ME and s. QC west to ND, south to c. GA (Jones & Coile 1988), n. peninsular FL, Panhandle FL, and TX. Naczi (1999b) reports chromosome numbers of n = 15-18. [= RAB, C, F, FNA, K, M, Pa, S, W, WH; = *C. laxiflora* var. *blanda* (Dewey) F. Boott – G]

Carex breviculmis R. Brown, Blue Sedge. Cemeteries, lawns, disturbed areas; native of e. Asia, se. Asia, and Australia. See Majure & Bryson (2008) for additional information.

Carex brevior (Dewey) Mackenzie ex Lunell. Dry forests and margins. May-June. MW west to BC, south to GA, c. TN, MS, TX, Tamaulipas, and AZ. [= F, FNA, G, K, Pa, W; < *C. festucacea* – RAB, GW; < *C. brevior* – C (also see *C. molesta* and *C. molestiformis*); < *C. festucacea* Schkuhr ex Willdenow var. *brevior* (Dewey) Fernald]

Carex bromoides Willdenow *ssp.* ***bromoides***, Common Brome Sedge. Swamp forests, bogs, seeps, hydric hammocks, other wetlands. May-July. Ssp. *bromoides* ranges from NB west to e. MN, south to c. peninsular FL and e. TX, and disjunct in Mexico. Naczi (1999b) reports a chromosome number of n = 32-34. [= FNA, K; < *C. bromoides* – RAB, C, F, G, GW, M, S, W, WH; *C. bromoides* var. *bromoides* – Pa]

Carex bromoides Willdenow *ssp.* ***montana*** Naczi, Blue Ridge Brome Sedge. Mountain bogs in the Blue Ridge, seepages in the Blue Ridge Escarpment. June-July. Ssp. *montana* is known only from sw. VA, w. NC, and nw. SC. This taxon needs further study in order to better understand its habitats and distribution. Naczi (1999b) provided additional evidence for its recognition, in the form of different chromosome numbers (n=30-31 for ssp. *montana* and n= 32-34 for ssp. *bromoides*). [= FNA, K; < *C. bromoides* – RAB, C, F, G, GW, M, S, W]

Carex brunnescens (Persoon) Poiret var. *brunnescens*. Reported for our area by FNA. [= F; < *C. brunnescens* – RAB, C, G, M, Pa, S, W; = *C. brunnescens* ssp. *brunnescens* – FNA, K] {rejected; not keyed}

Carex brunnescens (Persoon) Poiret *var*. ***sphaerostachya*** (Tuckerman) Kükenthal, Brown Sedge. Grassy balds, bogs, moist forests at moderate to high elevations. June-July. The species is circumboreal, in North America ranging south to NJ, OH, MI, and MN, south to w. NC, nw. SC, e. TN, and n. GA. Var. *sphaerostachya* is apparently the only infraspecific taxon (of four) to reach our area. See Gaddy (1981) for the report of this species in SC. [= F; < *C. brunnescens* – RAB, C, G, M, Pa, S, W; = *C. brunnescens* ssp. *sphaerostachya* (Tuckerman) Kalela – FNA, K]

Carex brysonii Naczi, Bryson's Sedge. Mesic forests. Endemic to the Cumberland Plateau of n. AL. See Naczi (1993) for additional information. [= FNA, K]

Carex bulbostylis Mackenzie. Moist deciduous forests. April-May. MS west to TX and OK; disjunct in sw. TN. Reports for GA in Jones & Coile (1988) are probably based on misidentifications. [= FNA, K; = *Carex amphibola* Steudel var. *globosa* (L.H. Bailey) L.H. Bailey] {add to synonymy}

Carex bullata Schkuhr ex Willdenow. Bogs. May-June. NS south to GA, primarily on the Coastal Plain, but with scattered occurrences inland (as in AR and the Eastern Highland Rim of sc. TN). [= RAB, C, F, FNA, GW, K, M, Pa, S; > *C. bullata* var. *bullata* – G; > *C. bullata* var. *greenii* (Böckler) Fernald – G]

Carex bushii Mackenzie. Meadows. May-June. MA and s. NY west to MO and KS, south to NC, GA (Jones & Coile 1988), MS, and TX; disjunct in MI. [= RAB, C, F, FNA, G, K, M, Pa, S, W; ? *C. caroliniana* Schweinitz var. *cuspidata* (Dewey) Shinners]

Carex buxbaumii Wahlenberg, Brown Bog Sedge, Buxbaum's Sedge. Bogs, fens, and seepages (especially over calcareous or mafic rocks). June-July. Circumboreal, in North America ranging from NL (Newfoundland) west to s. and w. AK, south to se. VA, w. NC, nw. SC, n. GA (Jones & Coile 1988), c. TN, KY, n. AR, CO, UT, and CA. Reported for South Carolina by Hill & Horn (1997) and Hill (1999). [= RAB, C, F, FNA, G, K, M, Pa, S, W]

Carex calcifugens Naczi. Rich bluff forests, evergreen maritime forests. Se. NC south to Panhandle FL. See Naczi, Bryson, & Cochrane (2002). [= FNA] {not yet keyed; synonymy incomplete; section *Griseae*}

Carex canescens Linnaeus *var*. ***canescens***, Silvery Sedge. Acidic bogs, other wetlands. Greenland and AK south to VA, IL, NM, and CA; South America, Eurasia; Australia. [= F, G, Pa; < *C. canescens* – C, M; = *C. canescens* ssp. *canescens* – FNA, K]

Carex canescens Linnaeus *var*. ***disjuncta*** Fernald, Silvery Sedge. Bogs, swamps, often in disturbed areas. June. NL (Newfoundland) west to MN, south to VA, NC, SC, OH, and IN. [= RAB, F, G, Pa; < *C. canescens* – C, M; = *C. canescens* ssp. *disjuncta* (Fernald) Toivonen – FNA, K]

Carex careyana Torrey ex Dewey, Carey's Sedge. Nutrient-rich moist forests, mostly over calcareous rocks. May-June. NY west to MI and IA, south to sw. NC, AL and MO. Naczi (1999b) reports a chromosome number of n = 34. [= C, F, FNA, G, K, M, Pa, W]

Carex caroliniana Schweinitz, Carolina Sedge. Forests. May-June. NJ, PA, MO, and OK south to SC, e. GA, and TX; apparently disjunct in Panhandle FL and adjacent sw. GA. [= RAB, C, F, FNA, G, GW, K, M, Pa, S, W, WH]

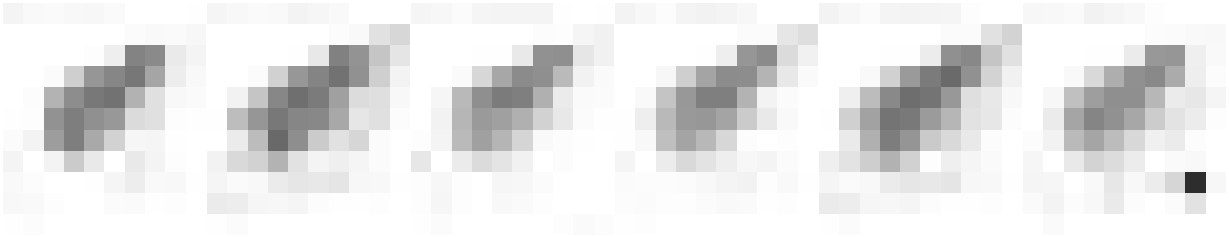
* ***Carex caryophyllea*** Latourette, Spring Sedge. Disturbed areas; native of Eurasia. [= C, F, FNA, G, K, M]

Carex castanea Wahlenberg, Chestnut Sedge. Calcareous sites. NL (Newfoundland) west to MB, south to NY, WI, MI, and MN. The alleged disjunct occurrence in TN cited in FNA is in error. [= C, F, FNA, G, K, M] {rejected; not keyed}

Carex cephaloidea (Dewey) Dewey. Basic forests. NB, ON, and MN south to MD, OH, IN, IL, and IA. [= F, FNA, K, M, Pa; = *C. sparganioides* Muhlenberg ex Willdenow var. *cephaloidea* (Dewey) Carey – C, G]

Carex cephalophora Muhlenberg ex Willdenow. Deciduous forests. May-July. ME west to MN, south to Panhandle FL and TX. [= F, FNA, K, M, Pa, S; < *C. cephalophora* – RAB, W (also see *C. mesochorea*); = *C. cephalophora* var. *cephalophora* – C, G]

Carex chapmanii Steudel, Chapman's Sedge. Edges of calcareous pine savannas, calcareous slopes and bottomlands, mesic hammocks, stream terraces. April-May. Se. NC south to c. peninsular FL, on the Coastal Plain; allegedly disjunct in nc. TN (Chester et al. 1993). The affinities of this species are questionable; it is usually placed in section *Paniceae*, but may actually belong to *Laxiflorae*. [= RAB, FNA, K, S; = *C. chapmannii* – M, WC, orthographic variant; = *C. styloflexa* Buckley var. *fusiformis* (Chapman ex Dewey) Wiegand]

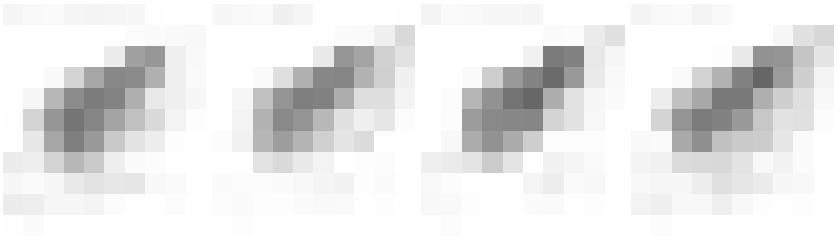


Carex cherokeensis Schweinitz, Cherokee Sedge. Moist, rich, calcareous forests. May-June. Se. NC, nw. SC, sw. NC, nc. TN, se. MO, and OK, south to n. peninsular FL, Panhandle FL, and west to e. TX and se. OK; disjunct in the Mountains of VA, where perhaps introduced (Belden et al. 2004). [= RAB, FNA, G, K, M, S, W, WH]

Carex collinsii Nuttall, Collins's Sedge. White cedar (*Chamaecyparis*) bogs and pocosins in the Coastal Plain, bogs in the southwest mountains of NC (where associated with other Coastal Plain disjuncts). June-July. RI to wc. GA on the Coastal Plain, disjunct in the mountains of nw. NJ, PA, sw. NC, and possibly TN (Chester et al. 1993). *C. collinsii* is a very distinctive species; the slender perigynia teeth are reflexed 180 degrees (thus appressed back against the perigynium). [= RAB, C, F, FNA, G, K, M, Pa, S, W; = *C. collinsiae* – GW, orthographic error]

Carex communis L.H. Bailey. Dry woodlands and forests. May-June. PE west to MN, south to n. SC, c. GA (Jones & Coile 1988), and AR. [= C, F, G, M, RAB, S, W; = *C. communis* var. *communis* – FNA, K, Pa]

Carex comosa F. Boott, Bottlebrush Sedge, Bristly Sedge. Swamps, marshes. April-June. QC west to MN, south to s. FL, LA, and se. OK (Hoagland & Buthod 2012); also in w. North America. [= RAB, C, F, FNA, G, GW, K, M, Pa, S, W, WH]



Carex complanata Torrey & Hooker. Forests. May-June. NJ and s. PA south to n. peninsular FL and Panhandle FL, west to TX and MO; apparently disjunct in AZ. [= F, FNA, K, M, S; = *C. complanata* var. *complanata* – C, G; < *C. complanata* – RAB, GW, W, WH (also see *C. hirsutella*)]

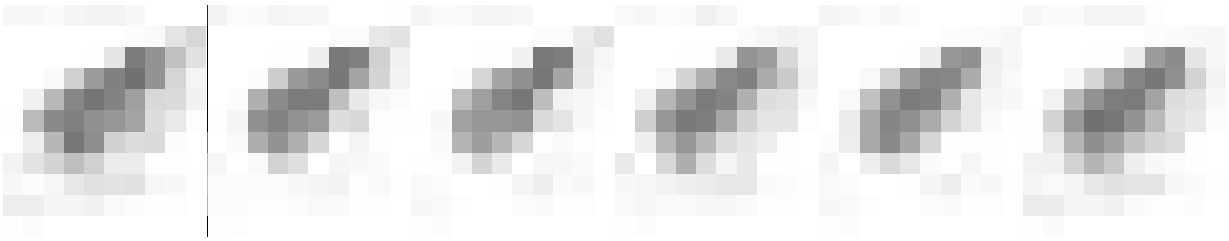
Carex conjuncta F. Boott, Soft Fox Sedge. Mesic forests. May-July. NY, NJ, MN, and SD, south to VA, sc. TN, and AR. [= C, F, FNA, G, K, M, Pa, W]

Carex conoidea Schkuhr ex Willdenow, Field Sedge. Seepage and fen over mafic rocks (amphibolite). May-June. NL (Newfoundland) west to MN, south to nw. NC (Ashe Co. and Alleghany Co.) and MO. First found in NC by a party led by Asa Gray in 1841; recently located at a second site by D.B. Poindexter. [= RAB, C, F, FNA, G, K, M, Pa, S]

Carex corrugata Fernald. Wet calcareous forests. {distribution and abundance needing additional herbarium investigation}. May-June. Se. VA and KY south to Panhandle FL and AL. See Hill (1992). [= F, FNA, K, WH; < *C. grisea* – RAB, G, M, S; < *C. amphibola* – GW; ? *C. amphibola* Steudel var. *turgida* Fernald]

Carex crawei Dewey, Crawe's Sedge. Dry calcareous barrens. QC west to BC, south to NJ, w. VA, c. TN, AL, and AR. First reported for VA by Ludwig (1999). Naczi (1999b) reports a chromosome number of n = 30. [= C, F, FNA, G, K, M, S]

Carex crebriflora Wiegand. Bottomland and other nutrient-rich forests. April-June. VA, KY, and AR south to n. peninsular FL and Panhandle FL and TX. [= RAB, C, F, FNA, G, K, M, S, W, WH]



Carex crinita Lamarck *var*. ***brevicrinis*** Fernald. Swamps, wet forests. May-June. MA south to FL, west to TX, north in the interior to KY and MO. [= C, F, FNA, K, Pa; < *C. crinita* Lamarck var. *crinita* – RAB, G, GW; < *C. crinita* – M, S; < *C. crinita* – W (also see *C. gynandra* and *C. mitchelliana*)]

Carex crinita Lamarck *var*. ***crinita***. Swamps, wet forests, bogs. May-June. NL (Newfoundland) west to MN and AB, south to GA, TN, and AR. [= C, F, FNA, K, Pa; < *C. crinita* Lamarck var. *crinita* – RAB, G, GW; < *C. crinita* – M, S; < *C. crinita* – W (also see *C. gynandra* and *C. mitchelliana*)]

Carex cristatella Britton, Crested Sedge. Grassy balds, bogs, wet meadows. May-June. VT west to SK, south to NC, KY, MO, and KS. See Fox, Godfrey, & Blomquist (1952) for the first report from NC. [= RAB, C, F, FNA, G, K, Pa, W]

Carex crus-corvi Shuttleworth ex Kunze, Crowfoot Sedge, Ravenfoot Sedge. Swamp forests, especially over calcareous substrates. May-June. Se. VA south to Panhandle FL, west to TX, north in the interior to IN, s. ON, MI, and MN. [= RAB, C, FNA, G, GW, K, M, S; > *C. crus-corvi* var. crus-*corvi* – F; > *C. bayardii* Fernald – F; > *C. crus-corvi* var. *virginiana* Fernald]

Carex cryptolepis Mackenzie. Acid, boggy sites. June-August. NL west to MN, south to NJ, NY, NJ. [= FNA, C, G, K, Pa; = *C. flava* var. *fertilis* Peck – F] {synonymy incomplete; section *Ceratocystis*}

Carex cumberlandensis Naczi, Kral, & Bryson, Cumberland Sedge. Rich, mesic, deciduous or mixed forests. May; June. Sw. PA, s. OH, s. IL south to c. NC, c. SC, c. GA, sc. AL, e. MS, and w. TN; disjunct in nw. AR. [= FNA; < *C. abscondita* – RAB, C, G, K, M, S, W; < *C. abscondita* var. *abscondita* – F]

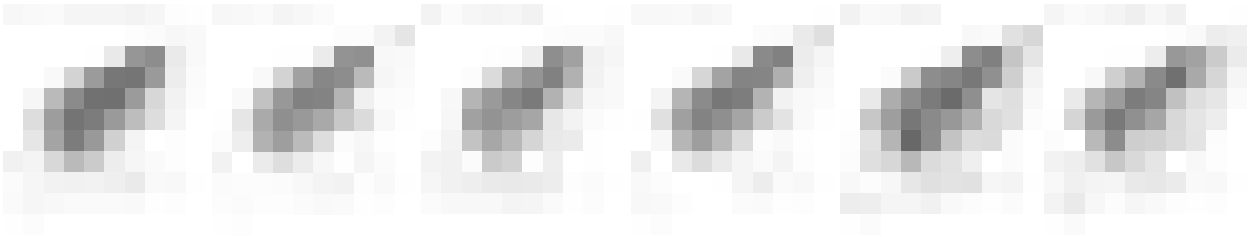
Carex cumulata (Bailey) Fernald. Dry to wet acid barrens and glades. NL west to SK, south to NJ, PA, IN, and IL. [= Pa] {not yet keyed; synonymy incomplete; not yet mapped; section *Ovales*}

Carex dasycarpa Muhlenberg, Velvet Sedge. Maritime forests, hammocks, other sandy forests. May-June. E. SC south to n. peninsular FL, west to MS. Gaddy & Rayner (1980) report this species from a number of barrier islands in Beaufort and Charleston counties, SC; it has since been found in Georgetown County, SC, as well. [= RAB, FNA, K, M, S, WH]

Carex davisii Schweinitz & Torrey, Davis's Sedge. Rich forests. VT, ON, and MN south to VA (Fairfax County) (Steury 2004b), e. WV, nc. TN (Chester et al. 1993), AR, and TX. First reported for VA by Steury (2004b). [= C, F, FNA, G, K, M, Pa]

Carex debilis Michaux. Swamps, bogs, other moist to wet habitats. May-August. MA west to s. IN, south to n. peninsular FL, Panhandle FL, and TX. For other taxa often treated as varieties of *C. debilis*, see *C. allegheniensis* and *C. flexuosa*. [= M, S; = *C. debilis* var. *debilis* – RAB, C, F, FNA, G, K, PA; < *C. debilis* – GW, W, WH (also see *C. allegheniensis* and *C. flexuosa*)]

Carex decomposita Muhlenberg, Cypress-knee Sedge, Epiphytic Sedge. Blackwater swamp forests, often growing on cypress knees, cypress bases, or fallen logs (often at or near water level), river sloughs. NY west to MI, south to sw. GA (Jones & Coile 1988), Panhandle FL, and TX; rarely disjunct inland from the Coastal Plain, especially in river sloughs. See Gaddy & Rayner (1980). [= RAB, C, F, FNA, G, GW, K, M, S, WH]



Carex deflexa Hornemann *var*. ***deflexa***. Seepage at high elevations; rare. Greenland west to AK, south to MA, n. NY, n. MI, and n. MN; apparently disjunct in the high mountains of WV. Var. *boottii* L.H. Bailey of w. North America is of variable taxonomic treatment, included within *C. deflexa*, treated as varietally distinct, or as a full species. [= FNA; < C, F, G, K, M]

Carex diandra Schrank, Lesser Tussock Sedge. Swamps, bogs, especially over limestone. Circumboreal, south in North America to w. MD, PA, TN, OH, IL, CO, CA; also reported from TN on the basis of a destroyed specimen. [= C, F, FNA, G, K, M, Pa]

Carex digitalis Willdenow *var*. ***digitalis***. {Infraspecific taxa need separating: Cp (DE, FL), Pd (DE), Mt (WV), {Mt, Pd, Cp (GA, NC, SC, VA)}: rich forests; common in DE and WV. April-June. ME west to WI, south to FL and e. TX. Naczi (1999b) reports a chromosome number of n = 24. [= FNA, K; < *C. digitalis* – RAB, C, F, G, M, Pa, S, W, WH] {not yet mapped}

Carex digitalis Willdenow *var*. ***floridana*** (L.H. Bailey) Naczi & Bryson. Rich forests. April-June. MD south to FL, west to TX. Naczi (1999b) reports a chromosome number of n = 24. [= FNA; = *C. digitalis* var. *asymmetrica* Fernald – F, K; < *C. digitalis* – RAB, C, G, M, S, W, WH]

Carex digitalis Willdenow *var*. ***macropoda*** Fernald. {Infraspecific taxa need separating: Cp (FL), {Mt, Pd, Cp (GA, NC, SC, VA): rich forests; common.} April-June. PA and IL south to FL and TX. Naczi (1999b) reports a chromosome number of n = 24. [= F, FNA, K; < *C. digitalis* – RAB, C, F, G, M, Pa, S, W, WH] {not yet mapped}

* ***Carex distans*** Linnaeus. Disturbed areas. Introduced in MD and PA; native of Eurasia. [= FNA, K]

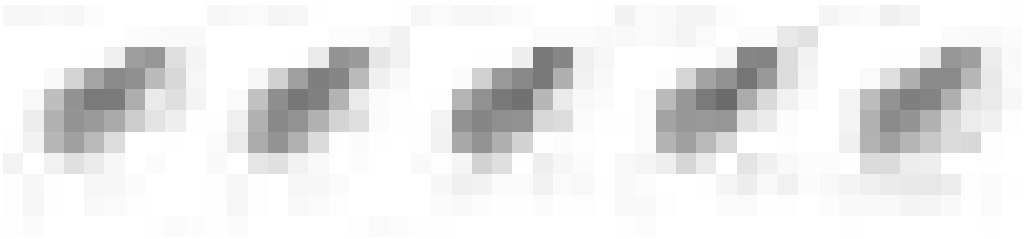
* ***Carex divisa*** Hudson, Divided Sedge. Brackish and oligohaline marshes; native of the Old World. May-June. [= RAB, C, F, FNA, G, K]

* ***Carex divulsa*** Stokes. Fields, pastures, disturbed areas; native of Europe and w. Asia. Reported for Washington, DC; MD, KY. [= C, F; ? *C. divulsa* ssp. *divulsa* – FNA, K, PA; ? *C. virens* – G, M, misapplied]

Carex eburnea F. Boott, Bristle-leaf Sedge. Calcareous cliffs, bluffs, and outcrops. May. NL (Newfoundland) west to AK, south to w. VA, w. NC, nw. SC, c. AL, n. AR, NE, s. AB, and s. BC; early reports of this species from TX are referrable to a recently described species, *C. mckittrickensis* P.W. Ball. Locally abundant on limestone bluffs, easily recognized vegetatively by its wiry stems and leaves (ca. 0.5 mm wide). [= RAB, C, F, FNA, G, K, M, Pa, S, W]

Carex echinata Murray *ssp.* ***echinata***, Star Sedge. Bogs. May-June. Ssp. *echinata* is circumboreal, ranging in North America from NL (Newfoundland) west to SK, south to DE, PA, IN, IA, and ND, and in the mountains to w. NC and e. TN; also in w. North America from AK (Aleutians) and BC south to CO, UT, and s. CA. Ssp. *phyllomanica* (F. Boott) Reznicek occurs along the western coast of North America from s. AK south to n. CA. [= FNA, K; > *C. muricata* Linnaeus var. *angustata* (Carey) Carey ex Gleason – RAB, G, misapplied; = *C. echinata* var. *echinata* – C, Pa; > *C. muricata* var. *cephalantha* (L.H. Bailey) Wiegand & Eames – G; = *C. angustior* Mackenzie – M, S; > *C. angustior* – F; > *C. cephalantha* (L.H. Bailey) Bicknell – F; < *C. muricata* – W]

Carex elliottii Schweinitz & Torrey, Elliott's Sedge. Bogs. May-June. E. NC south to c. pen. FL and west to s. AL. [= RAB, FNA, GW, K, M, S, WH]



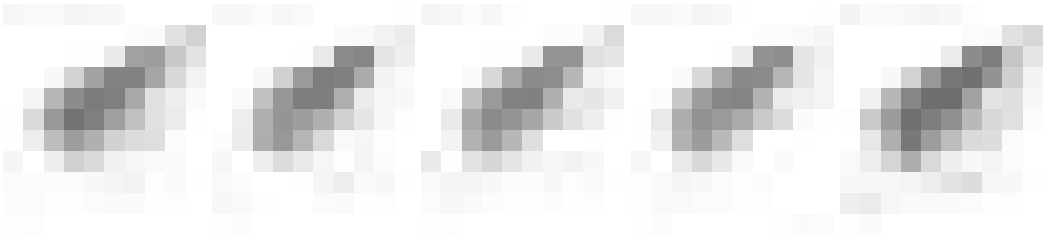
Carex emmonsii Dewey ex Torrey, Emmons's Sedge. Dry, sandy woodlands. April-May. NS west to WI, south to PA, NC, SC, and TN. [= RAB, F, Pa, W; = *C. albicans* Willdenow ex Sprengel var. *emmonsii* (Dewey ex Torrey) J. Rettig – C, FNA, K; = *C. nigro-marginata* Schweinitz var. *minor* (F. Boott) Gleason – G; < *C. varia* Muhlenberg ex Willdenow – S; = *C. albicans* – M, misapplied]

Carex emoryi Dewey in Torrey. Seepages, ditches, other wetlands. May-June. NY and ND south to w. VA, s. IL, n. AR, and TX. [= C, F, FNA, K, M; = *C. stricta* Lamarck var. *elongata* (Böckeler) Gleason – G]

Carex exilis Dewey, Coastal Sedge. Peaty seepage bogs. May-June. NL (Newfoundland) and NL (Labrador) west to ON and n. MN, south to NJ, DE, MD, NY, and n. MI; disjunct southward in sc. NC and in se. MS / sw. AL. The southern occurrences are remarkably disjunct from the Canadian, northern Coastal Plain, and Great Lakes distribution. [= RAB, C, F, FNA, G, K, M]

* ***Carex extensa*** Goodenough, Long-bracted Sedge. Salt marshes, introduced around seaports; native of Europe. [= C, F, FNA, G, K, M]

Carex festucacea Schkuhr ex Willdenow, Fescue Sedge. Bottomland forests. May-June. VT west to MN, south to GA, Panhandle FL, AL, MS, LA, and TX. [= C, F, FNA, K, Pa, WH; < *C. festucacea* – RAB, GW, W; < *C. festucacea* – G (also see *C. straminea*)]



Carex fissa Mackenzie *var.* ***aristata*** Hermann, Hammock Sedge. Wet savannas, roadside banks and ditches. Extreme se. SC (Jasper Co.), s. GA (Clinch County) (Carter, Baker, & Morris 2009; Sorrie 1998b) south to c. peninsular FL, west to FL Panhandle and s. MS (Bryson et al. 1996). The SC distribution is documented by a voucher (Crins 9848 & D. Brunton) at MICH. Probably a species distinct from *C. fissa*. [= FNA, GW, K, WH; < *C. fissa* – M]

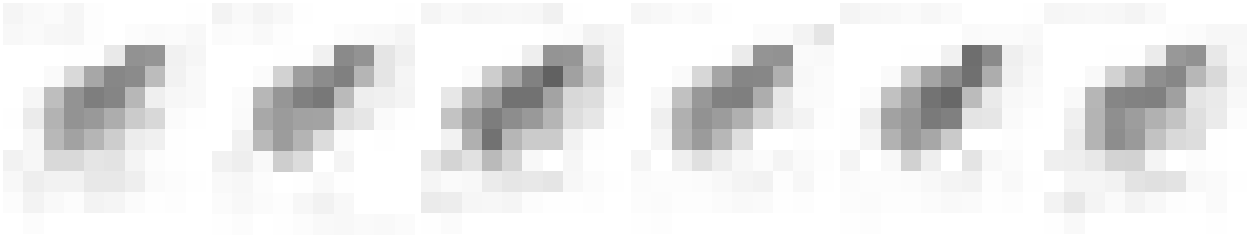
* ***Carex fissa*** Mackenzie *var.* ***fissa***. Disturbed areas, introduced at old railroad stockyard, well-established; native of sc. United States (MO and KS south to TX). See Simmons, Strong, & Parrish (2008) for additional information about the VA occurrence, and Knapp et al. (2011) about the MD occurrence. [= FNA, K; < *C. fissa* – M]

Carex flaccosperma Dewey. {distribution and abundance needing additional herbarium investigation} May-June. Se. VA south to Panhandle FL, west to TX, north in the interior to s. MO. [= FNA, G, K, M, S; < *C. flaccosperma* – RAB, C, GW, WH (also see *C. glaucodea* and/or *C. pigra*); = *C. flaccosperma* var. *flaccosperma* – F]

Carex flava Linnaeus, Yellow Sedge. Calcareous seeps. June. Circumboreal, ranging south in North America to NJ, PA, IN, ID, and BC; disjunct in sw. VA (Giles County). First reported for VA by Wieboldt et al. (1998). [= C, FNA, K, Pa; > *C. flava* var. *flava* – F, G; > *C. flava* var. *laxior* (Kükenthal) Gleason – G]

Carex flexuosa Muhlenberg ex Willdenow. Dry to moist upland forests, openings, granitic domes, rock outcrops. May-July. NL (Newfoundland) west to MN, south to VA and MO, and in the Appalachian Mountains to w. NC and e. TN. [= M, S; = *C. debilis* var. *rudgei* L.H. Bailey – RAB, C, F, G, K; < *C. debilis* var. *rudgei* L.H. Bailey – FNA, Pa; < *C. debilis* – GW, W]

Carex floridana Schweinitz, Florida Sedge. Mesic hammocks, dry hammocks, maritime forests. March-May. E. NC (se. VA?) south to c. peninsular FL, west to TX. [= FNA, K, M, S; = *C. nigromarginata* Schweinitz var. *floridana* (Schweinitz) Kükenthal – RAB, F, WH]



Carex foenea Willdenow, Hay Sedge. NL (Labrador) and NL (Newfoundland) west to YT, south to CT, NY, s. NJ, PA, MI, and ID. [= C, FNA, Pa; > *C. aenea* Fernald – F, M; < *C. siccata* – G, K, misapplied; > *C. foenea* – M]

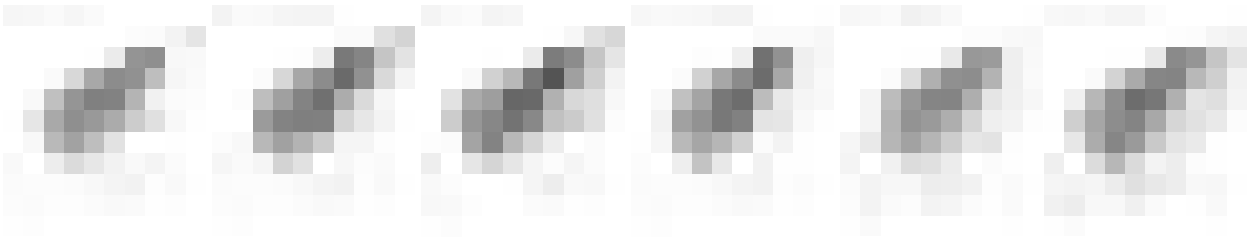
Carex folliculata Linnaeus. Bogs, boggy forests, high elevation forests (spruce-fir). May-July. NL (Newfoundland) west to WI, south to NC and e. TN. [= FNA, K, M, Pa, S, W; = *C. folliculata* var. *folliculata* – RAB, C, F, G; < *C. folliculata* – GW (also see *C. lonchocarpa*)]

Carex frankii Kunth. Bottomland forests. May-July. W. NY and s. ON west to MI and se. NE, south to GA, AR, and OK. [= FNA; < *C. frankii* – RAB, C, F, G, GW, K, M, Pa, S, W (also see *C. aureolensis*)] {not yet mapped}

Carex fraseriana Ker-Gawler, Fraser's Sedge, Lily-leaf Sedge. Cove forests, mostly rather acidic and associated with *Rhododendron maximum*, at moderate elevations. May-July. A Southern and Central Appalachian endemic: w. MD and s. PA south through w. VA and WV to w. NC, e. TN, nw. SC, and n. GA (Jones & Coile 1988). This species is a peculiar plant, often considered a relict species most closely related to *Carex*, but recent molecular evidence suggests that it is embedded within *Carex* and is best considered a component of that genus. The foliage slightly resembles some of the broader-leaved species of *Carex* (such as *C. platyphylla* or *C. plantaginea*) or genera of the Liliaceae; immediately distinctive, however, are the minutely undulate-scaberulous leaf margins. The odd leaves may be derived evolutionary from leaf sheaths (Reznicek in FNA 2002b). Kartesz & Gandhi (1991) have shown that Ker-Gawler's epithet *fraseriana/fraserianus* has priority over Andrews's epithet *fraseri*. [= *Cymophyllus fraserianus* (Ker-Gawler) Kartesz & Gandhi – FNA, K, Pa; = *Cymophyllus fraseri* (Andrews) Mackenzie – RAB, C, F, G, S, W; = *Carex fraseri* Andrews – WV]

Carex gholsonii Naczi & Cochrane, Gholson's Sedge. Moist calcareous forests, especially marl flats and bottomlands over coquina. E. NC south to c. peninsular FL, west to s. AL. See Naczi, Bryson, & Cochrane (2002). [= FNA, WH; presumably included in the concept of *C. granularis* by authors before 2002]

Carex gigantea Rudge, Giant Sedge. Swamps, bottomland forests, cypress depressions. June. DE south to s. FL, west to e. TX, north in the interior to nw. GA (Jones & Coile 1988), IN and OK. [= RAB, C, F, FNA, G, GW, K, M, S, WH]



Carex glaucescens Elliott, Blue Sedge, Southern Sedge. Blackwater swamps, pocosins, wet pine savannas, seepage bogs, depression ponds, pondcypress savannas, other acid and peaty situations. July-September. E. MD south to c. peninsular FL, west to e. TX; disjunct in nw. GA (Jones & Coile 1988) and c. TN. [= RAB, C, F, FNA, G, GW, K, M, S, WH]

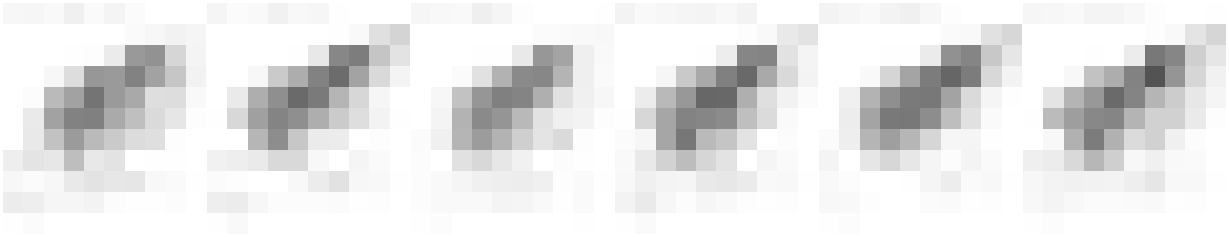
Carex glaucodea Tuckerman ex Olney. {distribution and abundance needing additional herbarium investigation}. May-June. MA and ON west to s. IN and MO, south to NC, sc. TN, and AR. [= FNA, K, Pa; < *C. flaccosperma* – RAB, C, GW; < *C. flaccosperma* Dewey var. *glaucodea* (Tuckerman ex Olney) Kükenthal – F; < *C. glaucodea* – G, M, S]

Carex godfreyi Naczi, Godfrey's Sedge. Calcareous swamps and bottomlands. May-June. Se. NC south to se. GA, c. peninsular FL and west to Panhandle FL, sw. GA, and s. AL. See Naczi (1993) for additional information. [= FNA, K, WH; < *C. grisea* – RAB, M, S; < *C. amphibola* – GW]

Carex gracilescens Steudel. Moist, nutrient-rich forests, calcareous hammocks. May-June. VT and s. QC west to WI, south to SC, AL, LA, and e. TX; disjunct in sw. GA and Panhandle FL. Naczi (1999b) reports a chromosome number of n = 17, 19, 20. [= RAB, F, FNA, K, M, Pa, S, W, WH; < *C. gracilescens* – C (also see *C. ormostachya*); = *C. laxiflora* var. *gracillima* F. Boott – G]

Carex gracillima Schweinitz, Graceful Sedge. Moist ravine and slope forests, floodplains of rivers and large creeks. April-June. NL (Newfoundland) west to MB, south to n. GA, AL, and AR. [= RAB, C, FNA, G, K, M, Pa, W; > *C. gracillima* var. *gracillima* – F]

Carex granularis Muhlenberg ex Willdenow. Moist, nutrient-rich forests, especially bottomlands, mostly over calcareous rocks (limestone, dolostone, coquina limestone) or mafic rocks (diabase. May-June. ME and QC west to SK, south to GA, OK, and ne. TX. *C. haleana* Olney [= *C. granularis* var. *haleana* (Olney) Porter] is alleged to differ primarily in its more slender perigynia (1.0-1.5 mm wide vs. 1.5-2.5 mm) (see F and M for additional information). Here interpreted to include *C. haleana* Olney. Naczi (1999b) found little correlation between the morphological and cytological variability of *C. granularis*, and also little correlation of that variability with geography; he concluded that there was little support for recognition of infraspecific taxa. [= RAB, C, FNA, G, GW, K, S, W; > *C. granularis* var. *granularis* – F, Pa; > *C. granularis* var. *haleana* (Olney) Porter – F, Pa; > *C. granularis* – M; > *C. haleana* Olney – M]



* ***Carex gravida*** L.H. Bailey. Fields. ON west to SK, south to TN, MS, AR, TX, and NM, rarely introduced eastward. Two varieties or species (see synonymy) are sometimes distinguished: var *gravida* with perigynia 4-5 mm long, 2× as long as wide, nerveless or very obscurely nerved on the dorsal face, and var. *lunelliana*, with perigynia 3-4.5 mm long, 1.3-1.5× as long as wide, strongly few-nerved on the dorsal face. Steury (1999) reported var. *lunelliana* as new to MD (Calvert County). [= FNA; > *C. gravida* var. *gravida* – C, F, G, K; > *C. gravida* L.H. Bailey var. *lunelliana* (Mackenzie) F.J. Hermann – RAB, C, F, G, K; > *C. lunelliana* Mackenzie – M; > *C. gravida* – M]

Carex grayi Carey, Asa Gray's Sedge. Bottomland forests. May-June. Sw. QC west to WI and IA, south to nw. GA and OK; disjunct in Panhandle FL. [= RAB, C, FNA, K, Pa, W; = *C. grayii* – G, GW, M, orthographic variant; > *C. grayii* var. *grayii* – F; > *C. grayii* var. *hispidula* A. Gray – F; = *C. asa-grayi* L.H. Bailey – S]

Carex grisea Wahlenberg. {habitats, distribution and abundance in our area needing additional herbarium investigation} May-June. NB west to MN and SD, south to VA, TN, MS, LA, and TX. [= FNA, K, Pa; < *C. grisea* – RAB, G, M, S (also see *C. corrugata* and/or *C. godfreyi*); < *C. amphibola* – C, GW; *? C. amphibola* var. *turgida*]

Carex gynandra Schweinitz. Mountain bogs, swamp forests, seepages. May-June. NL (Newfoundland) west to MN, south to WI, n. VA, w. NC, n. GA, e. TN, OH, and WI. This is the most montane and northern element of the *C. crinita* complex, and the usual one encountered in the Mountains of our area. [= C, FNA, K, M, Pa, S; = *C. crinita* Lamarck var. *gynandra* (Schweinitz) Schweinitz & Torrey – RAB, F, G, GW; < *C. crinita* – W]

Carex haydenii Dewey. Wet meadows, wet prairies. NL (Newfoundland) and QC west to SD, south to s. PA, MD (C. Frye, pers. comm. 2000), IL, and IA. [= C, F, FNA, G, K, M, Pa]

Carex hirsutella Mackenzie. Forests. May-June. ME, s. ON, and IA, south to GA and ne. TX. [= F, FNA, K, M, Pa, S; = *C. complanata* Torrey & Hooker var. *hirsuta* (L.H. Bailey) Gleason – C, G; < *C. complanata* – RAB, GW, W]

* ***Carex hirta*** Linnaeus. Dry sandy areas; native of Eurasia. The report of *C. hirta* for NC (Burk 1961, RAB) is based on a misidentification of *C. pumila* (Reznicek 1993). [= C, F, FNA, G, K, M, Pa]

Carex hirtifolia Mackenzie. Nutrient-rich, though often rather dry, forests and woodlands. May-June. NB west to MN, south to MD, sw. VA, c. TN, KY, MO, and e. KS. [= C, F, FNA, G, K, M, Pa, W]

Carex hitchcockiana Dewey. Rich moist forests, especially over limestone, other calcareous, or mafic rocks. June-July. MA west to MN, south to NC, sc. TN, and AR. [= C, F, FNA, G, K, M, Pa, W]

Carex hormathodes Fernald. Freshwater and slightly brackish tidal marshes. NL (Newfoundland) south to ne. NC, along the coast. [= F, FNA, K, M; = *C. straminea* Willdenow ex Schkuhr var. *invisa* W. Boott – C, G]

Carex howei Mackenzie, Howe's Sedge. Bogs and seepages. May-June. NS west to MI and nw. IN, south to c. peninsular FL and e. TX, predominantly (but by no means strictly) on the Coastal Plain. See *C. atlantica* for discussion of the relationship between the two taxa. [= RAB, F, G, GW, M, S, W; = *C. atlantica* var. *capillacea* (L.H. Bailey) Cronquist – C; = *C. atlantica* L.H. Bailey ssp. *capillacea* (L.H. Bailey) Reznicek – FNA, K, Pa, WH]

Carex hyalina F. Boott. Bottomland forests. TN, AR, and OK, south to MS, LA, and TX. [= FNA, K, M] {not yet keyed; synonymy incomplete; *Ovales*}

Carex hyalinolepis Steudel. Marshes, swamp forests. May-June. NJ south to Panhandle FL, west to TX, north in the interior to KS; disjunct around the Great Lakes in MI, IN, and s. ON. [= RAB, C, F, FNA, K, M, Pa, S, WH; = *C. lacustris* Willdenow var. *laxiflora* Dewey – G; = *C. hyalinolepsis* – GW, misspelling]

Carex hystericina Muhlenberg ex Willdenow, Porcupine Sedge. Calcareous marshes and wet meadows. June-July. NB west to BC, south to w. VA, sc. TN, w. TX, and n. CA. [= C, FNA, G, K, Pa; = *C. hystricina* – F, M, W, orthographic variant]

Carex impressinervia Bryson, Kral, & Manhart. Moist forests. April-May. Sc. NC south to AL and west to MS, apparently very rare and widely scattered. See Bryson, Kral, & Manhart (1987) for additional information on this species. [= FNA, K]

Carex interior L.H. Bailey, Inland Sedge. Calcareous seepage areas. May-June. NL (Newfoundland) and NL (Labrador) west to s. AK, south to w. VA, n. AR, n. AZ, and n. CA; disjunct in Mexico (Chihuahua). [= C, F, FNA, G, K, M, Pa, W]

Carex intumescens Rudge *var*. ***fernaldii*** L.H. Bailey. Spruce-fir forests, northern hardwood forests, grassy balds. June-July. NL (Newfoundland) west to MB, south to NY, n. PA, MI, MN, and, at higher elevations in the Appalachians, to w. VA, w. NC, and e. TN. See Uttal (1971) and Reznicek & Ball (1974) for different views on the validity of this variety. [= F; < *C. intumescens* – RAB, C, FNA, G, GW, K, M, Pa, S, W]

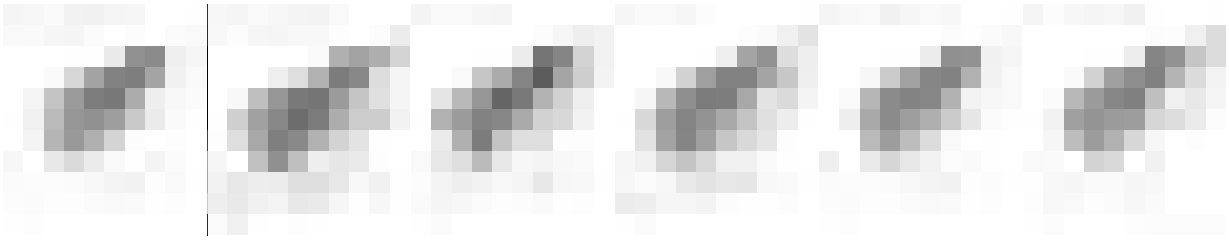
Carex intumescens Rudge *var*. ***intumescens***. Bogs, wet forests. May-July. NS west to WI, south to c. peninsular FL and e. TX. [= F; < *C. intumescens* – RAB, C, FNA, G, GW, K, M, Pa, S, W, WH]

Carex jamesii Schweinitz, James's Sedge. Nutrient-rich bottomlands and mesic slopes over calcareous or mafic rocks. May-June. MD and NY west to MI, MN, and e. NE, south to c. SC, GA, and LA. Naczi (1999b) reports chromosome numbers of n = 33, 35. [= FNA, Pa; < *C. jamesii* – RAB, C, F, G, K, M, W]

Carex joorii L.H. Bailey, Joor's Sedge, Hummock Sedge, Cypress-swamp Sedge. Swamps, upland depression swamps in the Piedmont, sphagnous wetlands. June-October. E. MD south to n. peninsular FL and Panhandle FL, west to e. TX, north in the interior to TN, MO, and OK. [= RAB, C, F, FNA, G, GW, K, M, S, WH]

Carex juniperorum Catling, Reznicek, & Crins. On edges of calcareous glades and barrens, in subxeric to submesic calcareous woodlands. This species was recently described, and is so far known only from alvars in s. ON, calcareous glades and barrens in s. OH and ne. KY, and has recently been found in Montgomery Co., VA (Belden et al. 2004) and Botetourt Co., VA (Townsend, pers. comm., 2008). [= FNA, K]

* ***Carex kobomugi*** Ohwi, Sea Isle Sedge, Japanese Sedge. Sand dunes; native of Japan. March-July. *C. kobomugi* is distinctive in its short stout culms, and its terminal, headlike, dioecious inflorescences. This species is planted as a stabilizer of coastal dunes. [= C, F, FNA, G, K]



Carex kraliana Naczi & Bryson, Kral's Sedge. Mesic forests, slightly acidic to circumneutral. MD, OH, and IN south to Panhandle FL and TX. See Naczi, Bryson, & Cochrane (2002). [= FNA; variously included in the concepts of other species in sect. *Laxiflorae* by authors before 2002]

Carex lacustris Willdenow, Lakeshore Sedge. Marshes, swamp forests. QC west to SK, south to e. VA, w. VA, and NE. [= C, F, FNA, K, M, Pa; = *C. lacustris* var. *lacustris* – G]

Carex laevivaginata (Kükenthal) Mackenzie. Marshes, swamp forests, alluvial forests. May-June. MA, MI, and MN, south to Panhandle FL, AL, and MO. [= RAB, C, F, FNA, G, GW, K, M, Pa, W, WH; = *C. laevi-vaginata* – S, orthographic variant]

Carex lasiocarpa Ehrhart *var*. ***americana*** Fernald, Slender Sedge. In shallow water of alkaline spring seep, on hummocks in acidic basin marsh, and in high elevation fen over amphibolite. A circumboreal species; var. lasiocarpa is Eurasian, var. americana ranges from NL west to AK, south to NJ, WV, MD (C. Frye, pers. comm. 2000), VA, nw. NC, IA, CO, UT, and n. CA. First reported for VA by Wieboldt et al. (1998). Found for the first time in NC in the valley of Long Hope Creek (Ashe County, NC), in July 1999 by A.S. Weakley and P.D. McMillan. [= C, F, G, K; = *C. lasiocarpa* ssp. *americana* (Fernald) Hultén – FNA; < *C. lasiocarpa* – M, Pa, W]

Carex laxiculmis Schweinitz *var*. ***copulata*** (L.H. Bailey) Fernald. Mesic forests. April-June. VA, ON, and WI south to NC, AL, and AR. Var. *copulata* (L.H. Bailey) Fernald, has sometimes been considered the hybrid *C. digitalis* × *laxiculmis*; current evidence suggests that it is not a hybrid but is not consistently separable from *C. laxiculmis* (Manhart 1984). Naczi (1999b) reports chromosome numbers for the two varieties, n= 22, 23, 25 for var. *laxiculmis*, and n = 23-24 for var. *copulata*; normal pairing further suggests that var. *copulata* is not a hybrid. [= FNA, K, Pa; < *C. laxiculmis* – RAB, G, K, S, W; = *C.* ×*copulata* (L.H. Bailey) Mackenzie – F, M]

Carex laxiculmis Schweinitz *var*. ***laxiculmis***. Rich slope or alluvial forests. April-June. S. ME west to s. WI and s. IA, south to NC, nw. GA (Jones & Coile 1988), n. AL, and MO. [= FNA, K, Pa; < *C. laxiculmis* – RAB, G, S, W; = *C. laxiculmis* – F, M]

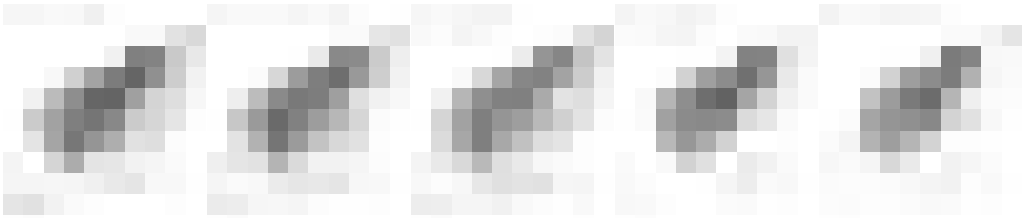
Carex laxiflora Lamarck. Bottomland and other nutrient-rich forests. May-June. Varieties have been recognized; their appropriate disposition is uncertain. Var. *laxiflora* ranges from ME and s. QC west to WI and IN, south to NC, TN, and AL; allegedly also in s. Mexico. Var. *serrulata* F.J. Hermann has been reported for our area by Hill & Horn (1997). Its range is stated by F to be NY and PA to MI, IN, and TN. It differs in being distinctly scabrous (vs. smooth to scaberulous), and in having the bract sheaths with serrulate angles (vs. entire or erose angles). [= RAB, C, FNA, M, Pa, W; > *C. laxiflora* var. *serrulata* F.J. Hermann – F, K; > *C. laxiflora* var. *laxiflora* – F, K; < *C. laxiflora* var. *laxiflora* – G; *? C. heterosperma* Wahlenberg – S]

Carex leavenworthii Dewey. Dry forests. May-June. NY, ON, and NE south to Panhandle FL and TX. [= RAB, C, F, FNA, G, K, M, Pa, S, W; < *C. cephalophora* Muhlenberg ex Willdenow – WH]

Carex leptalea Wahlenberg *var*. ***harperi*** (Fernald) Weatherby & Griscom. Bogs, seeps, blackwater bottomlands, usually in saturated conditions with *Sphagnum spp*. May-June. NJ south to c. peninsular FL, west to TX, inland in the interior to IN and MO. Var. *harperi* is considered to differ from the typic variety in its larger perigynia, larger spikes, more aristate pistillate scales, and more southern range; it needs additional study. [= F, G; < *C. leptalea* – RAB, C, GW, M, S, W, WH; = *C. leptalea* ssp. *harperi* (Fernald) W. Stone – FNA, K; = *C. harperi* Fernald]

Carex leptalea Wahlenberg *var*. ***leptalea***. Bogs, seeps, usually in saturated conditions with *Sphagnum spp*. May-June. NL (Labrador) west to AK, south to NC, TN, MO, SD, NM, and CA. [= F, G; < *C. leptalea* – RAB, C, GW, M, Pa, S, W; = *C. leptalea* ssp. *leptalea* – FNA, K]

Carex leptonervia (Fernald) Fernald. Nutrient-rich forests, such as rich, seepy northern hardwoods forests. May-June. NL (Newfoundland) west to MN, south to NJ, PA, IN, and WI, and in the Appalachians south to NC and SC (L.L. Gaddy, pers.comm., 2009). [= RAB, C, F, FNA, G, K, M, Pa, S, W]



Carex limosa Linnaeus, Mud Sedge. Bogs, swamps, wet meadows. Circumboreal, south in North America to se. PA (Rhoads & Klein 1993; Rhoads & Block 2007), NJ, DE, OH, IN, NE, UT, and CA. [= C, F, FNA, G, K, M, Pa]

Carex livida (Wahlenberg) Willdenow. Bogs and fens. Circumboreal, south in North America to s. NJ, NY, MI, IN, MN, CO, and CA; also disjunct in Panama and South America. Material in NJ is described as being atypical and needing additional research (Rothrock & Reznicek in FNA 2002b). [= FNA; > *C. livida* var. *radicaulis* Paine – K] {add to synonymy; add to key; not yet mapped; 26aa. *Paniceae*}

Carex lonchocarpa Willdenow. Pocosin margins, small blackwater stream swamps. May-July. S. MD south to ne. FL and Panhandle FL, west to LA; rarely inland, as in sc. TN. Recognition of *C. lonchocarpa* at the species level is supported by its distinctive achene micromorphology (Wujek & Menapace 1986). [= FNA, K, M, WH; = *C. folliculata* Linnaeus var. *australis* L.H. Bailey – RAB, C, F, G; < *C. folliculata* – GW; = *C. smalliana* Mackenzie – S]

Carex longii Mackenzie, Long's Sedge. Low fields, bottomlands. May-June. NS west to WI, south to s. FL and TX. [= C, F, FNA, K, Pa, WH; < *C. albolutescens* – RAB, G, GW, W]

Carex louisianica L.H. Bailey. Calcareous forests. May-July. S. NJ south to ne. FL, Panhandle FL, west to TX, north in the interior to KY, IN, and MO; disjunct in ne. OH. [= RAB, C, F, FNA, G, GW, K, M, S, W, WH]

Carex lucorum Willdenow ex Link *var*. ***austrolucorum*** J. Rettig, Appalachian Woodland Sedge. Xeric to mesic wooded slopes, usually in oak forests and northern hardwood forests. *C. lucorum* var. *austrolucorum* is endemic to the Southern Appalachians, ranging from sw. VA and s. WV south through w. NC and e. TN to nw. SC and ne. GA. It has been reported from farther north, in sc. WV (Boone County) (Cusick 1996). Var. *lucorum* differs in having the leaves broader (mostly 1.5-2.8 mm wide vs. mostly 1.1-1.3 mm), the beak averaging shorter (1.3 mm vs. 1.5 mm), chromosome number n = 20 (vs. n = 13), and various details of flavonoid chemistry and achene micromorphology (see Rettig 1988 for details). While the two taxa can be

difficult to tell apart on morphological grounds, they are clearly separate taxa. *C. lucorum* var. *austrolucorum* was first reported for South Carolina by Hill & Horn (1997). [= FNA, K; < *C. pensylvanica* Lamarck var. *distans* Peck – RAB, F, G (the name misapplied as to our plants); < *C. lucorum* – C, M, S; < *C. pensylvanica* – W; = *C. lucorum* ssp. *austrolucorum* (J. Rettig) A. Haines]

Carex lucorum Willdenow ex Link *var*. ***lucorum***, Northern Woodland Sedge. Moist forests. NB west to MN, south to MD (Cecil County; C. Frye, pers. comm. based on specimen at DOV), DE (Knapp et al. 2011), and PA. [= FNA, K, Pa; < *C. pensylvanica* Lamarck var. *distans* Peck – F, G; < *C. lucorum* – C, M, S; < *C. pensylvanica* – W; = *C. lucorum* ssp. *lucorum*]

Carex lupuliformis Sartwell ex Dewey, False Hop Sedge. Wet forests, swamps, riverbanks, especially around ponds. June-July. VT and QC west to se. WI, south to s. FL and e. TX. [= RAB, C, F, FNA, G, K, M, Pa, WH; < *C. lupulina* – GW]

Carex lupulina Muhlenberg ex Willdenow, Hop Sedge. Bottomland forests. June-September. NS west to MN, south to ne. FL and e. TX. [= RAB, C, FNA, G, K, M, Pa, S, W, WH; < *C. lupulina* – GW (also see *C. lupuliformis*); > *C. lupulina* var. *lupulina* – F; > *C. lupulina* var. *pedunculata* A. Gray – F]

Carex lurida Wahlenberg. Bogs, marshes, ditches. June-September. NS west to MN, south to c. peninsular FL, Panhandle FL, and Mexico. [= RAB, C, F, FNA, G, GW, K, M, Pa, S, WH]

Carex lutea LeBlond, Golden Sedge. Wet savannas shallowly underlain by coquina limestone, with open canopy of *Taxodium ascendens*, *Pinus palustris*, and *Liriodendron tulipifera*. May. Endemic to Pender and Onslow counties, NC, where associated with other narrow endemics, such as *Thalictrum cooleyi* and *Allium species 1*, and other rare species, such as *Plantago sparsiflora*, *Parnassia caroliniana*, *Rhynchospora thornei*, and others. See LeBlond et al. (1994) for additional information. [= FNA, K]

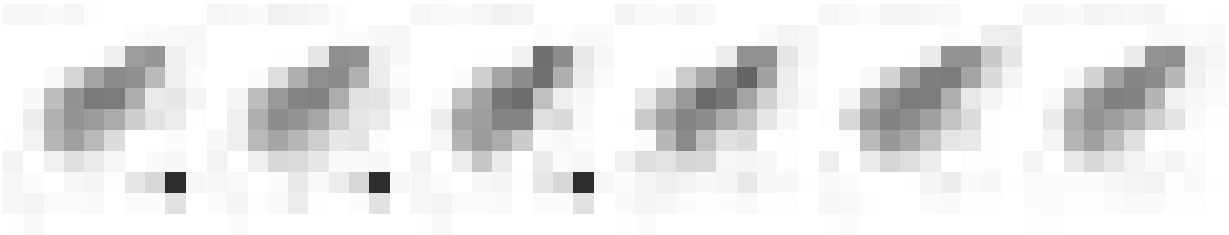
Carex magnifolia Mackenzie. Bogs, acid swamps. April-May. E. NC south to FL, and disjunct in mountain bogs with Coastal Plain affinities, as in Henderson County, NC. *C. magnifolia* differs morphologically from *C. abscondita* in its larger perigynia, longer leaves, and much more strongly glaucous leaves; it has a more southern distribution and occurs in wetter, boggier habitats. Manhart (1984) found that it differed chemically from *C. abscondita*. Further study is needed to verify its taxonomic status. [= M, S; < *C. abscondita* – RAB, FNA, K]

Carex manhartii Bryson, Blue Ridge Purple Sedge, Manhart's Sedge. Cove forests and montane oak-hickory forests, mostly at medium to fairly high elevations, especially over mafic rocks (such as amphibolite) and calcareous rocks (such as marble), but occurring on more acidic substrates as well. April-May. Endemic to w. NC, sw. VA, nw. SC, ne. GA, and se. TN, in the Blue Ridge Mountains. Once considered very rare, this species is now known to be locally common in portions of sw. NC and adjacent ne. GA. For more information on the Virginia occurrence, see Belden et al. (2004). [= FNA, K, W; < *C. purpurifera* Mackenzie – RAB, M, S]

Carex meadii Dewey, Mead's Sedge. Prairies, on low, moist clayey soils over mafic rocks (such as diabase) or calcareous rocks. May-June. NJ west to MI and SK, south to nc. NC, GA, AR, sw. LA, and TX. The species forms large clonal patches with a distinctive bluish cast at the time of flowering and fruiting. Naczi (1999b) reports a chromosome number of n = 28. [= RAB, C, F, FNA, G, K, M, Pa, S, W]

Carex mesochorea Mackenzie, Midland Sedge. Dry forests and woodlands. MA, ON, and NE south to GA, AL, and TX. First reported for South Carolina by Hill & Horn (1997). [= F, FNA, K2, M, Pa, S; < *C. cephalophora* – RAB, W; = *C. cephalophora* Muhlenberg ex Willdenow var. *mesochorea* (Mackenzie) Gleason – C, G]

Carex michauxiana Böckeler, Michaux's Sedge. Bogs, seeps, usually in *Sphagnum*. NL (Labrador) and MB south to MA, n. MI, n. WI, n. MN, and SK; disjunct in w. MD. Closely related to an e. Asian species. [= C, F, FNA, G, K2, M]



Carex microdonta Torrey & Hooker. Limestone glades, calcareous prairies. AL and Panhandle FL west to MO, KS, OK, TX, NM, and AZ. [= FNA, K, M, S]

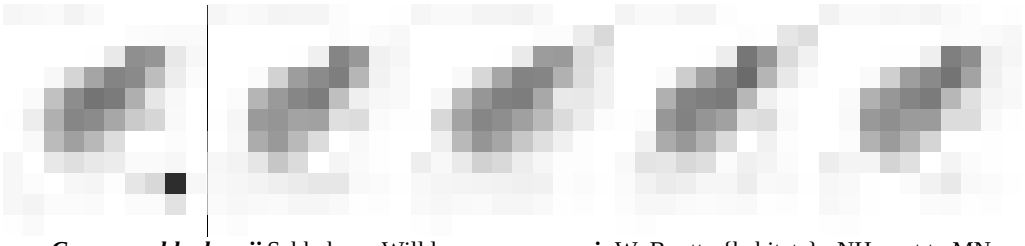
Carex misera Buckley, Wretched Sedge. Moderate to high elevation cliffs and rock outcrops. June. A Southern Blue Ridge endemic: nw. NC and w. TN south to ne. GA (Rabun County). Schell & Waterway (1992) discuss interesting geographic patterns of allozyme diversity in this narrowly endemic species. [= RAB, FNA, K, M, S, W; = *C. juncea*, apparently misapplied]

Carex mitchelliana M.A. Curtis, Mitchell's Sedge. Swampy woodlands and forests. May-June. Se. MA west to PA and KY, south to Panhandle FL, n. AL, and sc. TN. This species has a scattered distribution throughout its range, and is apparently rare. Bruederle, Fairbrothers, & Hanks (1989) and Bruederle (1999) provide additional information about this species. Allozyme studies suggest that *C. mitchelliana* is less closely related to *C. gynandra*, *C. crinita* var. *crinita*, and *C. crinita* var. *brevicrinis*

than they are to one another. [= C, F, FNA, K, M, Pa, S, WH; = *C. crinita* Lamarck var. *mitchelliana* (M.A. Curtis) Gleason – RAB, G, GW; < *C. crinita* – W]

Carex molesta Mackenzie ex Bright, Troublesome Sedge. Calcareous soils. NH west to ND, south to VA, AL, MS, and OK. [= F, FNA, G, K, Pa; < *C. brevior* (Dewey) Mackenzie ex Lunell – C]

Carex molestiformis Reznicek & P.E. Rothrock. Bottomland forets, wet meadows, ditches. W. VA, WV, s. OH, c. KY, and c. MO south to nw. NC, n. GA, c. TN, n. MS, sw. AR, and se. OK (likely to be more widespread after further study). See Rothrock, Reznicek, & Bryson (2011). [= FNA, K; < *C. brevior* (Dewey) Mackenzie ex Lunell – C, G] {synonymy incomplete}



Carex muehlenbergii Schkuhr ex Willdenow *var*. ***enervis*** W. Boott. {habitats}. NH west to MN and NE, south to GA, AL, MS, and TX. [= FNA, K; < *C. muhlenbergii* – RAB, Pa, W, orthographic variant; < *C. muhlenbergii* var. *muhlenbergii* – C; = *C. muhlenbergii* var. *enervis* – F, G, orthographic variant; = *C. plana* Mackenzie – M, S]

Carex muehlenbergii Schkuhr ex Willdenow *var*. ***muehlenbergii***. Dry to dry-mesic hammocks, {additional habitats}. ME, ON, and MN south to Panhandle FL and TX. [= FNA, K; < *C. muhlenbergii* – RAB, Pa, W, WH, orthographic variant; < *C. muhlenbergii* var. *muhlenbergii* – C (also see var. *enervis*); = *C. muhlenbergii* var. *muhlenbergii* – F, G, orthographic variant; = *C. muhlenbergii* – M; < *C. muhlenbergii* – S (also see *C. austrina*)]

* ***Carex muricata*** Linnaeus *ssp*. ***lamprocarpa*** Čelakovský. A European alien, with known occurrences south to e. PA (Rhoads & Block 2007) and MD. [= FNA, Pa; < *C. muricata* – C, K]

Carex muskingumensis Schweinitz. Floodplain forests. ON and MN south to KY, TN, AR, and OK. [= C, F, FNA, G, K, M]

Carex nigromarginata Schweinitz, Blackedge Sedge. Dry woodlands and forests. March-May. DE and NJ west to WI, south to SC, GA, and TX. [= C, FNA, K, M, Pa, W; = *C. nigromarginata* var. *nigromarginata* – RAB, F; = *C. nigro-marginata* var. *nigro-marginata* – G; = *C. nigro-marginata* – S]

Carex normalis Mackenzie. Mesic forests. May-June. ME, QC, and ON south to GA and AR. [= RAB, C, F, FNA, G, GW, K, Pa, W]

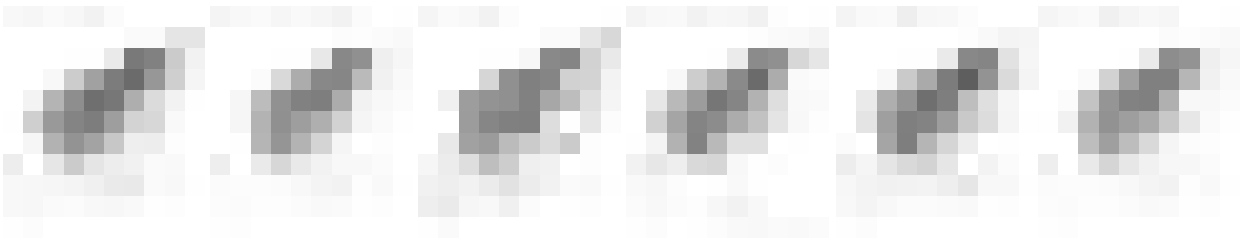
Carex novae-angliae Schweinitz, New England Sedge. Moist forests. NL (Newfoundland) and ON, south to e. PA, n. WV, and WI. [= C, F, G, K, M; < *C. novae-angliae* – FNA, Pa]

Carex oblita Steudel. Swamps and other wet habitats. NY (Long Island) and NJ south to sc. GA, west to w. LA, mostly on the Coastal Plain, but extending much less commonly inland to the Piedmont and Mountains. [= M, S; = *C. venusta* Dewey var. *minor* Böckler – C, F, G, K; < *C. venusta* – RAB, FNA, GW, W]

* ***Carex oklahomensis*** Mackenzie, Oklahoma Sedge. Seepages, disturbed wetlands; probably adventive from farther west. Se. MO west to KS, south to AR, and ne. TX; disjunct (and apparently adventive) in various scattered sites east of the Mississippi River, as in AL, MS, GA, w. NC (Graham County) and w. VA (Giles County). First reported for VA by Wieboldt et al. (1998). See Bryson & Rothrock (2010) for further discussion; they consider that this species is "introduced during highway and reservoir construction or maintenance in contaminated hay, grass seeds or on construction, maintenance, and mowing equipment." [= F, FNA, K, M; < *C. stipata* – S; = *C. stipata* Muhlenberg ex Willdenow var. *oklahomensis* (Mackenzie) Gleason – G]

Carex oligocarpa Schkuhr ex Willdenow, Few-fruited Sedge. Rich forests, over calcareous or mafic rocks. May-June. MA west to MN, south to FL and TX. *C. oligocarpa* sensu stricto in SC (P. McMillan, pers. comm., specimen at CLEMS). [= RAB, C, F, FNA, G, K, M, Pa, S, W]

Carex oligosperma Michaux. Bogs and seeps at high elevations. NL (Newfoundland) west to NT, south to CT, c. PA, n. IN, WI, and MN; disjunct in ne. OH, WV (Hardy County) and NC (Ashe, Avery, Mitchell, and Watauga counties). [= C, F, FNA, G, M, Pa; > *C. oligosperma* var. *oligosperma* – K]



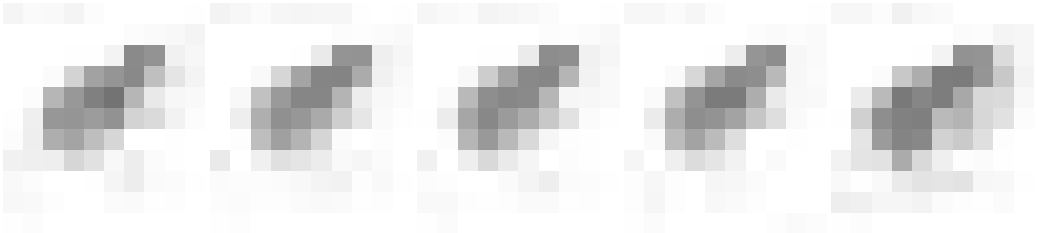
* ***Carex opaca*** (F.J. Hermann) P.E. Rothrock & Reznicek. Introduced at old railroad livestock yard, well-established; native of sc. United States. Native range in prairies, IL and KS south to MS, AR, and OK. [= FNA; = *C. bicknellii* Britton var. *opaca* F.J. Hermann – K; < *C. bicknellii* – M]

Carex ormostachya Wiegand, Necklace Spike Sedge. Northern hardwood forests. S. Canada south to ME, MA, PA, w. VA (Augusta County), n. OH, MI, and WI. [= F, FNA, K, M, Pa; < *C. gracilescens* – C; = *C. laxiflora* var. *ormostachya* (Wiegand) Gleason – G]

Carex ouachitana Kral, Manhart, & Bryson, Ouachita Sedge. Dry to dry-mesic slope and ridge forests. Disjunct in nc. TN and sc. KY from the Ouachita Mountains of sw. AR and se. OK. [= FNA, K] {not yet keyed; synonymy incomplete; *Griseae*}

* ***Carex ovalis*** Goodenough. Grassy balds, disturbed areas; native of Eurasia. Known to range in North America from NL (Newfoundland) and NY south to w. NC and ne. TN. The records reported in RAB and elsewhere of *C. aenea* are actually misidentified material of this species (A.A. Reznicek, pers. comm. 2005). [= FNA, K, PA; = *C. aenea* – RAB, misapplied (based on misidentified material); < *C. leporina* Linnaeus – C, F, G, misapplied; ? *C. tracyi* Mackenzie]

Carex oxylepis Torrey & Hooker. Bottomlands, calcareous forests. May-June. VA, KY, IL, MO, and OK south to c. peninsular FL and TX. A distinction is sometimes made between var. *oxylepis* and var. *pubescens*. Var. *oxylepis* is widespread in the Southeast; var. *pubescens* is more restricted, from KY and s. IL south to AL and MS. [= RAB, C, F, FNA, G, GW, M, S, W; > *C. oxylepis* var. *oxylepis* – K; > *C. oxylepis* var. *pubescens* J.K. Underwood – K]



Carex paeninsulae Naczi, E.L. Bridges, & Orzell, Peninsula Sedge. Mesic hammocks. Endemic to FL peninsula, north into ne. FL (Suwanee and Duval counties). [= FNA] {not yet keyed; *Griseae*}

Carex pallescens Linnaeus, Pale Sedge. Grassy balds at high elevations, other grassy openings. June-July. Circumboreal (in ne. North America and n. Eurasia); in North America ranging from NL (Newfoundland), QC, and MN, south to w. NC, e. TN, and MI. *C. pallescens* is reported to occur on Big Bald, Unicoi County, TN, immediately adjacent to the NC line (Churchill et al. 1992). [= C, FNA, G, K, M, Pa, W; > *C. pallescens* var. *neogaea* Fernald – F]

Carex pauciflora Lightfoot, Few-flowered Sedge. Open bogs. Circumboreal, south in North America to NY, WV (Grant, Randolph, and Tucker counties), WI, MN, and WA. [= C, F, FNA, G, K, M, Pa]

Carex pedunculata Muhlenberg ex Willdenow *var*. ***pedunculata***, Longstalk Sedge. Nutrient-rich dry to mesic forests, usually over calcareous or mafic rocks. April. Var. *pedunculata* ranges from NL (Newfoundland), SK, and ND, south to NJ, w. VA, sw. NC, nw. GA (Dade County) (Jones & Coile 1988), n. AL, c. IN, c. IL, and n. IA. Var. *erythrobasis* (Léveillé & Vaniot) Koyama occurs in Korea. It may well prove that these two widely disjunct taxa should be recognized at the species level. [= FNA; < *C. pedunculata* – C, F, G, K, M, Pa, W; = *C. pedunculata* ssp. *pedunculata*]

Carex pellita Muhlenberg. Wet meadows. NB west to BC, south to w. VA, w. TN, sc. TN (May Prairie, Coffee County), AR, and CA. McClintock & Waterway (1994) discuss the distinctiveness of *C. pellita* and *C. lasiocarpa*, as well as the misapplication of the name *C. lanuginosa* to the species now properly called *C. pellita*. [= C, FNA, K, Pa; = *C. lanuginosa* Michaux – F, M, misapplied; = *C. lasiocarpa* Ehrhart var. *latifolia* (Böckler) Gilly]

* ***Carex pendula*** Hudson, Pendulous Sedge. Disturbed areas; native of Europe. Introduced in VA (FNA, Kartesz 1999). [= FNA, K]

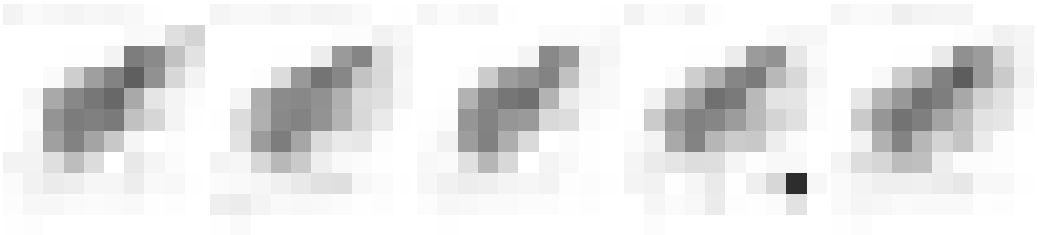
Carex pensylvanica Lamarck. Dry to moist woodlands and forests, grassy balds, shale barrens, rock outcrops. April-June. ME west to s, MB and ND, south to SC, n. GA, TN, and AR. [= FNA, K, Pa; = *C. pensylvanica* var. *pensylvanica* – RAB, C, F, G; = *C. pennsylvanica* – M, S, orthographic variant; < *C. pensylvanica* – W (also see *C. lucorum* var. *austrolucorum*)]

Carex physorhyncha Liebmann ex Steudel, Bellow's-beak Sedge. Dry woodlands. Se. VA south to ne. FL and FL Panhandle, west to AR, OK, TX, and Mexico. [= RAB, F, M, S, W; = *C. albicans* Willdenow ex Sprengel var. *australis* (L.H. Bailey) J. Rettig – FNA, K, WH]

Carex picta Steudel, Painted Sedge. Mesic forests. S. IN south through KY and c. TN to nc. GA (Jones & Coile 1988), c. AL, and LA. Reported (erroneously?) for VA (Kartesz 1999). Locally abundant and forming "doughnut clumps", sometimes aggregated to form a coarse turf. [= C, F, FNA, G, K, M, S]

Carex pigra Naczi, Lazy Sedge. Moist forests, bottomlands. May-June. Se. VA west to se. and sc. TN, south to n. FL, s. AL, and ne. MS. See Naczi (1997) for additional information. [= FNA, K; < *C. flaccosperma* – RAB, G, GW, WH; < *C. flaccosperma* Dewey var. *glaucodea* (Tuckerman ex Olney) Kükenthal – F; < *C. glaucodea* – S]

Carex planispicata Naczi. Rich to fairly acid mesic forests, on slopes and floodplains. C. NJ west to s. IN, se. MO, and se. OK, south to c. GA, s. MS, and se. TX. See Naczi (1999a) for additional information. [= FNA, Pa; = *C. grisea* Wahlenberg var. *rigida* L.H. Bailey; = *C. amphibola* var. *rigida* (L.H. Bailey) Fernald – F, K]



Carex plantaginea Lamarck, Plantainleaf Sedge. Rich cove forests, mostly over mafic or calcareous rocks, montane alluvial forests. April-May. NB west to MN, south to MD, NJ, VA, NC, ne. GA (Jones & Coile 1988), e. TN, c. TN, KY, and s. IN. [= RAB, C, F, FNA, G, K, M, Pa, S, W]

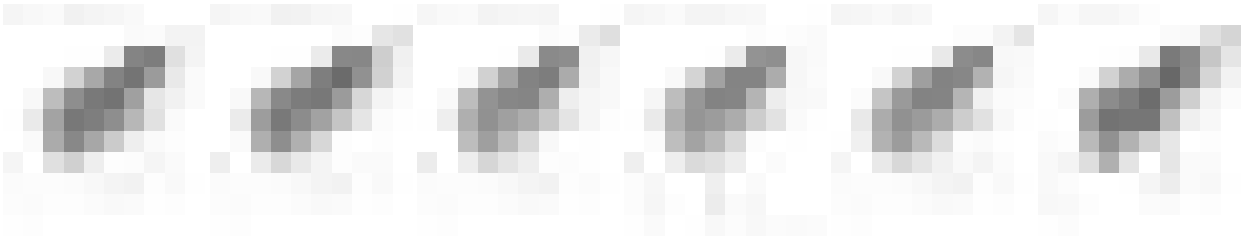
Carex platyphylla Carey, Broadleaf Sedge. Rich cove forests, mostly over mafic or calcareous rock. April-June. ME and s. QC west to WI, south to NC, e. TN, and MO. Naczi (1999b) reports a chromosome number of n = 35. [= RAB, C, F, FNA, G, K, M, Pa, S, W]

Carex polymorpha Muhlenberg, Variable Sedge. Dry, acidic ridgetop forests. May-June. ME south to MD, VA, and WV. Standley, Dudley, & Bruederle (1991) studied genetic variability in this species. [= C, F, FNA, G, K, M, Pa, W]

* ***Carex praegracilis*** W. Boott, Freeway Sedge. Medians of interstate highways; native of w. North America. May-June. This species is apparently spreading through ne. North America as the result of the winter salting of highways. [= C, F, FNA, G, K, M, Pa]

Carex prairea Dewey ex Wood, Prairie Sedge. Calcareous wetlands. QC west to YT, south to NJ, w. VA, OH, NE, MT, and BC. [= C, F, FNA, G, K, M, Pa]

Carex prasina Wahlenberg. Rich forests, especially in seepage. May-June. ME, ON, and WI south to GA, MS, and AR; in nearly all TN counties adjacent to NC and VA. [= RAB, C, F, FNA, G, GW, K, M, Pa, S, W]



Carex projecta Mackenzie. Moist forests. May-June. NL (Newfoundland), NL (Labrador), and SK south to NC, IN, IL, and IA. [= RAB, C, F, FNA, G, K, M, Pa]

* ***Carex pumila*** Thunberg. Open disturbed sand flats; native of Asia. May. See Reznicek (1993) for additional information. [= FNA, K; >< *C. hirta* – RAB, misidentification]

Carex purpurifera Mackenzie, Limestone Purple Sedge. Moist, rich cove forests, at low elevations, over calcareous or mafic rocks. May-June. W. VA and KY south to n. GA and n. AL, mostly west of the Blue Ridge Mountains, but with scattered disjunct populations on calcareous or mafic sites in the Blue Ridge. Naczi (1999b) reports a chromosome number of n = 17-19. [= C, FNA, K, W; < *C. purpurifera* – RAB, M, S (also see *C. manhartii*); = *C. laxiflora* var. *purpurifera* (Mackenzie) Gleason – G]

Carex radfordii Gaddy, Radford's Sedge. Very nutrient-rich, moist cove forests in the Blue Ridge Escarpment region, over calcareous or mafic rocks (especially along the Brevard Fault). May-June. Endemic to the Blue Ridge Escarpment of sw. NC, nw. SC, and ne. GA. See Gaddy (1995) for additional information. Naczi (1999b) reports a different chromosome number for *C. radfordii* (n = 23) than for the related *C. purpurifera* (n = 17, 18, 19). [= FNA, K]

Carex radiata (Wahlenberg) Small. Mesic to wet-mesic forests. May-June. NS west to MB, south to SC, AL, LA, and OK. [= C, FNA, K, Pa; < *C. rosea* – RAB, G, W; = *C. rosea* – F, M, S, misapplied]

Carex reniformis (L.H. Bailey) Small, Kidney Sedge. Floodplain forests (including blackwater), marshes, ditches, other wet areas. VA, IL, and OK south to FL Panhandle and TX. [= RAB, C, F, FNA, G, GW, K, S, WH]

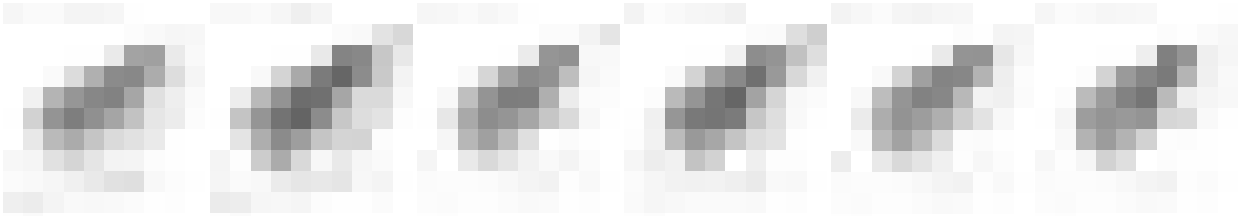
Carex retroflexa Muhlenberg ex Willdenow. Dry to mesic forests. ME, MI and IA, south to n. peninsular FL and TX. See Downer & Hyatt (2003). [= F, FNA, K, M, Pa, S; < *C. retroflexa* – RAB, W (also see *C. texensis*); = *C. retroflexa* var. *retroflexa* – C, G]

Carex retrorsa Schweinitz. Bottomland forests and nutrient-rich moist forests. NB and BC, south to n. NJ, sc. PA, IL, UT; reported, apparently erroneously, for DE and MD. [= C, F, FNA, G, K, M, Pa] {not yet mapped}

Carex reznicekii Werier, Reznicek's Sedge. Moist, forested slopes. RI, NY, PA, KY, and MO, south to SC, sw. GA, se. AL, n. MS and AR. To be expected in Panhandle FL and in WV. See Werier (2006) for detailed information. {add to synonymy; section *Acrocystis*}

Carex richardsonii R. Brown, Richardson's Sedge. Dry, rocky forests. VT west to AB, south to DC, MD, OH, IN, IA, and SD. This species ranges south to DC (according to C). [= C, F, FNA, G, K, M, Pa]

Carex roanensis F.J. Hermann, Roan Mountain Sedge. Cove forests, moderate to high elevation oak forests, northern hardwood forests. May-June. Sw. PA, w. VA, and e. WV south through e. KY, e. TN, w. NC to se. TN and nw. GA (Smith & Waterway 2008; Smith et al. 2006). See Smith & Waterway (2008), Smith et al. (2006), and Hermann (1947) for additional information; closely related to *C. virescens*. First reported for VA by Wieboldt et al. (1998). [= FNA, K, W]



Carex rosea Schkuhr ex Willdenow, Rosy Sedge. Dry to dry-mesic hardwood forests. May-June. NS west to MB, south to FL Panhandle and TX. [= C, FNA, K, Pa; < *C. rosea* – RAB, G, W, WH (also see *C. appalachica* and *C. radiata*); = *C. convoluta* Mackenzie – F, M, S; *? C. flaccidula* Steudel]

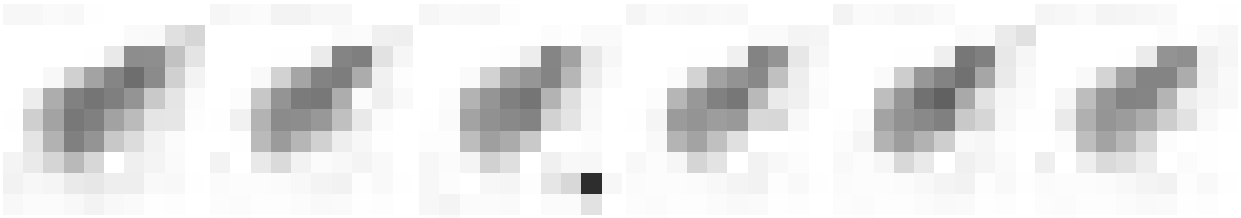
Carex rugosperma Mackenzie, Parachute Sedge. Old fields, shallow soils of rock outcrops, exposed forest margins. {Distribution and habitats in our area obscure} PE west to MN, south to MD, VA, IN, IL, and MO. See *C. umbellata* for discussion. Reported for South Carolina by Hill & Horn (1997). [= G, M; < *C. umbellata* – RAB, C, W; = *C. umbellata* – F, misapplied; = *C. tonsa* (Fernald) Bicknell var. *rugosperma* (Mackenzie) Crins – FNA, K, Pa]

Carex ruthii Mackenzie, Ruth's Sedge. Seepage areas, in forest or open areas. May-June. A Southern Appalachian endemic: sw. VA south through w. NC and e. TN to nw. SC and n. GA. [= C, F, FNA, K, M, S; = *C. muricata* Linnaeus var. *ruthii* (Mackenzie) Gleason – RAB, G; < *C. muricata* – W]

Carex sartwellii Dewey, Sartwell's Sedge. Wetlands. QC west to BC, south to MD, PA, OH, IN, IL, MO, CO, and ID. [= FNA, C, F, G, M, Pa; > *C. sartwellii* var. *sartwellii* – K]

Carex scabrata Schweinitz. Seepage slopes, brook-banks, often in shade. May-July. NS west to MI, south to NJ, n. GA, OH, and MO. [= RAB, C, F, FNA, G, GW, K, M, Pa, S, W]

Carex schweinitzii Dewey ex Schweinitz, Schweinitz's Sedge. Bogs. June. VT west to n. MI, south to NJ (and MO?); disjunct in NL (Newfoundland). The distribution of this species is local and fragmented. The alleged occurrences of *C. schweinitzii* in w. NC are based on misidentification of *C. utriculata*. [= C, F, FNA, G, K, M, Pa, S]



Carex scoparia Schkuhr ex Willdenow *var*. ***scoparia***. Bogs, swamp forests, marshes, seepy ledges, ditches. May-June. NL (Newfoundland) west to BC, south to GA, MS, and CA. Var. *tesselata* Fernald & Wiegnd is endemic to NB and ME. [= F, FNA, K, Pa; < *C. scoparia* – RAB, C, G, GW, W]

Carex seorsa Howe. Acidic swamp forests. May-June. MA south to GA and Panhandle FL in the Coastal Plain, scattered inland westward to NY, OH, MI, IN, AR, and TN. [= RAB, C, FNA, G, GW, K, M, Pa, S, W]

Carex shortiana Dewey, Short's Sedge. Calcareous bottomlands and meadows. May-June. PA, s. ON, IL, and IA, south to w. VA, e. TN, AR, and OK. [= C, F, FNA, G, K, M, Pa, W]

Carex siccata Dewey, Bronze Sedge. Dry upland habitats. May-July. ME and NT south to NJ, OH, IL, MN, and AZ. [= C, FNA, G, M, Pa; < *C. siccata* – K (also see *C. foenea*); = *C. foenea* Willdenow – F, misapplied]

Carex silicea Olney, Seabeach Sedge. Beaches and shores. NL (Newfoundland) south to VA, along the coast. [= C, F, FNA, G, K]

Carex socialis Mohlenbrock & Schwegman. Blackwater and brownwater swamp forests and bottomlands. Se. and sc. NC south to e. GA, west to e. TX, and north in the interior to s. IN, s. IL, and se. MO. [= C, FNA, K]

Carex sparganioides Muhlenberg ex Willdenow. Rich forests. May-June. ME, ON, MN, and SD south to GA, AR, and KS. Records entangled with *C. aggregata*. [= RAB, F, FNA, K, M, Pa, W; = *C. sparganioides* var. *sparganioides* – C, G]

Carex species 2, Blue Ridge Sedge. Seepages over various substrates along the Blue Ridge Escarpment, including opn fen-like wetlands. Early April-early June. A Southern Blue Ridge endemic, from sw. VA through w. NC to ne. GA (Rabun County). Under study by D.B. Poindexter and T.F. Wieboldt. {section *Acrocystis*}

Carex species 3, Smoky Mountain Sedge. Seepages at moderate to high elevations. Endemic to the Great Smoky Mountains National Park. Under study by D. Estes. {not yet keyed; section *Phacocystis*}

* ***Carex spicata*** Hudson. Fields and lawns; native of Europe and w. Asia. Reported as south to s. NJ, n. DE, c. MD. VA reports said to be erroneous in FNA. [= C, F, FNA, G, K, M, PA]

Carex sprengelii Dewey ex Sprengel, Sprengel's Sedge, Long-beaked Sedge. Calcareous forests, woodlands, and outcrops. South to n. NJ, e. PA (Rhoads & Block 2007), and n. DE (FNA). [= C, F, FNA, G, K, M, Pa]

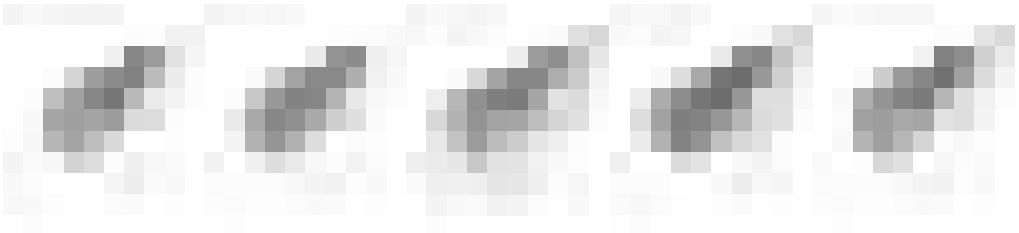
Carex squarrosa Linnaeus. Bottomland forests. June-July. CT west to se. ME and NE, south to NC, n. SC, and AR. [= RAB, C, F, FNA, G, GW, K, M, Pa, S, W]

Carex sterilis Willdenow, Sterile Sedge. Mafic fens. NL (Newfoundland) west to SK, south to sw. VA (Grayson County), ne. TN, IL, and MO. Outside of our area, *C. sterilis* is primarily a species of calcareous fens or seepages. First reported for VA by Wieboldt et al. (1998). [= C, F, FNA, G, K, M]

Carex stipata Muhlenberg ex Willdenow *var*. ***maxima*** Chapman. Marshes, ditches, sloughs, alluvial forests, cypress-gum forests. May-June. NJ south to c. peninsular FL, west to TX, north in the interior to s. MO, s. IN, w. TN, and w. KY, primarily on the Coastal Plain. The validity of this variety needs additional study. [= RAB, C, F, FNA, G, K, Pa; < *C. stipata* – GW, W, WH; = *C. uberior* (C. Mohr) Mackenzie – M, S]

Carex stipata Muhlenberg ex Willdenow *var*. ***stipata***. Marshes, ditches, alluvial forests. May-June. NL (Newfoundland) west to AK, south to SC, TN, KS, NM, and Mexico. [= RAB, C, F, FNA, G, K, Pa; < *C. stipata* – GW, W; = *C. stipata* – M; < *C. stipata* – S]

Carex straminea Willdenow ex Schkuhr, Straw Sedge. Wetlands. MA west to WI, south to NC, KY, and MO. [= F, FNA, K, Pa; = *C. straminea* var. *straminea* – C, G; *? C. richii* (Fernald) Mackenzie – M]



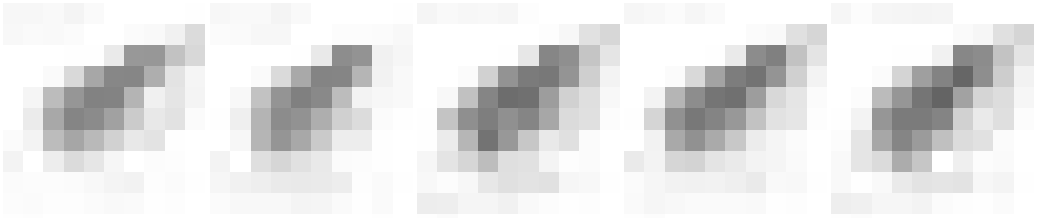
Carex striata Michaux *var*. ***brevis*** L.H. Bailey. Pocosins, limesink ponds, small depression ponds, clay-based Carolina bays, acid peaty swamps, wet savannas (dominated by *Pinus serotina* and/or *Taxodium ascendens*). May-June. E. MA south to SC. See Reznicek & Catling (1986) for discussion of the nomenclatural change. [= C, FNA, K; < *C. walteriana* L.H. Bailey – RAB, GW, M, S; = *C. walteriana* var. *brevis* (L.H. Bailey) L.H. Bailey – F, G]

Carex striata Michaux *var*. ***striata***, Pocosin Sedge. Pocosins, limesink ponds, small depression ponds, clay-based Carolina bays, acid peaty swamps, wet savannas (dominated by *Pinus serotina* and/or *Taxodium ascendens*). May-June. SC south to c. FL and Panhandle FL. [= C, FNA, K; < *C. walteriana* L.H. Bailey – RAB, GW, M, S; = *C. walteriana* var. *walteriana* – F, G; < *C. striata* – WH]

Carex striatula Michaux. Bottomland and other nutrient-rich forests. May-June. Se. NY and PA west to TN, south to n. FL, Panhandle FL, and TX. The distinction of this species as separate from *C. laxiflora* is problematic and requires additional study. Naczi (1999b) reports chromosome numbers of n = 18, 20. [= RAB, C, F, FNA, K, M, Pa, W, WH; = *C. laxiflora* var. *angustifolia* Dewey – G; *? C. laxiflora* – S, misapplied]

Carex stricta Lamarck. Bogs, sedge meadows, depression ponds, old beaver ponds. May-June. QC and NS west to MB, south to n. NC and TX. [= RAB, C, FNA, GW, K, Pa, W; > *C. stricta* var. *stricta* – F; > *C. stricta* var. *strictior* (Dewey) Carey – F; = *C. stricta* var. *stricta* – G; > *C. stricta* – M, S; > *C. strictior* Dewey – M, S]

Carex styloflexa Buckley. Bogs, wet forests. May-June. CT west to s. OH, south to c. peninsular FL and se. TX. [= RAB, C, F, FNA, G, K, M, Pa, S, W, WH]



Carex suberecta (Olney) Britton, Prairie Straw Sedge. Fens, calcareous wetlands. ON and MN south to sw. VA, WV, OH, IN, IL, AR, and TX. [= C, F, FNA, G, K]

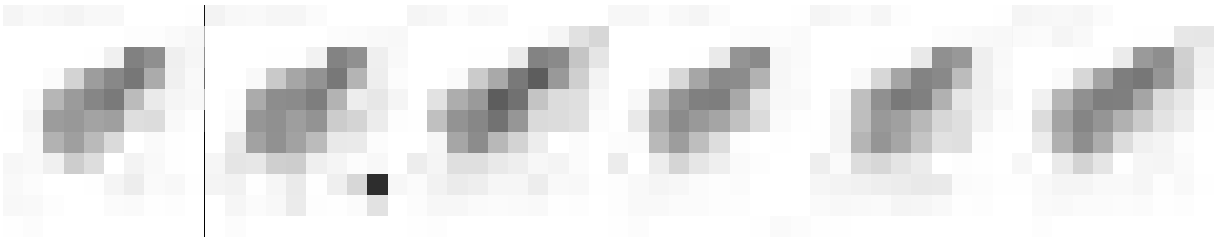
Carex superata Naczi, Reznicek, & B.A. Ford. Calcareous forests and woodlands. April-June. Sc. NC, nc. SC, sw. VA, sc. KY, and ne. MS, south to Panhandle FL and s. AL. Reported for sw. VA (as *C. willdenowii* var. *megarrhyncha*) by Wieboldt et al. (1998). [= FNA, K, WH; < *C. willdenowii* – RAB, F; < *C. willdenovii* – C, G, M, S (also see *C. basiantha* and *C. willdenowii*) and orthographic variant; < *C. willdenowii* Schkuhr ex Willdenow var. *megarrhyncha* Hermann]

Carex swanii (Fernald) Mackenzie. Nutrient-rich forests, woodlands, and openings. May-June. NS, s. MI, s. WI, south to nw. SC and ne. AR. [= RAB, C, F, FNA, G, K, M, Pa, S, W; = *C. virescens* Muhlenberg ex Willdenow var. *swanii* Fernald]

* ***Carex sylvatica*** Hudson. Pastures, lawns; native of Europe. [= C, F, FNA, G, K, M]

Carex tenax Chapman. Longleaf pine sandhills. May-June. Sc. NC south to Panhandle FL, west to MS; also in sw. LA and se. TX. [= RAB, FNA, K, M; *? C. validior* Mackenzie – S]

Carex tenera Dewey *var.* ***tenera***, Slender Sedge. Low forests. NS west to BC, south to VA, NC, n. GA, ne. TN, MO, KS, WY, and OR. Var. *echinodes* (Fernald) Wiegand is restricted to the northern Midwest. [= F, FNA, Pa; < *C. tenera* – RAB, C, G, K]



Carex tetanica Schkuhr, Rigid Sedge. Moist forests, calcareous seeps, calcareous fens. May-June. MA west to MN, NE, and AB, south to NJ, MD, VA, e. TN (Campbell County; A. Floden, pers. comm.), NC, KY, MO, and NE. *C. tetanica* var. *canbyi* Porter, of Piedmont seepages and floodplains in MD, DE, and se. PA, may merit recognition, but needs additional study. [= RAB, C, F, FNA, K, M, Pa; = *C. tetanica* var. *tetanica* – G]

Carex texensis (Torrey) L.H. Bailey. Dry to mesic forests. NY, OH, and KS south to FL and TX. See Downer & Hyatt (2003). [= F, FNA, K, M, S, Pa; < *C. retroflexa* Muhlenberg ex Willdenow – RAB; = *C. retroflexa* var. *texensis* (Torrey) Fernald – C, G]

Carex thornei Naczi (section *Griseae*). Mesic deciduous forests, often in the upper floodplain. Endemic to the drainage of the Apalachicola/Chattahoochee and Flint in s. GA and s. AL south to Panhandle FL. See Naczi, Bryson, & Cochrane (2002). [= FNA] {not yet keyed}

Carex timida Naczi & B.A. Ford. Calcareous, dry to mesic woodlands and forests. East to AL, TN, and KY. Related to *C. jamesii* and *C. juniperorum*, from which it was separated by Naczi & Ford (2001). [= FNA; < *C. jamesii* – C, F, G, K, M]

Carex tonsa (Fernald) Bicknell, Shaved Sedge. Xeric disturbed areas, old fields. {distribution and habitats in our area obscure}. QC west to AB, south to VA, e. TN, IN, and WI. See *C. umbellata* for discussion. [= F, G, K, M; < *C. umbellata* – RAB, C, W; = *C. tonsa* var. *tonsa* – FNA, K, Pa]

Carex torta F. Boott in Tuckerman, Streambed Sedge, Twisted Sedge. Rocky streambeds, often dominant in patches in mountain streams. April-May. NS west to ON, south to sc. NC, SC, nc. GA (Jones & Coile 1988), AL, TN, and OH. See Gaddy (1981) for the first report of this species in SC. [= RAB, C, F, FNA, G, K, M, Pa, S, W]

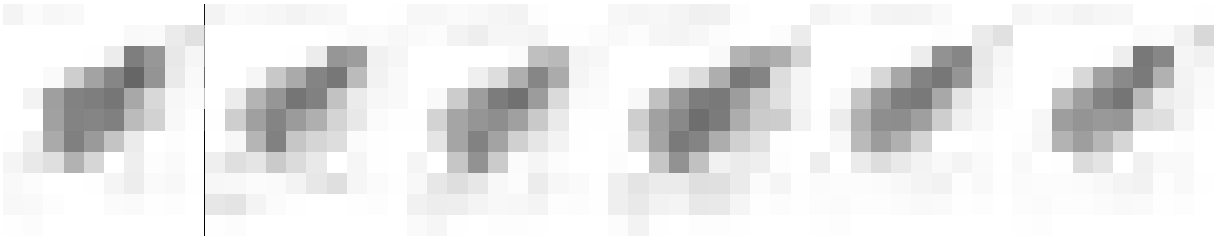
Carex triangularis Böckler. Moist forests, ditches, other wet sites. April-June. SC and GA west to KS and TX. [= RAB, F, FNA, G, K, M, S; < *C. vulpinoidea* var. *vulpinoidea* – C; < *C. vulpinoidea* – GW]

Carex tribuloides Wahlenberg *var.* ***sangamonensis*** Clokey. Bottomland forests. May-June. OH, IL, and KS, south to SC, AL, LA, and TX. [= FNA, G, K; < *C. tribuloides* – RAB, C, F, GW, W]

Carex tribuloides Wahlenberg *var.* ***tribuloides***. Bottomland forests. May-June. NB west to MN and NE, south to c. peninsular FL, GA, TN, MO, and KS. [= FNA, G, K, Pa; < *C. tribuloides* – RAB, C, F, GW, W]

Carex trichocarpa Muhlenberg ex Willdenow. Wet meadows, marshes. May-July. QC west to MN, south to DE, nw. NC, WV, IN, and MO. [= RAB, C, F, FNA, G, K, M, Pa, W]

Carex trisperma Dewey, Three-seeded Sedge. Bogs and swamps at high elevations (in NC and VA), usually growing in living *Sphagnum*, in shaded situations under shrubs or trees in montane wetlands, northward in bogs at low elevations. June. NL (Labrador) west to SK, south to NJ, MD, OH, n. IN, IL, and MN; and in the mountains to w. NC and WV. See Kirschbaum (2007) for additional information about *C. trisperma* and *C. billingsii*. [= *C. trisperma* var. *trisperma* – C, F, FNA, G, K, M; < *C. trisperma* – RAB, Pa, W]



Carex tuckermanii F. Boott. Calcareous swampy forests and wet meadows. NB and MN south to WV, sc. PA, NJ, MD, and IL. A reported for Alleghany County, NC appears to be erroneous. [= C, F, FNA, K, Pa; = *C. tuckermani* – G, M, orthographic variant]

Carex turgescens Torrey, Pinebarren Sedge. Sandhill seepage bogs, streamhead pocosins, pocosin-sandhill ecotones, canebrakes, cypress domes and stringers, in highly acidic, sandy-peaty soils. May-June. Sc. NC south to Panhandle FL, west to se. LA, a Southeastern Coastal Plain endemic. [= RAB, FNA, GW, K, M, S, WH]

Carex typhina Michaux. Bottomland forests. June-July. ME and QC west to WI and se. MN, south to GA, Panhandle FL, and LA. [= RAB, C, F, FNA, G, GW, K, M, Pa, S, W, WH]

Carex umbellata Schkuhr ex Willdenow, Parasol Sedge. Old fields, other habitats. {distribution and habitats in our area obscure. NL (Newfoundland) west to SK, south to VA, TN, IL, and MN. It seems very possible that southern members of the *C. umbellata* complex may not correspond to the taxa "distinguished" in the northeastern United States. *C. tonsa*, *C. rugosperma*, and *C. umbellata* are circumscribed by various authors in different ways. This group needs critical study. [= FNA, G, K, M, Pa; < *C. umbellata* – RAB, C, W (also see *C. rugosperma* and *C. tonsa*); = *C. abdita* Bicknell – F]

Carex utriculata F. Boott, Beaked Sedge. Wet meadows. Boreal American, ranging south to DE, w. VA, nw. and sw. NC, ne. TN (Johnson County), IN, NE, NM, and CA. Recently verified for NC. [= C, FNA, K, Pa; = *C. rostrata* Stokes var. *utriculata* (F. Boott) L.H. Bailey – F, G; < *C. rostrata* – M, misapplied as to our material; = *C. schweinitzii* – RAB, by misidentification]

Carex venusta Dewey. Bay swamps, peat bogs, mossy wetlands, and other wet habitats. Se. VA south to Panhandle FL, on the Coastal Plain. [= M, S; = *C. venusta* var. *venusta* – C, F, G, K; < *C. venusta* – RAB, FNA, GW, W, WH (also see *C. oblita*)]

Carex verrucosa Muhlenberg. Pocosins, wet pinelands, pond cypress ponds, domes, and stringers. July-September. Se. NC south to south to s. FL, west to w. LA and e. TX. [= RAB, FNA, GW, K, M, S, WH; = *C. glaucescens* Elliott var. *androgyna* M.A. Curtis]

Carex vesicaria Linnaeus, Inflated Sedge. Bogs. Circumboreal, ranging south in North America to DE, w. VA, nw. NC, KY, IN, MO, NM, and CA. [= FNA, G, Pa; > *C. vesicaria* var. *vesicaria* – C, F, K; > *C. vesicaria* var. *monile* (Tuckerman) Fernald – F, K; *?* *C. vesicaria* – M; > *C. monile* Tuckerman]

Carex vestita Willdenow. Low forests. April-May. S. ME south to se. VA and nc. NC. [= RAB, C, F, FNA, G, K, M, Pa]

Carex vexans F.J. Hermann, Florida Hammock Sedge. Marshes, distches, swamps, hydric hammocks. E. Panhandle FL south to s. FL. [= FNA, K, WH; < *C. alata* – S]

Carex virescens Muhlenberg ex Willdenow. Nutrient-rich forests, woodlands, and openings. May-June. S. ME, NY, and s. MI, south to e. VA, w. NC, nw. SC, and MO. [= RAB, C, F, FNA, G, K, M, Pa, S, W]

Carex vulpinoidea Michaux. Wet sites. NL (Labrador) west to BC, south to FL, TX, Sonora, and CA. [= RAB, F, FNA, G, M, Pa, S, W; < *C. vulpinoidea* var. *vulpinoidea* – C, K; < *C. vulpinoidea* – GW (also see *C. annectens* and *C. triangularis*)]

Carex willdenowii Schkuhr ex Willdenow. Calcareous mesic forests, but also in more acidic dry-mesic upland oak forests. May-June. MA, VT, NY, s. ON, and c. IN, south to nc. SC, n. AL, and s. IL; disjunct in c. AR. Naczi (1999b) reports

chromosome numbers of n = 31, 39. [= FNA, K; < *C. willdenowii* – RAB, F, W (also see *C. basiantha* and *C. superata*); < *C. willdenovii* – C, G, M, S (also see *C. basiantha* and *C. superata*) and orthographic variant]

Carex woodii Dewey, Wood's Sedge. Moist slopes and cove forests over mafic rocks (such as amphibolite), ultramafic rocks (such as olivine), or felsic rocks. May-June. NY west to MB, south to NC, nw. SC, n. GA, and MO. This species forms clonal patches reminiscent of *C. pensylvanica*, but has perigynia glabrous and filled by the achene at maturity; the foliage also has a paler green cast. It has probably been much overlooked in the past. Naczi (1999b) reports chromosome numbers of n = 22, 26. [= RAB, C, F, FNA, K, M, Pa, W; = *C. tetanica* var. *woodii* (Dewey) Wood – G]

Cladium P. Browne (Sawgrass, Twig-rush)

A genus of 3-4 species, herbs, subcosmopolitan. References: Bridges, Orzell, & Burkhalter (1993); Tucker in FNA (2002b); Goetghebeur in Kubitzki (1998b). Key based closely on Bridges, Orzell, & Burkhalter (1993).

1 Plants 1-3 m tall, coarse, from short rhizomes, forming dense tussocks; leaves 3-15 dm long, 5-12 mm wide, stiff and flat (or broadly V-shaped), the margins and midrib (beneath) harshly serrate (saw-toothed); inflorescence a narrow panicle 3-9 dm long, the branches bearing several fascicles of spikelets; achene base broadly rounded to truncate; [of tidal freshwater to brackish marshes or outer coastal plain calcareous savannas].....***C. jamaicense***

1 Plants 0.4-1 m tall, relatively delicate, from creeping rhizomes, forming loosely tufted colonies; leaves 1-3 dm long, 1-3 mm wide, flat to channeled (terete apically), margins only slightly scabrous; inflorescence 0.5-3 dm long, of 2-4 umbelliform cymes, the branches rigidly ascending and bearing simple glomerules of spikelets; achene base squarely truncate to slightly flaring; [of Coastal Plain acidic seepages and tidal freshwater to slightly brackish marshes, Mountain fens or bogs]..... ***C. mariscoides***

Cladium jamaicense Crantz, Sawgrass. In circumneutral to alkaline situations, including brackish marshes, and rarely somewhat inland in savannas underlain by coquina limestone. July-October. Se. VA south to s. FL, west to e. TX, and in the West Indies. This is, of course, the famous sawgrass which dominates many square miles in the Everglades of s. FL (where underlain by oolite). The leaves can cut flesh or clothing. *C. jamaicense* is sometimes treated as one component (ssp. *jamaicense*) of a multi-continental *C. mariscus* complex. [= RAB, C, F, FNA, G, GW, WH; = *C. mariscus* (Linnaeus) Pohl ssp. *jamaicense* (Crantz) Kükenthal – K; = *Mariscus jamaicensis* (Crantz) Britton – S]

Cladium mariscoides (Muhlenberg) Torrey, Twig-rush, Fen-sedge, Smooth Sawgrass. In strongly acidic to circumneutral situations, including acidic seepage at the margins of brackish marshes, in wet flats under *Pinus serotina* and *Taxodium ascendens* (Gaddy & Rayner 1980), in mucky seepage bogs in the fall-line sandhills, in peaty fens and bogs in the Mountains (especially over mafic or ultramafic rocks, such as amphibolite). July-September. NL (Newfoundland) west to SK Widespread and rather common north of the glacial boundary, with scattered and disjunct occurrences southward in VA, NC, SC, GA, Panhandle FL, n. KY (Clark et al. 2005), s. AL, se. MS (Sorrie & Leonard 1999), and e. TX. Bridges, Orzell, & Burkhalter (1993) discuss in detail the phytogeography of this plant, particularly in reference to its southern occurrences, which are curiously fragmented and disjunct. [= RAB, C, F, FNA, G, K, Pa, W, WH; = *Mariscus mariscoides* (Muhlenberg) Kuntze – S]

Cyperus Linnaeus 1753 (Umbrella Sedge)

A genus of about 500-550 species, herbs, of tropical and warm temperate areas. References: Goetghebeur in Kubitzki (1998b); Tucker, Marcks, & Carter in FNA (2002b). [also see *Kyllinga*]

This treatment is closely adapted from Tucker, Marcks, & Carter in FNA (2002b) and other sources. It needs substantial customization and revision prior to publication. Key lead 4 in the main key is problematic.

1 Inflorescences unbranched (the spikes sessile); spikelets 1-2-flowered; rachilla not or only slightly elongate; scales conspicuously keeled; lowest 2 scales of spikelet greatly reduced .....[see ***Kyllinga***]

1 Inflorescences branched (the spikes pedunculate); spikelets 1-many-flowered; rachilla elongate; scales generally broadly rounded; lowest 2 scales of spikelet not greatly reduced.

2 Stigmas 2; achenes lenticular.

3 Achenes dorsiventrally flattened, borne with a flattened face toward the rachillas; [subgenus *Juncellus*] .....**Key A**

3 Achenes laterally flattened, borne with an edge toward the rachilla; [subgenus *Pycreus*].....**Key B**

2 Stigmas 3; achenes trigonous.

4 Spikelets borne in digitate clusters (rarely singly), or in umbellate or glomerulate heads; [subgenus *Pycnostachys*] .....**Key C**

4 Spikelets borne in spikes on a conspicuous rachis.

5 Rachilla articulate at the base of each scale, the mature spike therefore disarticulating into segments consisting of a scale, an achene, and a cartilaginously thickened section of the rachilla (and its wings); [subgenus *Diclidium*] .....**Key D**

5 Rachilla continuous, or articulate only at the base; [subgenus *Cyperus*] .....**Key E**

Key A – subgenus *Juncellus* – stigmas 2; achenes lenticular; achenes dorsiventrally flattened, borne with a flattened face toward the rachillas

1 Plants 1-3 (-6) dm tall; leaf blades 0-7 cm long ..... ***C. laevigatus***
1 Plants to 10 dm tall; leaf blades 20-40 cm long ..... ***C. serotinus***

Key B – subgenus *Pycreus* – stigmas 2; achenes lenticular; achenes laterally flattened, borne with an edge toward the rachilla

1 Scales with excurved awn 0.3-0.5 mm long; stamens 1-2; achenes ca. 0.6 mm long ..... ***C. pumilus***
1 Scales entire or minutely mucronate; stamens 2-3; achenes (0.7-) 1.0-1.6 mm long.
2 Achenes oblong with a truncate apex, subcylindric, only slightly compressed laterally.
3 Scales 2.7-3.6 mm long, 1.6-1.8 mm wide; achenes 1.2-1.6 mm long, 0.6-0.9 mm wide ..... ***C. filicinus***
3 Scales 1.5-2.4 mm long, 1.0-1.4 mm wide; achenes 0.8-1.2 mm long, 0.4-0.6 mm wide ..... ***C. polystachyos***
2 Achenes ovoid, obovoid, or ellipsoid, with a rounded or subacute apex, biconvex or strongly laterally flattened.
4 Scales membranous, ovate, loosely imbricate, each barely overlapping the next scale on the same side of the rachilla, the spikelets thus appearing serrate-margined to the unaided eye; annual, 30-75 cm tall ..... ***C. flavicomus***
4 Scales firm, oblong, closely imbricate, thus the spikelets appearing smooth-margined to the unaided eye; perennial or annual, 5-75 cm tall.
5 Achene reticulations rectangular, elongate; achenes broadly obovoid, black; stamens 3 ..... ***C. flavescens***
5 Achene reticulations isodiametric or square; achenes ellipsoid or obovoid, brown or black; stamens 2-3.
6 Scales yellow or yellowish brown; culms 15-75 cm tall ..... ***C. lanceolatus***
6 Scales brown or clear; culms 3-25 (-30) cm tall.
7 Plants perennial from slender rhizomes ..... ***C. sanguinolentus***
7 Plants annual from fibrous roots.
8 Scales 1.9-2.7 mm long, 1.8-2.3 mm wide; styles 0.6-1.0 mm long; stigmas 1.0-1.5 mm long ..... ***C. bipartitus***
8 Scales 2.5-3.0 mm long, 1.6-1.9 mm wide; styles 0.3-0.5 mm long; stigmas 2.2-3.1 mm long ..... ***C. diandrus***

Key C – subgenus *Pycnostachys* – stigmas 3; achenes trigonous; spikelets borne in digitate clusters (rarely singly), or in umbellate or glomerulate heads

1 Scales folded in half their entire length (conduplicate).
2 Plant a perennial.
3 Achenes with a granular or papillose surface; leaves often bladeless; bracts 2 (-3).
4 Rays 5-15; anthers 0.3-0.5 mm long ..... ***C. haspan***
4 Rays 100-250; anthers 1.0-1.2 mm long ..... ***C. prolifer***
3 Achenes with a smooth surface; leaves with blades; bracts 3-5.
5 Plants with tubers and stolons; spikelets commonly proliferous ..... ***C. dentatus***
5 Plants with stolons only; spikelets not proliferous ..... ***C. lecontei***
2 Plant an annual.
6 Scales cuspidate, with a cusp 0.6-1.2 mm long ..... ***C. cuspidatus***
6 Scales blunt or slightly mucronate.
7 Spikelets 30-20 per head; styles ca. 0.1 mm long ..... ***C. difformis***
7 Spikelets 3-12 per head; styles 0.3-0.4 mm long ..... ***C. fuscus***
1 Scales 2-keeled in the lower third to half (bicarinate).
8 Leaves bladeless; inflorescence bracts ca. 20, borne horizontally; stamens 3 ..... ***C. involucratus***
8 Leaves with leaf blades; inflorescence bracts 2-10, borne variously; stamens 1 (-2).
9 Stems sharply 3-angled, the faces concave, the angles harshly scabrous; leaf blades and inflorescence bracts with conspicuous cross-veins
10 Rays of the inflorescence 3-5; scales ovate, 1.4-1.6 mm long; achenes 1.0-1.2 mm long ..... ***C. drummondii***
10 Rays of the inflorescence 6-12; scales oblancolate, 1(1.3-) 1.5-2.0 (-2.4) mm long; achenes 1.2-1.5 mm long ..... ***C. virens***
9 Stems rounded, obscurely 3-faced, or 3-angled, the faces flat or convex, smooth or slightly scabrous; leaf blades and involucral bracts lacking conspicuous cross-veins.
11 Stems slightly scabrous, the prickles pointing downward (retrorse) ..... ***C. surinamensis***
11 Stems smooth or if rough, the prickles pointing upward (antrorse) or outward (extrorse).
12 Achene bases swollen, spongey ..... ***C. distinctus***
12 Achene bases not swollen and spongey.
13 Achenes narrowly ellipsoid to linear, about 3-6× as long as wide.
14 Longest bract erect (appearing as a continuation of the culm); spikelets red-tinged ..... ***C. reflexus***
14 Longest bract ascending (not appearing as a continuation of the culm); spikelets pale green.
15 Achenes ellipsoid to narrowly ellipsoid, 0.9-1.1 mm long, 0.3-0.4 mm wide, about 3× as long as wide; style 0.2-0.4 mm long; stigmas 0.4-0.6 mm long ..... ***C. entrerianus***
15 Achenes linear, 1.2-1.4 mm long, 0.2 (-0.3) mm wide, about 5-6× as long as wide; style 0.5-0.8 mm long; stigmas 0.6-1.0 mm long ..... ***C. pseudovegetus***
13 Achenes broadly ellipsoid, about 2-2.5× as long as wide (the stipe or cuneate base typically conspicuous).
16 Annual; longest inflorescence bract erect or strongly ascending; anther ca. 0.5 mm long ..... ***C. acuminatus***
16 Perennial; longest inflorescence bract horizontal or slightly ascending (< 30 degrees); anther 0.8-1.2 mm long.
17 Scales declined 3-45 degrees from the rachilla; achenes with a stipe ..... ***C. eragrostis***
17 Scales declined (45-) 60-90 degrees from the rachilla; achenes cuneate at the base ..... ***C. ochraceus***

Key D – subgenus *Diclidium* – stigmas 3; achenes trigonous; spikelets borne in spikes on a conspicuous rachis; rachilla articulate at the base of each scale, the mature spike therefore disarticulating into segments consisting of a scale, an achene, and a section of the rachilla (including its wings)

1 Tip of each scale not reaching above the base of the next distal scale on the same side of the rachilla, and usually ending short of it; achene linear oblong, 1.5-2 mm long, about 3× as long as wide ..... ***C. odoratus*** *var.* ***engelmannii***
1 Tip of each scale reaching above the base of the next distal scale on the same side of the rachilla; achene ellipsoid, obovoid-oblong, or slenderly obovoid, 1-1.5 mm long, about 2× as long as wide ..... ***C. odoratus*** *var.* ***odoratus***

Key E – subgenus *Cyperus* – stigmas 3; achenes trigonous; spikelets borne in spikes on a conspicuous rachis; rachilla continuous, or articulate only at the base

1 Upper scales of the spikelet with a straight or excurved mucronate or cuspidate apex 0.4-1.2 mm long.
2 Floral scales persistent, appressed, 2.6-3.9 mm long; spikelets nearly cylindrical in ×-section; rachilla winged..... ***C. retroflexus***
2 Floral scales deciduous, spreading, mostly < 3 mm long; spikelets quadrangular in ×-section; rachilla wingless, or wings < 0.4 mm wide.
3 Plant a rhizomatous perennial, culms single ..... ***C. schweinitzii***
3 Plant an annual, culms several, cespitose.
4 Achenes 0.2-0.6 mm wide; stamen 1; culms 2-16 cm tall.
5 Achenes 0.5-0.6 mm wide, < 2× as long as wide, cuneate to the base; scales 1.0-2.0 mm wide, 9-13-nerved; filaments ca. 2.5 mm long; anthers 0.4-0.8 mm long ..... ***C. granitophilus***
5 Achenes (0.2-) 0.3-0.4 (-0.5) mm wide, > 2× as long as wide, with a minute stipe at the base; scales 0.5-1.0 mm wide, (5-) 7-9 (-11)-nerved; filaments ca. 1.5 mm long; anthers 0.3-0.4 mm long ..... ***C. squarrosus***
4 Achenes 0.5-1.1 mm wide; stamens 3; culms (2-) 6-50 cm tall.
6 Achenes obovoid, truncate at the apex; leaves flat to V-shaped; live plants not viscous to the touch ..... ***C. compressus***
6 Achenes elipsoid, with a beak 0.5-1.2 mm long; leaves involute; live plants viscous to the touch..... ***C. oxylepis***
1 Upper scales blunt, or with a mucro <0.3 mm long.
7 Spikelets linear, 0.8-1.6 (-1.9) mm wide.
8 Spikelet 1.2-1.6 mm wide; scales deciduous; rachilla persistent, wingless or very narrowly winged, not clasping achene..... ***C. distans***
8 Spikelet 0.8-1.3 (-1.9) mm wide; scales persistent; rachilla breaking into segments with a scale and achene attached, the wing prominent and clasping the achene
9 Tip of each scale not reaching above the base of the next distal scale on the same side of the rachilla, and usually ending short of it; achene linear oblong, 1.5-2 mm long, about 3× as long as wide..... ***C. odoratus*** *var.* ***engelmannii***
9 Tip of each scale reaching above the base of the next distal scale on the same side of the rachilla; achene ellipsoid, obovoid-oblong, or slenderly obovoid, 1-1.5 mm long, about 2× as long as wide..... ***C. odoratus*** *var.* ***odoratus***
7 Spikelets oblong-ovate to linear-oblong, (1.5-) 2.0-3.0 (-4.0) mm wide.
10 Spikelets strongly compressed, >2×as wide as thick (in cross-section); scales spreading or appressed.
11 Scales obovate-orbiculate, notched at the tip; styles < 0.1 mm long.
12 Rachilla wingless; scales scarcely mucronate ..... ***C. iria***
12 Rachilla narrowly winged; scales distinctly mucronate..... ***C. microiria***
11 Scales elliptic to oblong or ovate, acute to obtuse, not notched at the tip; styles 0.3-1.3 mm long.
13 Rachilla with hyaline, whitish, or straw-colored wings 0.2-0.5 mm wide.
14 Culms terete (at least toward the base), nodose-septate; inflorescence bracts 2 (-4), all erect; leaf blades generally absent..... ..... ***C. articulatus***
14 Culms trigonous, not nodose-septate; inflorescence bracts 3-7, horizontal, ascending, or reflexed; leaf blades present.
15 Scales persistent; rachilla persistent; elongate stolons up to 15 cm long present, bearing tubers.
16 Scales purplish red to reddish brown, with green midveins; base of culm indurate; stolons wiry, springy when dried..... ..... ***C. rotundus***
16 Scales yellowish brown to brown; base of culm soft; stolons spongy, flexible when dried.
17 Style and stigma combined < 4.2 mm long..... ***C. esculentus*** *var.* ***leptostachyus***
17 Style and stigma combined > 4.2 mm long..... ***C. esculentus*** *var.* ***macrostachyus***
15 Scales deciduous; rachilla deciduous; rhizomes up to 5 cm long present, not bearing tubers.
18 Scales 3.2-4.5 (-6) mm long; anthers 0.3-0.5 mm long; stigmas 3-4 mm long; achenes narrowly oblong ..... ***C. strigosus***
18 Scales 1.5-2.5 (-3.1) mm long; anthers 0.7-1.8 mm long; stigmas 1-2 (-3) mm long.
19 Achenes coarsely punctate ..... ***C. planifolius***
19 Achenes smooth ..... ***C. grayi***
13 Rachilla wingless, or with wings 0-0.2 mm wide.
20 Longest inflorescence bract erect or strongly ascending..... ***C. schweinitzii***
20 Longest inflorescence bract horizontal, weakly ascending, or reflexed.
21 Longest inflorescence bract weakly ascending.
22 Rachis (to which the spikelets are attached) glabrous; achenes 1.5-2.0 mm long; spikes subglobose to broadly ovoid; [of upland sites, of NC northward]..... ***C. houghtonii***
22 Rachis hispidulous; achenes 1.0-1.2 mm long; spikes loosely oblong-ovoid; [of wetland sites, of SC southward] .... ***C. pilosus***
21 Longest inflorescence bract horizontal to reflexed.
23 Anthers 0.8-1.0 mm long ..... ***C. filiculmis***
23 Anthers 0.3-0.6 mm long.
24 Scales 2.5-3.8 mm long, usually fitting loosely over the mature achene, the margins spreading or loosely clasping it; spikelet with 5-22 scales..... ***C. lupulinus*** *ssp.* ***lupulinus***
24 Scales 1.8-2.5 mm long, usually fitting tightly over the achene, the margins tightly clasping it; spikelets with 3-7 scales ..... ***C. lupulinus*** *ssp.* ***macilentus***
10 Spikelets subterete or quadrangular, 1-1.5×as wide as thick (in cross-section); scales appressed.
25 Scales deciduous; rachillas persistent; rachilla wings deciduous, but remaining firmly attached at the base even after the achenes fall; spikelets with (6-) 12-20 (-40) scales..... ***C. erythrorhizos***

25 Scales persistent; rachillas **either** deciduous (the mature spikelets generaly falling as a single unit from the rachis) **or** persistent; rachilla wings persistent; spikelets with 2-8 scales.
26 Spikelets reflexed (some of the uppermost spreading to ascending).
27 Culms glabrous; leaves and inflorescence bracts nearly glabrous.....***C. hystricinus***
27 Culms (at least the upper portion) scaberulous or puberulent; leaves and inflorescence bracts puberulent on the upper surface.
28 Inflorescence rays scaberulous; leaves and inflorescence bracts pubescent on the upper and lower surfaces; culm obtusely trigonous to nearly terete.....***C. plukenetii***
28 Inflorescence rays smooth (or with a very few hairs); leaves and inflorescence bracts pubescent on the upper surface and on the midvein only on the lower surface; culm sharply 3-angled..... ***C. retrofractus***
26 Spikelets ascending to spreading (some of the lowermost reflexed).
29 Spikes cylindrical, 2-5× as long as wide.
30 Spikelets ellipsoid, 2-3×as long as wide; spikelets with 1-2 (-3) fertile scales .....***C. aggregatus***
30 Spikelets lanceolate to linear, 4-10× as long as wide; spikelets with 3-8 fertile scales.
31 Scales greenish to light brown, the tips overlapping the lower 1/4 to 1/3 of the next scale..... ***C. strigosus***
31 Scales reddish brown or tawny, the tips barely reaching the base of the next scale .....***C. thyrsiflorus***
29 Spikes ovoid, globose, or obovoid, 1-2× as long as wide.
32 Scales >4 mm long; achenes >2 mm long.
33 Spikes tightly globose.....***C. echinatus***
33 Spikes ellipsoid to obovoid.
34 Spikelets subquadrangular, the terminal scale elongate, forming a subulate tip to the spikelet; leaves and inflorescence bracts 3-6 mm wide, smooth.....***C. hystricinus***
34 Spikelets subterete, the terminal scale not elongate, the spikelet therefore acute; leaves and inflorescence bracts mostly >10 mm wide, scabrous on the upper surfaces.
35 Spikes dense, with 50-90 spikelets, each with 3-6 (-7) fertile scales; achenes conspicuously falcate-curved, 3-4× as long as wide.....***C. lancastriensis***
35 Spikes loose, of 13-75 spikelets, each with 4-8 (-11) fertile scales; achenes straight, 5-6× as long as wide..... .....***C. refractus***
32 Scales <4 mm long; achenes <2 mm long.
36 Spikes with parallel sides, mostly > 25 mm long; spikelets quadrate.
37 Spikelets narrowly ellipsoid, 1.5-2.0 mm wide..... ***C. tetragonus***
37 Spikelets linear, 0.5-1.0 mm wide .....***C. thyrsiflorus***
36 Spikes with curved (convex) sides, mostly < 20 mm long; spikelets somewhat compressed.
38 Scales ascending; achenes oblong-fusiform, gradually narrowed to both ends.....***C. ovatus***
38 Scales appressed; achenes elongate, abruptly constricted at the tip.
39 Spikes loose, globose to hemispheric; spikelets angular in cross-section, with 3-8 fertile scales; scales yellow-greenish.....***C. croceus***
39 Spikes tight, globose, oblong, or oblong-cylindric; spikelets subterete in cross-section, with 1-3 (-4) fertile scales; scales straw-colored or brown on the sides.
40 Spikes globose; spikelets (3.5-) 4.0-7.0 mm long; scales membranous, straw-colored, 3.5-4.5 mm long; achenes 1.7-2.3 mm long .....***C. echinatus***
40 Spikes oblong to oblong-cylindrical; spikelets 2.2-4.0 (-4.5) mm long; scales firm, brown or straw-colored, 1.8-2.6 mm long; achenes 1.2-2.0 mm long.....***C. retrorsus***

Cyperus acuminatus Torrey & Hooker ex Torrey. Wetlands, especially over limestone. IL west to ND, south to w. LA, TX, and n. Mexico; disjunct from WA to s. CA; disjunct eastward at scattered localities in VA, NC, GA (Echols 2007), TN, KY, and OH (where probably native), and NY and NH (where probably introduced). [= C, F, FNA, G, GW, K, Pa, W]

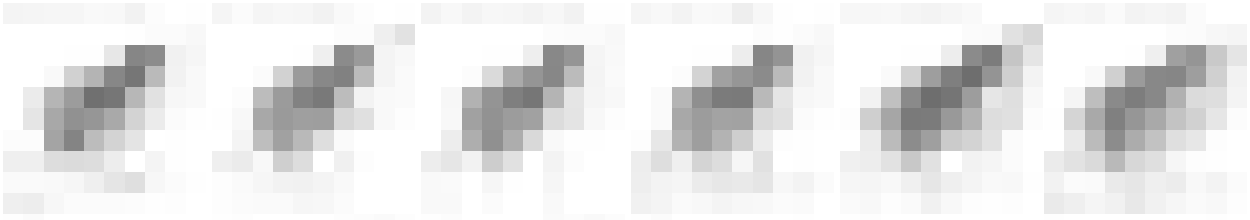
* ***Cyperus aggregatus*** (Willdenow) Endlicher. Disturbed areas in ports, apparently introduced on ballast, perhaps only a waif and no longer present; native of tropical America. [= FNA, K, WH; = *C. cayennensis* (Lamarck) Britton – S; = *C. flavus* (Vahl) Nees; = *C. huarmensis* (Kunth) M.C. Johnston, misapplied]

* *Cyperus alopecuroides* Rottbøll. Disturbed wet areas; native of Old World tropics. Reported for FL in FNA and for MS in Kartesz (2010). [= FNA, WH] {not yet keyed}

Cyperus articulatus Linnaeus. Marshes, especially tidal. July-September. Se. SC south to s. FL west to e. TX, and south into tropical America. [= RAB, FNA, GW, K, S, WH]

Cyperus bipartitus Torrey. Low fields, ditches, marshes, along streams. July-October. ME and QC west to MN and WA, south to FL (Wakulla County) (Kunzer et al. 2009), GA, LA, TX, NM, AZ, and CA. [= C, FNA, GW, K, Pa, W; ? *C. rivularis* Kunth – RAB, F, G, S, WV]

Cyperus compressus Linnaeus. Sandy fields, disturbed areas. July-September. Pantropical and warm temperate, north in North America to s. NY, s. OH, s. IL, and e. TX. [= RAB, C, F, FNA, G, GW, K, Pa, S, W, WH]



Cyperus croceus Vahl. Savannas, pine flatwoods, disturbed areas. July-October. NJ and MO south through the New World tropics. {problems in circumscription; check specimens} [= C, FNA, WH; = *C. globulosus* Aublet – F, G, GW, W, misapplied; > *C. croceus* – K; > *C. globosus* – S; > *C. multiflorus* (Britton) Small – S; > *C. globosus* – RAB; > *C. retrorsus* Chapman var. *robustus* (Böckler) Kükenthal – RAB, K; > *C. plankii* Britton – S]

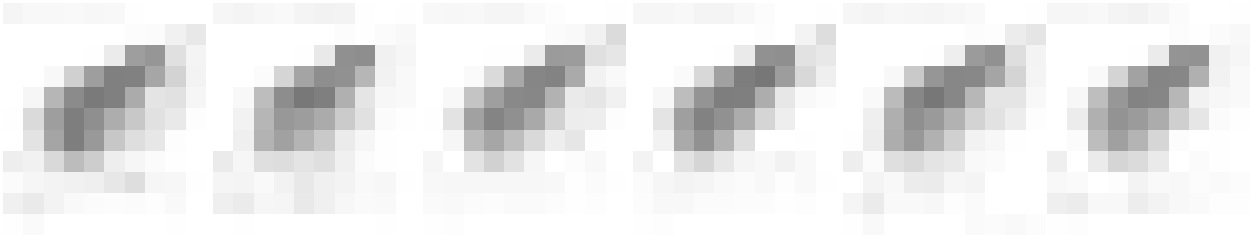
Cyperus cuspidatus Kunth. Sandy fields, disturbed areas. July. S. SC south to FL, west to LA; New World tropics. [= RAB, FNA, GW, K, S, WH]

Cyperus dentatus Torrey, Toothed Flatsedge. Low sandy areas. July-October. NS and QC south to e. SC; disjunct inland in WV, s. TN, and nw. IN. [= RAB, C, F, FNA, G, GW, K, Pa, S, W]

Cyperus diandrus Torrey. {habitat}. ME west to ND, south to VA, c. TN, n. AL, IL, MO, and IA. [= C, F, FNA, G, GW, K, Pa, S, W]

* ***Cyperus difformis*** Linnaeus, Smallflower Umbrella Sedge. Disturbed areas; native of Old World tropics. See Bryson et al. (1996), Carter, Baker, & Morris (2009). [= C, F, FNA, G, GW, K, Pa, WH]

Cyperus digitatus Roxburgh. Disturbed wet areas. Pantropical, north in North America to FL Panhandle, LA, and TX. [= FNA] {not yet keyed; add to synonymy}



* ***Cyperus distans*** Linnaeus f. Marshes; probably introduced from tropical America. July-September. [= RAB, FNA, K, S, WH]

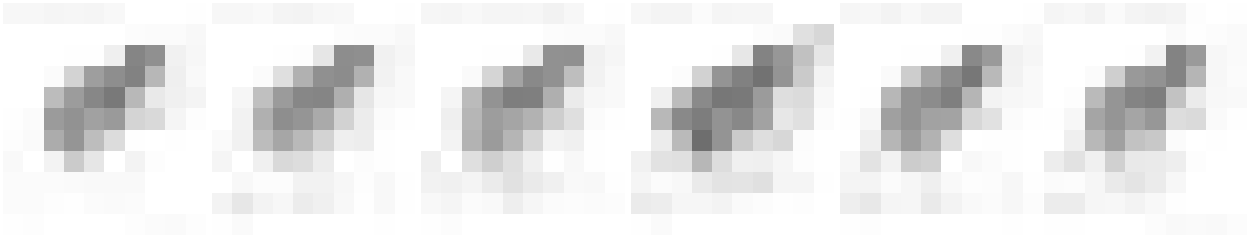
Cyperus distinctus Steudel. Marshes, wet flatwoods, wet hammocks, ditches. July-September. E. SC south to Panhandle FL and s. FL; se. LA; Bahamas (New Providence Cay). [= RAB, FNA, GW, K, WH]

Cyperus drummondii Torrey & Hooker in Torrey. Flatwoods ponds, savannas, coastal prairies, ditches, disturbed depressions. June-September. SC south to Panhandle FL, west to e. TX; West Indies; Central America; South America. Reported for several counties in the GA Coastal Plain (Carter, Baker, & Morris 2009). Reported for SC, GA, FL, AL, MS, LA, and TX (USDA Plants 2009). [= FNA, WH; = *C. virens* Michaux var. *drummondii* (Torrey & Hooker in Torrey) Kükenthal; < *C. virens* – GW, K, RAB, S]

Cyperus echinatus (Linnaeus) Wood. Sandy woodlands, forests, and fields. July-September. CT and NY west to s. OH, IL, and se. KS, south to n. FL, TX, and ne. Mexico. [= C, FNA, K, Pa, WH; = *C. ovularis* (Michaux) Torrey – RAB, G, GW, S, W, WV; > *C. ovularis* var. *ovularis* – F; > *C. ovularis* var. *sphaericus* Böckler – F]

Cyperus elegans Linnaeus, Royal Flatsedge. FL. July-August. FL, AL, MS, TX, and NM, south to South America. [= FNA, WH] {not yet keyed; add to synonymy}

* ***Cyperus entrerianus*** Böckler. Bottomland hardwood forests, coastal grasslands, marshes, vacant lots, disturbed areas; native of temperate South America. Established from E. GA south to s. FL and west to e. and s. TX. Rosen, Carter, & Bryson (2006) and Carter, Baker, & Morris (2009) discuss the spread of this noxious weed in the Southeastern United States. [= FNA, K, WH]



* ***Cyperus eragrostis*** Lamarck. Disturbed wetlands; native of tropical America. See Bryson et al. (1996), Brown & Marcus (1998), Kunzer et al. (2009). [= FNA, K]

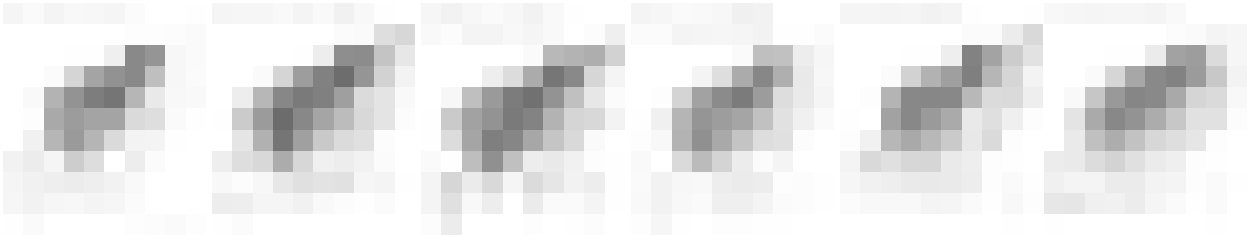
Cyperus erythrorhizos Muhlenberg, Redroot Flatsedge. Marshes, ditches. July-September. MA west to ND and WA, south to n. FL, LA, TX, AZ, and CA. [= RAB, C, F, FNA, G, GW, K, Pa, W, WH, WV; > *C. erythrorhizos* – S; > *C. halei* Torrey ex Britton – S]

Cyperus esculentus Linnaeus *var.* ***leptostachyus*** Böckler, Yellow Nutsedge, Yellow Nutgrass, Wild Chufa, Earth-almond. Fields, roadsides, disturbed areas. July-October. The species is pantropical and warm temperate. [= FNA, Pa; > *C. esculentus* var. *leptostachyus* – K; > *C. esculentus* var. *sativus* Böckler– K; < *C. esculentus* – RAB, C, F, G, GW, W, WH, WV; > *C. esculentus* – S; > *C. lutescens* Torrey & Hooker – S]

Cyperus esculentus Linnaeus *var.* ***macrostachyus*** Böckler, Yellow Nutsedge, Yellow Nutgrass, Wild Chufa, Earth-almond. July-October. The species is pantropical and warm temperate. [= FNA; < *C. esculentus* var. *esculentus* – K; < *C. esculentus* – RAB, C, F, G, GW, S, W, WH, WV; < *C. lutescens* Torrey & Hooker – S]

Cyperus filicinus Vahl. Brackish marshes. July-September. ME to s. FL, west to LA; West Indies. [= RAB, C, F, FNA, G, K, Pa, S; = *C. polystachyos* Rottbøll var. *filicinus* (Vahl) C.B. Clarke; < *C. polystachyos* – GW, WH]

Cyperus filiculmis Vahl. Sandy or rocky woodlands, forests, and fields. July-October. Se. MD south to s. peninsular FL, west to e. TX. [= FNA, RAB, WH; < *C. lupulinus* ssp. *lupulinus* – K (also see *C. lupulinus*]



Cyperus flavescens Linnaeus. Low fields, ditches, marshes. July-September. Pantropical and warm temperate, north in North America to MA, MI, MO, and KS. [= RAB, C, FNA, G, GW, K, Pa, S, W, WH, WV; > *C. flavescens* var. *poiformis* (Pursh) Fernald – F]

Cyperus flavicomus Michaux. Ditches, marshes, natural or artificial ponds; common (uncommon in DE, rare in GA). July-October. Se. VA and KY south through the New World tropics. [= C, FNA, K, W, WH; = *C. albomarginatus* (Martius & Schrader ex Nees) Steudel – RAB, F, G, GW; ? *C. sabulosus* (Martius & Schrader ex Nees) Steudel – S]

Cyperus fraternus Kunth. Disturbed depressions, ditches. Reported for several counties in the GA Coastal Plain (Carter, Baker, & Morris 2009). [< *C. reflexus* – FNA; = *C. reflexus* Vahl var. *fraternus* (Kunth) Kuntze] {add synonymy; not yet keyed; not yet mapped}

* ***Cyperus fuscus*** Linnaeus, Black Galingale, Brown Galingale. Wet, disturbed areas; native of temperate Eurasia. See McKenzie et al. (1998). [= C, F, FNA, G, K]

Cyperus granitophilus McVaugh, Granite Flatsedge. Granitic flatrocks, rarely on diabase flatrocks and Altamaha Grit glades. Sc. VA south to ec. AL in the Piedmont; disjunct in se. and c. TN on sandstone and limestone and in sc. GA on Altamaha Grit. [= FNA, GW, K; < *C. aristatus* Rottbøll – G, RAB, W; < *C. inflexus* Muhlenberg – F, S]

Cyperus grayi Torrey. Dry soils. July-September. NH south to GA and Panhandle FL (Liberty County) (Sorrie & LeBlond 2008). [= RAB, C, FNA, K, W; = *C. grayii* – G, orthographic variant; > *C. grayii* – F; > *C. filiculmis* var. *oblitus* Fernald & Griscom – F]

Cyperus haspan Linnaeus. Marshes, low fields, ditches. July-September. Pantropical in distribution, north in North America to se. VA. [= RAB, C, FNA, G, GW, K, S, WH; > *C. haspan* var. *americanus* Böckler – F]

Cyperus houghtonii Torrey, Houghton's Flatsedge. Dry upland sites. July. MA, VT, and QC west to MN, south to w. VA, WV, nc. NC, and nw. IN. [= RAB, C, F, FNA, G, K, Pa, W]

Cyperus hystricinus Fernald. Dry woodlands and forests. July-September. NJ south to n. FL, west to e. TX, mostly on the Coastal Plain. {check specimens of this and relatives – discrepancy between mapped and stated ranges} [= C, FNA, K, S, WH; < *C. retrofractus* – RAB, W, misapplied; = *C. retrofractus* (Linnaeus) Torrey var. *hystricinus* (Fernald) Kükenthal – F, G]

* ***Cyperus involucratus*** Rottbøll. Disturbed areas; native of Africa. Naturalized north at least to Panhandle FL (Kunzer et al. 2009). [= FNA, K, WH; ? *C. alternifolius* Linnaeus, misapplied]

* ***Cyperus iria*** Linnaeus. Marshes, ditches, disturbed wet areas; native of Old World. July-October. [= RAB, C, F, FNA, G, GW, K, S, WH]

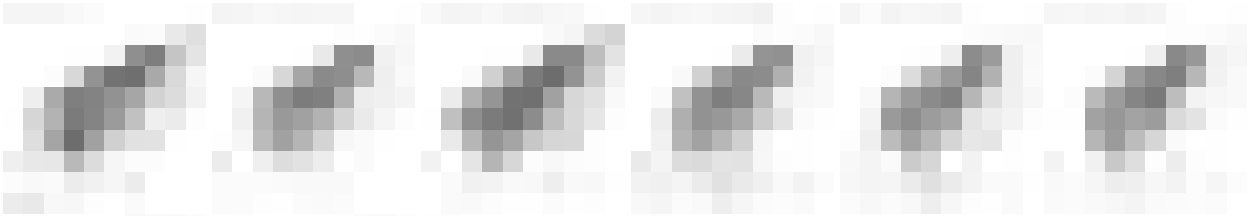
* ***Cyperus laevigatus*** Linnaeus. Brackish marshes; native of sw. North America and New World tropics. [= RAB, FNA, K; > *C. laevigatus* – S; > *C. careyi* Britton – S]

Cyperus lancastriensis Porter ex A. Gray. Dry woodlands, forests, and fields. July-September. NJ west to WV, OH, and MO, south to GA and AR. [= RAB, C, F, FNA, G, K, Pa, S, W, WV]

Cyperus lanceolatus Poiret. Wet places. Se. GA and ne. FL west to LA and c. TX (?), south into the Neotropics; also Africa. [= FNA, GW, K, WH; ? *C. densus* Link – S]

Cyperus lecontei Torrey ex Steudel. Limesink ponds, low pinelands. July-September. Se. NC south to s. FL, west to w. LA. Sorrie (1998b) reports it for e. GA (Glynn County). [= RAB, FNA, GW, K, S, WH]

Cyperus ligularis Linnaeus, Swamp Flatsedge. Brackish marshes, beaches, disturbed wetlands. FL and AL south into Mexico, Central America. South America; Africa. [= FNA, WH] {not yet keyed; add to synonymy}



Cyperus lupulinus (Sprengel) Marcks *var*. ***lupulinus***. Dry sterile soils. MA and VT west to MN, south to NC, n. SC, TX; disjunct in ID, WA, and OR. [= *C. lupulinus* ssp. *lupulinus* – FNA, K; < *C. filiculmis* Vahl – RAB, W; < *C. lupulinus* – C, Pa, WH; = *C. filiculmis* Vahl var. *filiculmis* – F, G, WV; >< *C. filiculmis* – S; > *C. martindalei* Britton – S]

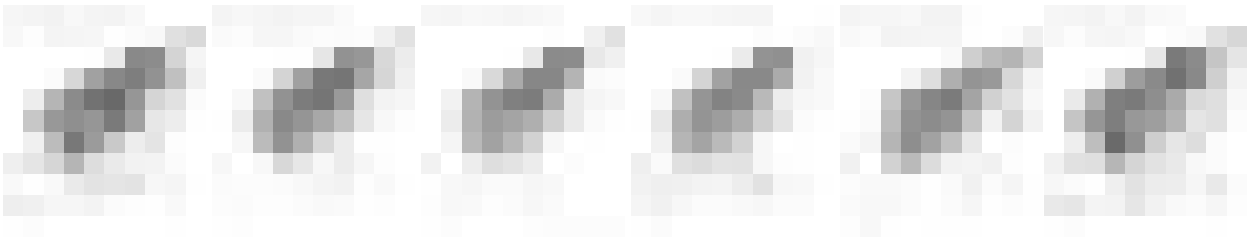
Cyperus lupulinus (Sprengel) Marcks *var*. ***macilentus*** (Fernald) A. Haines. Dry sterile soils. ME, QC, and MN south to w. VA, w. NC, nw. GA, and MO. [= *C. lupulinus* ssp. *macilentus* (Fernald) Marcks – FNA, K; < *C. filiculmis* Vahl – RAB, S, W; = *C. filiculmis* Vahl var. *macilentus* Fernald – F, G, WV; < *C. lupulinus* – C, Pa]

* ***Cyperus microiria*** Steudel. {habitats}; native of e. Asia. Naturalized in DE, PA, NJ, and NY. [= C, F, FNA, Pa; = *Cyperus amuricus* Maximowicz – G, K, misapplied]

Cyperus ochraceus Vahl. Marshes, ditches, wet disturbed areas. Se. GA (Jones & Coile 1988), s. FL, s. AL, s. MS, LA, TX, south into Mexico, Cenbtral America, and South America. [= FNA, GW, K, S, WH]

Cyperus odoratus Linnaeus *var*. ***engelmannii*** (Steudel) R. Carter, S.D. Jones, & J. Wipff. Alluvial and other damp to wet soils. July-October. North-central and northeastern North America, MA west to s. ON, MN and NE, south to se. NC and MO. Distribution in our region is poorly known. [= *C. engelmannii* Steudel – RAB, F, G, GW, Pa, S; < *C. odoratus* – C, FNA, K, W, WH]

Cyperus odoratus Linnaeus *var*. ***odoratus***. Low fields, marshes, ditches. July-September. Pantropical, north in North America to MA, se. ME, ON, MN, KS, NM, AZ, and CA. [= *C. odoratus* – RAB, F, G, GW, Pa; < *C. odoratus* – C, FNA, K, W, WH; > *C. ferruginescens* Böckler – RAB, F; > *C. ferax* L.C. Richard – S; > *C. longispicatus* J.B.S. Norton – S; > *C. speciosus* Vahl – S]



Cyperus ovatus Baldwin. Sandy beaches, maritime forests, and pinelands. July-October. Se. NC south to s. FL, west to s. AL. [= FNA, K; ? *C. retrorsus* Chapman var. *cylindricus* (Elliott) Fernald & Griscom; > *C. retrorsus* var. *deeringianus* (Britton ex Small) Fernald ex Griscom – RAB; < *C. retrorsus* – C, G, GW, W; > *C. deeringianus* Britton ex Small – S]

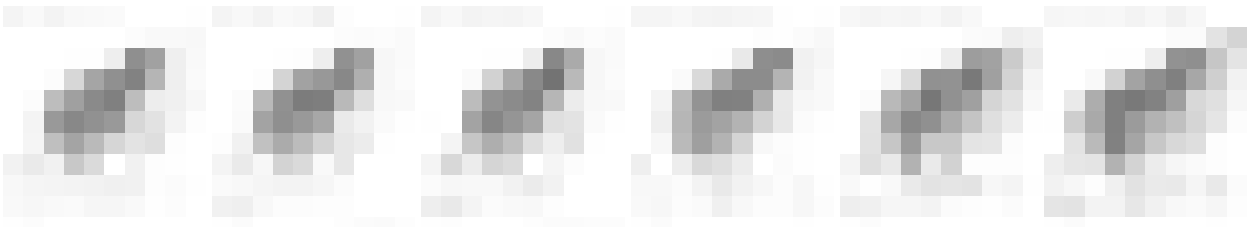
* ***Cyperus oxylepis*** Nees ex Steudel. Disturbed wet areas, marshes, saline areas; native of South America. See Bryson et al. (1996). [= FNA, GW, K, WH]

* ***Cyperus pilosus*** Vahl. Rice fields, ditches; native of e. Asia. See Carter, Baker, & Morris (2009). [= FNA, K, WH]

Cyperus planifolius L.C. Richard. Brackish marshes. Se. GA (Jones & Coile 1988) south to s. FL; West Indies; Central and South America. [= FNA, GW, K, WH; ? *C. brunneus* Swartz – S]

Cyperus plukenetii Fernald. Sandhills, sandy woodlands, and dry, disturbed areas. July-October. NJ, KY, MO, and se. OK, south to c. peninsular FL and e. TX. [= RAB, C, F, FNA, K, Pa, W, WH; = *C. retrofractus* var. *retrofractus* – G, misapplied; = *C. retrofractus* – S, misapplied]

Cyperus polystachyos Rottbøll. Low fields, ditches, and marshes. July-October. Pantropical and warm temperate, north in North America to ME, MA, KY, MO, and OK. [= FNA, Pa; > *C. polystachyos* Rottbøll var. *texensis* (Torrey) Fernald – RAB, C, F, G, K, W; > *C. polystachyos* var. *paniculatus* (Rottbøll) C.B. Clarke; > *C. microdontus* Torrey – S; > *C. odoratus* – S, misapplied; > *C. paniculatus* Rottbøll – S; < *C. polystachyos* – GW, WH]



* ***Cyperus prolifer*** Lamarck. Pond shores, marshes; native of tropical e. Africa. July-August. Also reported for se. VA (Kartesz 2010). [= FNA, WH; ? *C. isocladus* Kunth]

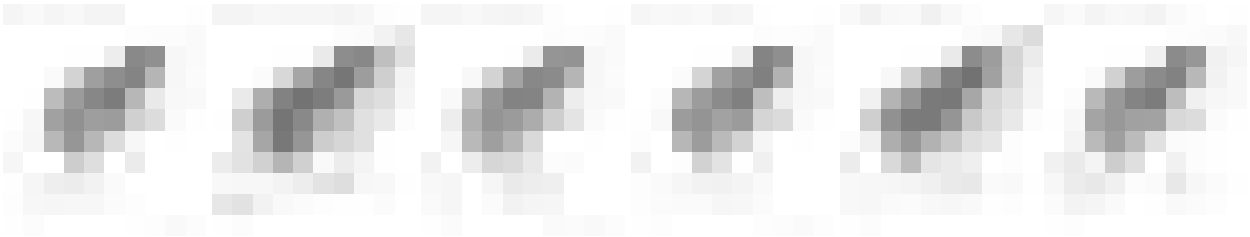
Cyperus pseudovegetus Steudel, Marsh Flatsedge. Marshes, ditches, depressions. July-October. NJ and MA, west to s. IL, s. MO, and OK, south to FL and TX. [= RAB, C, FNA, G, GW, K, S, W, WH; = *C. virens* – F, misapplied]

* ***Cyperus pumilus*** Linnaeus. Disturbed wet areas; native of the Old World, occurring in n. FL and se. GA. [= FNA, GW, K, WH]

* ***Cyperus reflexus*** Vahl. Disturbed wet areas; native of sw. United States south to tropical America. July-August. [= FNA, WH]

Cyperus refractus Engelmann ex Böckler. Dry sandy or rocky woodlands and forests. July-September. NJ west to OH and MO, south to SC, GA, AL, and AR. [= RAB, C, F, FNA, G, K, Pa, S, W]

Cyperus retroflexus Buckley. Cropped fields, damp disturbed areas. July-September. AL west to NM, south to Mexico. [= FNA, K]



Cyperus retrofractus (Linnaeus) Torrey. Dry sandy or rocky woodlands and fields. July-September. NJ west to s. OH, and se. MO, south to GA. AL, and AR. [= C, FNA, K, Pa, WH; = *C. dipsaciformis* Fernald – RAB, F, S, W; = *C. retrofractus* (Linnaeus) Torrey var. *dipsaciformis* (Fernald) Kükenthal – G]

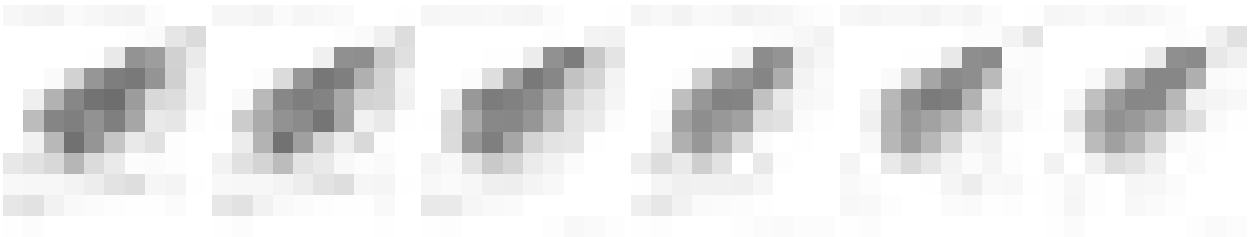
Cyperus retrorsus Chapman, Pinebarren Flatsedge. Dry woodlands, forests, and rock outcrops. July-October. S. NY south to FL, west to TX, mostly on the Coastal Plain, but north in the interior to KY and se. OK. [= C, FNA, G, GW, Pa, W, WH; = *C. retrorsus* Chapman var. *retrorsus* – RAB, K; > *C. retrorsus* var. *retrorsus* – F; > *C. retrorsus* var. *nashii* (Britton) Fernald – F; > *C. retrorsus* – S; > *C. nashii* Britton – S; > *C. torreyi* Britton – S]

* ***Cyperus rotundus*** Linnaeus, Purple Nutsedge, Nutgrass, Cocograss. Gardens, fields, disturbed areas. June-October. Pantropical and warm temperate in distribution (though extending less far north than *C. esculentus*). [= RAB, C, F, FNA, G, GW, K, S, WH]

* ***Cyperus sanguinolentus*** Vahl. Ditches, disturbed wet areas; native of Asia, known in North America from e. GA west to LA. See Carter & Bryson (2000) for detailed information. [= FNA; > *Cyperus louisianensis* Thieret – K]

Cyperus schweinitzii Torrey, Sand Flatsedge. Sandy soils. VT, MA, MN, and Albert, south to s. NJ, se. and sw. PA (Rhoads & Block 2007), n. KY, OH, MO, TX, NM, UT, and Mexico. [= FNA, C, F, G, K, Pa]

* ***Cyperus serotinus*** Rottbøll, Tidalmarsh Flatsedge. Tidal marshes; native of Eurasia. June-August. Reported as naturalized in s. NJ, DE, and PA (FNA, Kartesz 1999). [= FNA, K, Pa]



Cyperus squarrosus Linnaeus. Moist depressions and seepages on granitic and other rocks, drawdown riverbanks, moist disturbed sites. July-September. Nearly cosmopolitan in distribution, in Old World and New World. Similar to the closely related *C. granitophilus*. [= C, FNA, K, Pa, WH; = *C. aristatus* Rottbøll – GW; = *C. inflexus* Muhlenberg – WV; < *C. aristatus* Rottbøll – G, RAB, W; < *C. inflexus* Muhlenberg – F, S]

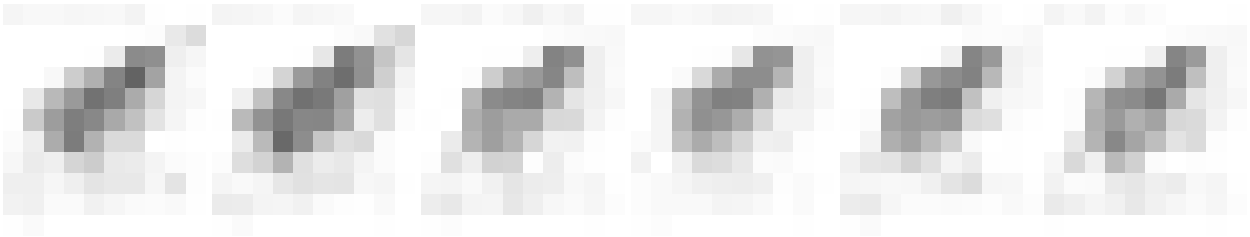
Cyperus strigosus Linnaeus, False Nutsedge. Marshes, ditches, wet flatwoods, wet disturbed areas. July-October. QC west to SD, south to FL and TX; also in w. North America. [= RAB, C, FNA, GW, K, Pa, W, WV; > *C. strigosus* var. *strigosus* – F, G; > *C. strigosus* var. *robustior* Britton – F; > *C. strigosus* var. *stenolepis* (Torrey) Kükenthal – G; > *C. strigosus* – S; > *C. praelongatus* Steudel – S; > *C. stenolepis* Torrey – S]

Cyperus surinamensis Rottbøll. Marshes, pond edges, disturbed wet areas. September-October. Se. NC south to s. FL, west to KS, OK, TX, and south into Mexico and tropical America. [= RAB, FNA, GW, K, S, WH]

Cyperus tetragonus Elliott, Four-angled Flatsedge. Maritime forests and dunes, edges of brackish marshes. July-September. E. NC south to s. FL and west to s. AL. *C. pringlei* of AZ, NM, and n. Mexico is sometimes treated as conspecific (as by FNA), but it should be regarded as distinct. [= RAB, S; < *C. tetragonus* – FNA, K1, K2, WH3]

Cyperus thyrsiflorus Junghuhn. Swamps and streambanks. Se. GA and FL peninsula west to se. TX; West Indies; South America. [= FNA, K, WH; = *C. hermaphroditus* (Jacquin) Standley – S, misapplied]

Cyperus virens Michaux. Marshes and ditches. July-September. Se. NC south to c. peninsular FL, west to TX; Mexico to Argentina. [= FNA, WH; < *C. virens* – GW, K, RAB, S]



Dulichium Persoon (Threeway Sedge)

A monotypic genus, an herb, North American (known as fossils from Europe). References: Goetghebeur in Kubitzki (1998b); Mastrogiuseppe in FNA (2002b).

Identification notes: The combination of the distichous *Cyperus*-like spikelets and numerous, distinctly 3-ranked, short, cauline leaves makes *Dulichium* distinctive.

Dulichium arundinaceum (Linnaeus) Britton *var.* ***arundinaceum***, Threeway Sedge. Streambanks, marshes, bogs, ditches. July-October. Var. *arundinaceum* ranges from NL (Newfoundland) west to MN, south to FL and TX; also from MT and BC south to CA. A second variety, var. *boreale* Lepage, is endemic in QC. [= FNA, Pa; < *D. arundinaceum* – RAB, C, F, G, GW, K, S, W, WV]

Eleocharis R. Brown 1810 (Spikerush)
[by Bruce A. Sorrie and Alan S. Weakley]

A genus of about 120-200 species, herbs, cosmopolitan. A molecular study supported the monophyly of subgenus *Limnochloa* (Roalson & Friar 2000). References: Smith et al. in FNA (2002b); Socorro González-Elizondo & Peterson (1997); Roalson & Friar (2000); Goetghebeur in Kubitzki (1998b).

Identification notes: "Scale" refers to the flower scales. "Sheath" refers to leaf sheaths. "Bristle" refers to perianth bristles.

subgenus *Eleocharis*
- section *Eleocharis*
  - series *Eleocharis*
    - subseries *Eleocharis*: erythropoda, fallax, halophila, palustris, smallii
    - subseries *Truncatae*: bifida, compressa, elliptica, intermedia, montevidensis, tenuis, tricostata, verrucosa
  - series *Albidae*: albida
  - series *Melanocarpae*: melanocarpa
  - series *Rostellatae*: rostellata
  - series *Tenuissimae*
    - subseries *Chaetariae*: baldwinii, brittonii, microcarpa, nigrescens, setifolia, tortilis, tuberculosa, vivipara
- section *Eleogenus*
  - series *Ovatae*: engelmannii, obtusa, ovata
  - series *Maculosae*
    - subseries *Ocreatae*: flavescens, olivacea
    - subseries *Rigidae*: atropurpurea, geniculata
- section *Parvulae*: parvula

subgenus *Limnochloa*
- section *Limnochloa*: cellulosa, elongata, equisetoides, interstincta, quadrangulata, robbinsii

subgenus *Scirpidium*
- section *Scirpidium*: acicularis, radicans

1 Culms producing vegetative proliferations rather than normal fertile spikelets ..... **Key A**
1 Culms producing at least some fertile spikelets (vegetative proliferations may or may not also be present).
- 2 Spike 1-2 (-2.5)× as thick as the culm immediately below the spike, gradually expanded from the culm, the base of the spike narrowly cuneate; spike (3-) 4-8× as long as wide; [subgenus *Limnochloa*] ..... **Key B**
- 2 Spike > 2× as thick as the culm immediately below the spike, abruptly expanded from the culm, the base of the spike broadly cuneate, rounded, or truncate; spike 1-3 (-4)× as long as wide.
  - 3 Achenes with several distinct longitudinal ribs or low ridges, the intervening spaces with abundant, very narrow, horizontally elongate cells; [subgenus *Scirpidium*] ..... **Key C**
  - 3 Achenes without longitudinal ribs, the surface smooth, granular, or honeycomb-like (*E. tortilis* and *E. tuberculosa* have indistinct ribs, but intervening cells are honeycomb-like, not thin horizontally; *E. tricostata* has 3 keel-like ribs, but achene surface appears granular).
    - 4 Achenes lenticular or biconvex; styles 2-branched ..... **Key D**
    - 4 Achenes trigonous or nearly terete; styles 3-branched ..... **Key E**

Key A – spikerushes proliferating vegetatively, with no fertile spikelets present

{key provisional and needing additional testing}

1 Each culm producing secondary or tertiary whorls.
- 2 Base of whorl abruptly widened from culm, forming a distinct shoulder; whorl divisions many per whorl (commonly 20 or more); whorl divisions usually 0.2 mm or less wide, finely capillary (often < 0.1 mm, but same may apperoach 0.3 mm); surface texture of divisions obviously beaded (under dissecting microscope) ..... ***E. confervoides***
- 2 Base of whorl gradually widened from culm, vase-shaped, not forming a istinct shoulder; whorl divisions fewer per whorl (commonly 15 or less); whorl divisions usually 0.3 mm or more wide (0.5 mm or more, but the finest secondary or tertiary divisions as slender as 0.15 mm); surface texture of divisions not beaded (under dissecting microscope) ..... ***E. vivipara***

1 Each culm producing a single whorl of proliferations.
- 3 Upper portion of sheath firm, the edge closely red-dotted; sheath tip < 1 mm long ..... ***E. vivipara***
- 3 Upper portion of sheath thin and scarious, the edge not differently colored; sheath tip 1-2 mm long; plants usually more filiform and capillary than *E. vivipara*.

4 Spikelet proliferations distichous; lowest scale much shorter than the others ..... ***E. baldwinii***
4 Spikelet proliferations polystichous or spirally disposed; lowest scale longer than others ..... ***E. brittonii*** or ***E. microcarpa***

Key B – spikerushes with the spike about as thick as the culm (subgenus *Limnochloa*)

1 Culm transversely nodose-septate (appearing jointed), about 5-9.5 mm in diameter.
2 Achene with longitudinal rows of enlarged linear cells separated by obscure longitudinal lines; perianth bristles narrow and weak, rudimentary to equaling achene; [widespread in our area] ..... ***E. equisetoides***
2 Achene with longitudinal rows of enlarged rectangular cells separated by distinct longitudinal lines; perianth bristles broad and stout, exceeding achene; [of Panhandle FL and s. AL] ..... ***E. interstincta***
1 Culm not transversely nodose-septate, 1-5.5 mm in diameter.
3 Spike 3-5 mm in diameter, to 5 cm long, rounded to obtuse at the tip, densely flowered, the flowers (scales) 50-100 per spike, arranged in obvious spiral rows; culm 2-5 mm in diameter; [of estuarine and riverine marshes, or brackish interdune swale ponds on barrier islands].
4 Culms 3-5 mm in diameter, live culms terete when fresh; tubercle base confluent with the summit of the achene..... ***E. cellulosa***
4 Culms 2-4 mm in diameter, sharply 3-4-angled when fresh; tubercle base distinctly constricted, forming a "waist"..... ***E. quadrangulata***
3 Spike 1-2 mm in diamater, to 2.5 cm long, sharply pointed at the tip, loosely flowered, the flowers (scales) 10-25, few enough that the spiral arrangement is not readily apparent; culm 0.5-1.5 (-2) mm in diameter; [of limesink (doline) ponds and Carolina bay lakes of the mainland].
5 Achene body 0.8-1.5 mm long; scales mostly ca. 3.5 mm long; culms terete when fresh ..... ***E. elongata***
5 Achene body 1.5-2.5 mm long; scales mostly ca. 5 mm long; culms 3-angled when fresh ..... ***E. robbinsii***

Key C – spikerushes with achenes with several distinct longitudinal ribs
with very narrow horizontal cells between (subgenus *Scirpidium*)

1 Culms about 0.5 mm thick, firm, not wrinkling in drying; spikes 3-6 mm long; [widespread] ..... ***E. acicularis***
1 Culms 0.6-1.0 mm thick, becoming wrinkled in drying; spikes 2-4 mm long; [of the Coastal Plain, known from Virginia Beach in 1934] .... ***E. radicans***

Key D – spikerushes with achenes lenticular or biconvex and styles 2-branched

1 Apex of sheath thin, membranous, hyaline, often with a torn edge.
2 Culms 0.1-0.3 mm in diameter; achenes whitish to pale brown; leaf sheaths of the upper culm closely sheathing the stem, not wrinkled, the apex acute..... ***E. bicolor***
2 Culms 0.3-0.6 mm in diameter; achenes rufous- or olivaceous-brown to black; leaf sheaths of the upper culm usually prominently wrinkled, inflated, membraneous, and disintegrating.
3 Achenes rufous-brown to reddish-purple to black, (0.3-) 0.4-0.6 mm wide; longer bristles retrorsely barbed, shorter than to equaling achene body ..... ***E. flavescens***
3 Achenes olivaceous-brown to black, 0.5-0.7 (-0.8) mm wide; longer bristles either retrorsely barbed and equaling to exceeding the tubercle, or smooth and shorter than the tubercle.
4 Bristles retrorsely barbed, the longer equaling to exceeding the tubercle; [wet sandy or peaty habitats, widespread] .... ***E. olivacea*** *var.* ***olivacea***
4 Bristles smooth, the longer shorter than the tubercle; plants of [tidal rivers, in s. NJ] ..... ***E. olivacea*** *var.* ***reductiseta***
1 Apex of sheath firm, somewhat thickened, opaque, with a definite edge.
5 Rhizomatous perennials growing from thick horizontal rhizomes.
6 Basal (sterile) scales 2-3, the lowest not encircling the base of the spike; [of the Mountains, rarely the Piedmont] ..... ***E. palustris***
6 Basal (sterile) scale solitary and spathiform, encircling the base of the spike; [of either the Mountains, upper Piedmont, or outer Coastal Plain].
7 Achenes prominently reticulate-pitted; [of the outer Coastal Plain] ..... ***E. fallax {ambigens* phase*}***
7 Achenes smooth to faintly reticulate; [of the Mountains, rarely Piedmont, or outer Coastal Plain].
8 Culms slender to filiform; scales obtuse, 30-40 per spike; [of basic soils, of the Mountains and rarely Piedmont] .... ***E. erythropoda***
8 Culms thicker, somewhat inflated; scales acute, 5-30 per spike; [of brackish habitats of the outer Coastal Plain]..... ***E. halophila***
4 Tufted or cespitose annuals without thick horizontal rhizomes.
9 Tubercle nearly or actually as broad as the achene, and appearing confluent with it, broader than high.
10 Tubercle flat-deltoid, 1/4 as high as the achene; bristles shorter than the achene body; [plants of clay soils only]..... ***E. engelmannii***
10 Tubercle short-conic, 1/3-1/2 as high as the achene; bristles much exceeding the tubercle; [plants of a variety of soils]..... ***E. obtusa***
9 Tubercle < 2/3 as broad as the achene, conic, taller than broad.
11 Achene body pale brown, about 1 mm long ..... ***E. ovata***
11 Achene body black, 0.5-1.0 mm long.
12 Spikes lance-ovoid to subcylindric; achene body -.5-0.6 mm long ..... ***E. atropurpurea***
12 Spikes ovoid to subglobose; achene body 0.7-1.0 mm long..... ***E. geniculata***

Key E – spikerushes with achenes trigonous or nearly terete and styles 3-branched

1 Achenes roughly and coarsely honeycomb-reticulate; plants usually forming dense, broad tussocks.
2 Tubercle much narrower than the achene; culms 'lazy', often reclining, distinctly 3-angled, twisted ..... ***E. tortilis***
2 Tubercle as broad or broader than the achene; culms ascending to erect, subterete, not twisted ..... ***E. tuberculosa***
1 Achenes smooth to finely honeycomb-reticulate.
3 Tubercle confluent with the achene summit, not constricted at the base.
4 Achenes bicolored, body black, tubercle whitish, depressed; [plant of freshwater ponds and Carolina bays]..... ***E. melanocarpa***
4 Achenes unicolored, body and tubercle light brown or olive brown; [plants of brackish to saline marshes].

5 Plants diminutive, culms slender, rounded, 1-7 cm long, not arching and rooting.....***E. parvula***
5 Plants robust, culms broad, flattened, 20-80 (or more) long, at least some arching and rooting at tips.....***E. rostellata***
3 Tubercle not confluent with the achene summit, constricted at the base.
6 Achenes with prominent keel-like angles or ribs .....***E. tricostata***
6 Achenes with rounded angles.
7 Scales 2-ranked; spikes usually 2-4-flowered.....***E. baldwinii***
7 Scales spirally imbricate; spikes many-flowered.
8 Achenes white or very pale gray.
9 Bristles present.
10 Tubercle depressed-deltoid; scales rounded, appressed.....***E. brittonii***
10 Tubercle conic or deltoid; scales acute to attenuate, the tips free .....***E. microcarpa***
9 Bristles none.
11 Sheath base pinkish to straw-colored; spikes lane-ovate to oblong, 1.5-5 mm long.....***E. brittonii***
11 Sheath base purple-red; spikes ovoid, 2-3 mm long; [plant very rare, Santee Canal, SC, late 1800's]..... ***E. nigrescens***
8 Achenes yellowish, brown, or olive.
12 Horizontal rhizomes absent.
13 Achene body 1.2-1.5 mm long; tubercle slender-conic with narrow base; [of basic soils inland] ..... ***E. intermedia***
13 Achene body 0.6-0.8 mm long; tubercle braod-conic with wide base; [of the Coastal Plain].....***E. vivipara***
12 Horizontal rhizomes present.
14 Achenes not honeycomb-reticulate.
15 Bristles present; culms rounded; [of coastal brackish soils].....***E. albida***
15 Bristles absent; culms strongly flattened; [of inland basic soils].....***E. compressa***
14 Achenes honeycomb-reticulate.
16 Achenes 1.2-1.7 mm long, at maturity normally with bristles.....***E. fallax {fallax* phase*}***
16 Achenes 0.7-1.2 mm long, with or without bristles.
17 Mature achenes with bristles; achenes yellow or brown; culms 0.6-1.0 mm thick; [rare, on outer Coastal Plain of NC and SC].....***E. montevidensis***
17 Mature achenes without bristles (present when immature, but drop off); achenes olive (yellow in *E. elliptica*); culms slender-wiry, 0.2-0.4 mm wide (0.4-0.8 in *E. tenuis* var. *pseudoptera*); [collectively widespread].
18 Culms 6-8-angled; mature achenes yellow to orange, with prominent transverse bands.....***E. elliptica***
18 Culms 4 (-5) angled; mature achenes olive, without transverse bands.
19 Culms 0.4-0.8 mm wide, prominently wing-angled; tubercle depressed..... ***E. tenuis*** *var.* ***pseodoptera***
19 Culms 0.2-0.4 mm wide, angles not wing-like; tubercle broadly conic or depressed.
20 Tubercle broadly conic, about 1/4-1/5 as high as the achene body.....***E. tenuis*** *var.* ***tenuis***
20 Tubercle depressed, about 1/8 as high as the achene body.....***E. tenuis*** *var.* ***verrucosa***

Eleocharis acicularis (Linnaeus) Roemer & J.A. Schultes. Marshes, ditches. July-September. Greenland, NL (Newfoundland), NU, and AK south to GA, TX, CA; Mexico, Central America, n. South America, Eurasia. [= C, FNA, G, GW, K, Pa, RAB, S; > *E. acicularis* var. *acicularis* – F]

Eleocharis aestuum Hines ex A. Haines. Freshwater tidal rivers. ME south to DE, PA, and NJ. [= FNA]

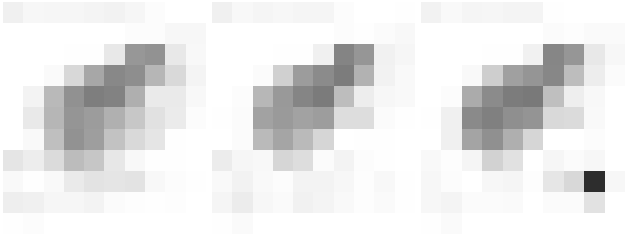
Eleocharis albida Torrey, White Spikerush. Brackish marshes. July-September. MD south to s. FL, west to TX and Mexico. [= RAB, C, F, FNA, G, GW, K, S]

Eleocharis atropurpurea (Retz.) J. & K. Presl. Clay-based Carolina bays, other pineland ponds, disturbed wetlands. Widely scattered in North America; Mexico, West Indies, Central America, South America, Asia, Africa. Reported for South Carolina by Hill & Horn (1997). [= C, F, FNA, G, GW, K, S]

Eleocharis baldwinii (Torrey) Chapman, Baldwin Spikerush. Bogs, pools, acid shores. July-September. VA south to FL, west to AR and TX. [= RAB, C, FNA, GW, K; > *E. capillacea* Kunth – S, misapplied; > *E. prolifera* Torrey – S; > *E. baldwinii* – S]

Eleocharis bicolor Chapman. Moist sites, wet savannas. AL and GA west to LA; West Indies; Nicaragua. [= FNA, K, S]

Eleocharis brittonii Svenson ex Small. Bogs, pine savannas. NC south to FL, west to TX, north in the interior to TN and MO; disjunct in DE. [= F, FNA, K, S; < *E. microcarpa* Torrey – RAB, C, G, GW]



Eleocharis cellulosa Torrey. Cp (GA, NC, SC): fresh to brackish interdune swale ponds on barrier islands; rare (NC Rare). July-September. E. NC south to s. FL, west to TX and Mexico; also in the West Indies, Bermuda, and Central America (Nicaragua). See Gaddy & Rayner (1980) for the report of this species in SC and Carter, Baker, & Morris (2009) for discussion of its occurrence in GA. [= RAB, FNA, GW, K, S]

Eleocharis compressa Sullivant *var*. ***compressa***, Flattened Spikerush. Mt (GA, VA, WV), Pd (VA): limestone glades and barrens, riverside scours; rare. QC, MN, SD, and CO south to VA, nw. GA, AL, MS, AR, and KS. Var. *acutisquamata* (Buckley) S.G. Smith is midwestern. See Brown & Marcus (1998). In nw. GA (Jones & Coile 1988). [= F, FNA, Pa; < *E. compressa* – C, G, GW, K, WV; ? *E. elliptica* – Harvill, misapplied]

Eleocharis confervoides (Poiret) G. Tucker. Cp (GA): submersed in lakes and ponds; rare. GA and FL; West Indies; Central and South America; Asia; Africa; n. Australia. This taxon, often segregated into the monotypic genus *Websteria*, is widely distributed in tropical and subtropical regions of both hemispheres. Its retention in *Eleocharis* is supported by a molecular phylogenetic study (Roalson & Friar 2000). [= *Websteria confervoides* (Poiret) S. Hooper – FNA, GW, K; = *Websteria submersa* (C. Wright) Britton – S; = *Scirpus confervoides* Poiret]

Eleocharis elliptica Kunth. Mt (VA, WV): calcareous prairies, fens, shores, riverside scours; rare. NL (Labrador) west to BC, south to PA, NJ, WV, TN, IA, and ID. [= F, FNA, K, Pa, WV; = *E. tenuis* (Willdenow) J.A. Schultes var. *borealis* (Svenson) Gleason – C, G]

Eleocharis elongata Chapman. Cp (GA, NC): quiet waters of limesink (doline) ponds; rare (NC Rare). July-August. Se. NC south to FL, west to s. AL, s. MS, and TX (Sorrie & Leonard 1999); Jamaica, Mexico, Central America, South America. [= FNA, GW, K, S]

Eleocharis engelmannii Steudel, Engelmann Spikerush. Cp (DE, NC, SC, VA), Pd (DE, GA, NC, VA), Mt (VA, WV): freshwater shores, marshes, disturbed wet places; uncommon (rare in WV)). July-September. MA, ON, and British Clumbia south to GA, MS (Sorrie & LeBlond 2008), TX, and CA. [= F, FNA, G, K, Pa, RAB, S, WV]

Eleocharis equisetoides (Elliott) Torrey, Horsetail Spikerush. Cp (DE, GA, NC, SC, VA): quiet waters of limesink (doline) ponds, natural lakes, borrow pits, ditches, artificial millponds; uncommon (rare in DE and VA). June-September. MA south to c. peninsular FL, west to se. TX; also near the Great Lakes from NY west to MI and MO. [= RAB, C, F, FNA, G, GW, K; < *E. equisetoides* – S]

Eleocharis erythropoda Steudel, Bald Spikerush. Mt (GA, NC, VA, WV), Cp (DE, NC, VA), Pd (DE, VA): streambanks, marshes, ponds, swamps; rare. July-September. NS and AK south to NC, MS, TX, AZ, and OR. [= FNA, GW, K, Pa, RAB; < *E. palustris* – C; > *E. calva* Torrey – F, G, S, WV, invalid name]

Eleocharis fallax Weatherby. Cp (DE, GA, NC, SC, VA): fresh to brackish tidal marshes; rare. July-September. MA south to FL, west to TX. [= RAB, C, GW, K; > *E. fallax* – F, FNA, G; > *E. ambigens* Fernald – F, FNA, G]

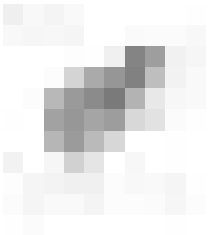
Eleocharis flavescens (Poiret) Urban. Cp (DE, FL, GA, NC?, SC?, VA?): Coastal Plain ponds, pools; rare. June-September. DE or VA (?) south to FL, west to se. OK and TX; also scattered in the Rocky Mountain states; West Indies; South America. [= K; = *E. flavescens* var. *flavescens* – C, FNA, G; < *E. flavescens* – RAB, F, GW]

Eleocharis geniculata (Linnaeus) Roemer & J.A. Schultes. Cp (SC), [GA?, NC?]: marshes; rare. July. Widespread but scattered across much of the United States; West Indies, Central America, South America, Asia, Africa. [= F, FNA, G, GW, K, Pa; > *E. caribaea* (Rottbøll) S.F.Blake – RAB, C, S]

Eleocharis halophila (Fernald & Brackett) Fernald. Cp (DE, NC, VA): brackish marshes; rare. July. NL (Newfoundland) to NC, along the coast. [= RAB, F, G, K; < *E. palustris* – C; < *E. uniglumis* (Link) Schultes – FNA; = *E. uniglumis* var. *halophila* Fernald & Brackett]

Eleocharis intermedia J.A. Schultes, Matted Spikerush. Mt (VA, WV): muddy calcareous seepage areas; rare. NS west to MN, south to VA, TN, and IL. The fruiting culms are of widely different lengths, the lowermost sprawling and much shorter than the longer. [= C, F, FNA, G, K, Pa, WV]

Eleocharis interstincta (Vahl) Roemer & J.A. Schultes. Ponds, borrow pits. May-September. S. AL and Panhadle FL south to s. FL and west (interruptedly) to OK and TX; Bahamas and West Indies; Mexico, Central America, e. South America. [= FNA, GW, K; < *E. equisetoides* – S]



Eleocharis melanocarpa Torrey, Black-fruited Spikerush. Cp (DE, GA, NC, SC, VA), Mt (VA): Coastal Plain ponds, cypress meadows, sinkhole ponds in the Shenandoah Valley; uncommon (rare in DE, NC, and VA). July-September. MA south to n. peninsular FL, west to s. MS; disjunct in e. TX, s. MI, and n. IN (Sorrie & Leonard 1999). [= RAB, C, F, FNA, G, GW, K, S]

Eleocharis microcarpa Torrey *var*. ***filiculmis*** Torrey. Cp (DE, NC, SC, VA): bogs, wet pine savannas; common. June-September. MA and MI south to FL west to TX. [= F, FNA; < *E. microcarpa* – C, G, GW, K, Pa, RAB; = *E. torreyana* Boeckeler – S]

Eleocharis microcarpa Torrey *var*. ***microcarpa***. Cp (SC): wet pine savannas, Coastal Plain bogs; rare. June-September. SC south to FL, west to LA; West Indies. [= F, FNA; < *E. microcarpa* – RAB, C, G, GW, K; = *E. microcarpa* – S]

Eleocharis montevidensis Kunth, Sand Spikerush. Cp (GA, NC, SC): maritime wet grasslands, ponds, swales, ditches; rare (GA Special Concern, NC Rare). July-September. E. NC south to FL, west to TX and CA; Mexico, South America. Reported for SC by Nelson & Kelly (1997) and discussed for GA by Carter, Baker, & Morris (2009). [= RAB, FNA, GW, K]

Eleocharis nigrescens (Nees) Steudel. Cp (SC): pond margins, flatwoods; rare. SC to FL; West Indies, Mexico; South America; Africa. [= FNA, GW, K; *? E. setifolia* (A. Richard) Raynal; < *E. microcarpa* – RAB; *? E. carolina* Small – S]

Eleocharis obtusa (Willdenow) J.A. Schultes. Cp (DE, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): ditches, marshes, disturbed wet areas; common. June-October. NS west to BC, south to FL, TX, and CA. [= FNA, G, GW, K, S, WV; < *E. ovata* – RAB, C; > *E. obtusa* var. *obtusa* – F, Pa; > *E. obtusa* var. *ellipsoidalis* Fernald – F; > *E. obtusa* var. *jejuna* Fernald – F; > *E. obtusa* var. *peasei* Svenson – Pa]

Eleocharis olivacea Torrey *var*. ***olivacea***. Cp (DE, GA, NC, SC, VA): Coastal Plain ponds, pools; common (uncommon in GA, NC, SC, VA). June-September. NS west to MN, south to FL and TX. [= K; < *E. flavescens* – RAB; < *E. flavescens* (Poiret) Urban var. *olivacea* (Torrey) Gleason – C, FNA, G; < *E. olivacea* – F, GW, Pa, S; ? *E. flaccida* (Reichenbach) Urban – S]

Eleocharis olivacea Torrey *var*. ***reductiseta*** (Schuyler & Ferren) Schuyler & Ferren. Tidal rivers. Endemic to s. NJ (as far as is known). [= K; < *E. flavescens* (Poiret) Urban var. *olivacea* (Torrey) Gleason – C, FNA, G; < *E. olivacea* – F]

Eleocharis palustris (Linnaeus) Roemer & J.A. Schultes, Small's Spikerush. Cp (DE, VA), Pd (DE, VA), Mt (NC, WV), {SC}: marshes; common (uncommon in VA and WV, rare in NC). June-September. NL (Labrador) west to AK, south to FL, TX, CA, and Mexico; Eurasia. As discussed by Smith et al. in FNA (2002b), variable in geographically correlated ways and probably warranting recognition of varieties or segregate species. *E. smallii* is sometimes separated as the eastern North American member of the north temperate *E. palustris* complex. [= FNA, G, K, Pa; < *E. palustris* – RAB, C; > *E. smallii* Britton – F, WV; > *E. palustris* var. *palustris* – F; > *E. palustris* var. *major* Sonder – F]

Eleocharis parvula (Roemer & J.A. Schultes) Link ex Bluff, Nees, & Schauer, Little-spike Spikerush. Cp (DE, GA, NC, SC, VA), Pd (GA, NC, SC), Mt (VA): tidal brackish and freshwater marshes, shallow waters of managed impoundments; common (rare in GA, NC, SC, and VA). July-September. NS, NL (Newfoundland), and MI south to FL and LA; BC south to CA; Mexico, Central America, South America, Eurasia, Africa. [= RAB, FNA, G, GW, K, Pa; = *E. parvula* var. *parvula* – C, F]

Eleocharis quadrangulata (Michaux) Roemer & J.A. Schultes. Cp (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV), Pd (GA, NC, SC, VA): pools, marshes; common (uncommon in GA, NC, SC, VA, and WV). June-September. MA west to ON and MI, south to n. FL and TX. [= RAB, C, FNA, GW, K, Pa, S, WV; > *E. quadrangulata* var. *quadrangulata* – F, G; > *E. quadrangulata* var. *crassior* Fernald – F, G]

Eleocharis radicans (A. Dietrich) Kunth, Rooting Spikerush. Cp (VA), Mt (WV): {habitat}; rare (VA Rare). Widely scattered in North America; n. Mexico, West Indies, Central America, South America. [= C, F, FNA, G, GW, K]

Eleocharis robbinsii Oakes, Robbins Spikerush. Cp (DE, GA, NC, SC, VA), Mt (VA): quiet waters of limesink (doline) ponds, natural lakes; uncommon (rare in GA, NC, SC, VA). July-August. NS and NB west to ON, south to s. MS (Sorrie & Leonard 1999); also near the Great Lakes, from NY west to IN, WI, and MN. [= C, F, FNA, G, GW, K, Pa, RAB, S]

Eleocharis rostellata (Torrey) Torrey, Beaked Spikerush. Cp (DE, NC, VA), Mt? (WV?), {GA?, SC}: brackish and freshwater tidal marshes; uncommon (rare in NC and VA). July-September. ME, ON, and BC south to FL, TX, CA and Mexico; West Indies. Reported for WV (Harmon, Fort-Werntz, & Grafton 2006). [= C, F, FNA, G, GW, K, Pa, RAB]

Eleocharis tenuis (Willdenow) J.A. Schultes *var*. ***pseudoptera*** (Weatherby ex Svenson) Svenson. Pd (DE), {NC, VA}: bogs; common (rare in NC and VA?). June-September. NS, QC and IN south to NC, GA, and LA. [= C, F, FNA, G, K, PA; < *E. tenuis* – RAB; = *E. elliptica* Kunth var. *pseudoptera* (Weatherby ex Svenson) L. Harms; < *E. capitata* (Linnaeus) R. Brown – S]

Eleocharis tenuis (Willdenow) J.A. Schultes *var*. ***tenuis***, Slender Spikerush, Kill-cow. Mt (WV), Cp (DE), Pd (DE), {GA, NC, SC, VA}: bogs, marshes; common (uncommon in DE). June-September. NS and QC south to SC and LA. [= C, F, FNA, G, K, Pa; < *E. tenuis* – RAB; < *E. capitata* (Linnaeus) R. Brown – S]

Eleocharis tenuis (Willdenow) J.A. Schultes *var*. ***verrucosa*** (Svenson) Svenson. Cp, Pd (GA, SC, VA): bogs; uncommon, rare in Piedmont (GA Special Concern, VA Watch List). June-September. PA, WI, and SD south to GA, LA, TX. [= C, F, FNA, G, K, PA; = *E. verrucosa* (Svenson) E. Harms – GW; < *E. capitata* (Linnaeus) R. Brown – S]

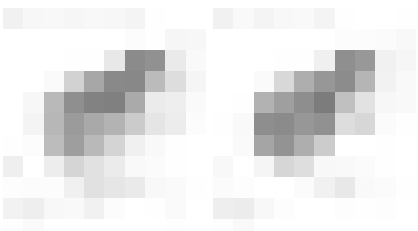
Eleocharis tortilis (Link) J.A. Schultes, Twisted Spikerush. Cp (DE, GA, NC, SC, VA): wet pine savannas, Coastal Plain seepage bogs, seeps, pocosin ecotones; common. July-September. NJ south to FL, west to TX, inland to TN and AR. [= RAB, C, F, FNA, G, GW, K; ? *E. simplex* (Elliott) A. Dietrich – S]

Eleocharis tricostata Torrey, Three-angle Spikerush. Cp (DE, GA, NC, SC, VA), Pd (NC): wet pine savannas, bogs; uncommon (rare in DE, NC, and VA). July-September. MA, NY, and MI south to FL and AL. [= C, F, FNA, G, GW, K, Pa, RAB, S]

Eleocharis tuberculosa (Michaux) Roemer & J.A. Schultes. Cp (DE, GA, NC, SC, VA), Pd (GA, NC, SC), Mt (NC, VA): bogs, savannas, ditches; common (rare in Piedmont and Mountains). June-September. NS south to FL, west to TX. [= C, F, FNA, G, GW, K, Pa, RAB, S]

Eleocharis vivipara Link, Viviparous Spikerush. Coastal Plain ponds. July-September. NC south to FL, west to LA. [= RAB, C, F, FNA, GW, K, S; > *E. vivipara* – S; > *E. curtisii* Small]

Eleocharis wolfii (A. Gray) A. Gray ex Britton. Shallow ephemeral pools on granitic flatrocks. OH, WI, MN, and ND south to GA, AL, TN, LA, and TX. [= F, FNA, C, G, K] {not yet keyed}



Eleocharis bifida S.G. Smith, Cedar Glade Spikerush. Mt (GA): seasonally wet seepage in limestone cedar glades; rare. KY south through TN to nw. GA and n. AL. [= FNA; < *E. compressa* of many earlier authors] {not yet keyed; synonymy incomplete}

Eleocharis lanceolata Fernald, Ozark Spikerush. MO and KS south to LA and TX; disjunct in c. TN. [= FNA, K] {not yet keyed}

Eleocharis macrostachya Britton. Mt (WV): {habitats}; rare in WV. QC to AK south to WV, AL, MS, TX, CA, and Mexico; South America. [= FNA, K; < *E. palustris* – C] {not yet keyed; add to synonymy}

Eleocharis minima Kunth. {GA}. MD, FL, TX; West Indies, Central America, South America, Asia, Australia (FNA). Reported from specimens from sc. GA (Sorrie, pers. comm.). [= FNA, K; ? *E. uncialis* Chapman – S] {not yet keyed; add to synonymy }

Eleocharis montana (Kunth) Roemer & J.A. Schultes. Cp (GA): ponds, swales; rare. Se. and Sw. GA west to TX, south to Mexico, Central America, and South America; West Indies. [= FNA, K; > *E. nodulosa* (Roth) Schultes – S; > *E. montana* var. *nodulosa* (Roth) Svenson] {not yet keyed}

Eleocharis ovata (Roth) Roemer & J.A. Schultes. {VA} NL (Labrador), ON, and MN south to NJ, MD, DE, PA, VA, KY, MO, and OK; scattered in w. United States. Reported for VA in FNA; documentation needing verification. [= F, FNA, G, K; < *E. ovata* – C] {keyed}

Eriophorum Linnaeus (Cottongrass, Cottonsedge, Bogwool)

A genus of about 20 species, herbs, primarily north temperate, boreal, and arctic. References: Ball & Wujek in FNA (2002b); Goetghebeur in Kubitzki (1998b).

1 Foliaceous bracts (subtending the head of spikelets) 2 or 3, spreading, the inflorescence therefore appearing terminal.
  2 Blade of the uppermost leaf on the stem much shorter than its sheath ..... ***E. gracile***
  2 Blade of the uppermost leaf on the stem as long as the sheath or longer ..... ***E. tenellum***
1 Foliaceous bract (subtending the head of spikelets) solitary, erect, appearing as a continuation of the culm, the inflorescence therefore appearing lateral.
  3 Scales (subtending the flower) prominently 3-7-nerved ..... ***E. virginicum***
  3 Scales (subtending the flower) 1-nerved ..... ***E. viridicarinatum***

Eriophorum gracile W.D.J. Koch ex Roth, Slender Cottongrass. Bogs and open swamps. May. Circumboreal, in North America from NL (Labrador) west to AK, south to s. PA (Rhoads & Block 2007), s.NJ, w. MD (C. Frye, pers comm. 2000), DE (McAvoy & Bennett 2001), OH, IN, IL, MN, CO, UT, NV, and CA. [= C, F, FNA, G, Pa; > *E. gracile* var. *gracile* – K]

Eriophorum tenellum Nuttall, Conifer Cottongrass. Bogs. June-September. NL (Newfoundland) west to MN, south to s. NJ, se. PA (Rhoads & Block 2007), IL, and MI. [= C, FNA, G, K, Pa; > *E. tenellum* var. *tenellum* – F]

Eriophorum virginicum Linnaeus, Tawny Cottongrass. Peaty sites, limited in habitat throughout the region, occurring in the Mountains in bogs and fens, in the Piedmont (formerly) in bogs, in the fall-line sandhills in burned-out pocosins, in the Coastal Plain in pocosins, acidic seeps, and peat-burn pools. June-September. NL (Labrador) and NL (Newfoundland) west to ON and MN, south to se. NC, sw. NC, e. KY; disjunct in se. GA at Okefenokee Swamp. Very variable in size, from 5-15 dm tall, with heads ranging from 1-6 cm in diameter, the larger plants primarily in the Coastal Plain and the smaller in the Mountains. [= C, F, FNA, G, GW, K, Pa, RAB, S, W, WV]

Eriophorum viridicarinatum (Engelmann) Fernald, Darkscale Cottongrass. Bogs. May-August. NL (Newfoundland and Labrador) west to AK, south to s. NJ, PA, OH, IN, IL, MN, ND, WY, ID, and WA; reported by Small (1933) for farther south, apparently in error. [= C, FNA, K, Pa; = *E. viridi-carinatum* – F, G, orthographic variant]

Fimbristylis Vahl 1806 (Fimbry)

A genus of about 250-300 species, herbs, primarily warm temperate and tropical. References: Kral (1971)=Z; Kral in FNA (2002b); GW; Goetghebeur in Kubitzki (1998b). Key largely adapted from Z.

1 Style branches 3; achene trigonous or terete; plant an annual.
  2 Achene trigonous; spikelets linear-oblong to lanceolate, 3-7 mm long; ligule present, as a line of short, pale hairs ..... ***F. autumnalis***
  2 Achene terete; spikelets subglobose to ovoid, 2-4 mm long; ligule absent ..... ***F. littoralis***
1 Style branches 2; achene lenticular or terete; plant an annual or perennial.
  3 Plants diminutive annuals, the culms 1-6 (-15) cm tall.
    4 Achene cylindrical, 2-4× as long as wide, curved like a tiny banana; inflorescence bracts 1-2 cm long ..... ***F. perpusilla***
    4 Achene obovate, 1-1.5× as long as wide, not curved; inflorescence bracts 4-10 cm long ..... ***F. vahlii***
  3 Plants small to large annuals or perennials, the culms (6-) 15-150 cm tall.
    5 Plant a medium-sized to robust perennial, the culms generally 5-15 dm tall, either cespitose, with a hardened base, and deeply set in the substrate, or rhizomatous, the rhizomes either slender or thick
      6 Plant cespitose, lacking rhizomes; bases of leaves hard, leathery, dark brown, deeply set in the substrate, the base of the plant generally 5-15 cm below the ground surface; achene (1.3-) 1.5-2 mm long ..... ***F. castanea***
      6 Plant rhizomatous, the rhizomes either thick and knotty or slender and scaly (rarely with both); bases of leaves often somewhat thickened, hardened, and brownish, the base of the plant not especially deeply set; achene 0.8-1.2 (-1.3) mm long.
        7 Plant a robust perennial to 15 (-20) dm tall, with elongate, slender, scaly, pale-to-reddish rhizomes (excavate carefully); leaves usually flat or keeled, 2-5 mm wide; stem usually flattened and scabrous-edged above; ligule a line of short, pale hairs ..... ***F. caroliniana***

7 Plant a medium-sized perennial to 10 dm tall, rhizomatous, the rhizomes short, thick, and knotty (rarely also with slender rhizomes); leaves usually involute, ca. 1 mm wide; stem usually terete or oval in cross-section, smooth; ligule absent or poorly developed..... ***F. puberula*** *var.* ***puberula***

5 Plant a small to medium-sized annual or perennial, the culms to 8 dm tall, neither rhizomatous (except *F. brevivaginata*) nor with a hardened base deeply set in the substrate.

8 Spikelets pale, usually solitary (-3) on the scape (and thus appearing somewhat like an *Eleocharis*)..... ***F. schoenoides***

8 Spikelets dark, usually in a complex inflorescence.

9 Face (one side) of the achene with 15 or more longitudinal rows of rounded pits, the achene margin noticeably paler. ***F. tomentosa***

9 Face (one side) of the achene with 13 or fewer longitudinal rows of rectangular pits, the achene margin not noticeably paler.

10 Plant a perennial; leaves spreading, 2-5 mm wide; achenes lacking warts.

11 Plant bulbous at base, and also with scale-covered short rhizomes; spikelet scales glabrous or puberulent; [plant a rare native of rock outcrops in GA and AL]..... ***F. brevivaginata***

11 Plant neither bulbous nor rhizomatous; spikelet scales glabrous; [plant weedy, probably introduced in North America]..... ***F. dichotoma***

10 Plant an annual; leaves spreading or ascending, 1-4 mm wide; achenes with or without warts.

12 Achenes lacking warts or with warts scattered over the entire surface; primary rays of umbel spreading or ascending, the inflorescence generally longer than broad; leaves relatively soft ..... ***F. annua***

12 Achenes with a few low warts on the edges; primary rays of umbel stiffly spreading (even deflexed), the inflorescence therefore often as broad as long or broader; leaves relatively hard, broad (averaging 2 mm wide), and spreading subdistichously..... ***F. decipiens***

*? ***Fimbristylis annua*** (Allioni) Roemer & J.A. Schultes. Wet, disturbed areas, thin soils of rock outcrops; variously interpreted as entirely alien or partly native. July-September. SE. PA, WV, s. IN, s. IL, MO, e. KS, south to n. peninsular FL, s. TX, s. AZ, and south through Mexico to Central and South America; West Indies; Eurasia, Africa, etc. [= C, FNA, G, GW, K, Pa, W, Z; < *F. dichotoma* – RAB; *? F. baldwiniana* (J.A. Schultes) Torrey – F, S]

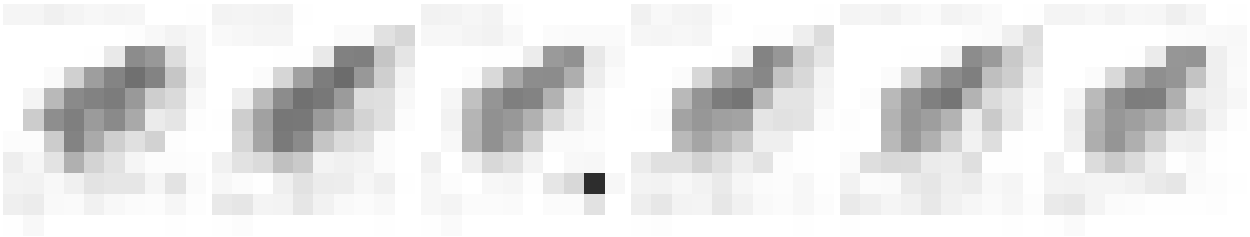
Fimbristylis autumnalis (Linnaeus) Roemer & J.A. Schultes. Moist to wet disturbed areas. June-October. ME west to MN and SD and south to s. FL and TX; New World tropics. [= C, FNA, G, GW, K, Pa, RAB, W, Z; > *F. autumnalis* var. *autumnalis* – F; > *F. autumnalis* var. *mucronulata* (Michaux) Fernald – F, WV; > *F. autumnalis* – S; > *F. geminata* (Nees) Kunth – S]

Fimbristylis brevivaginata Kral, Flatrock Fimbry. Pools and seepage over granite. Endemic to Piedmont of GA (on granite) and Cumberland Plateau of AL (on sandstone) (Kral 1992). See Kral (1992) for details. [= FNA, K]

Fimbristylis caroliniana (Lamarck) Fernald. Brackish or alkaline sands of marsh edges and dune swales, less typically in savannas or pine flatwoods. July-September. NJ south to s. FL and west and south to TX and the Yucatan Peninsula; West Indies. This species often grows in proximity to *F. castanea*, which, however, occupies the brackish marsh itself. [= C, F, FNA, G, GW, K, Z; < *F. spadicea* (Linnaeus) Vahl – RAB; > *F. harperi* Britton ex Small – S]

Fimbristylis castanea (Michaux) Vahl. Brackish marshes and dune swales. July-September. NY (Long Island) south to s. TX and adjacent Mexico; Yucatan peninsula; West Indies. Replaced in most of the New World tropics by the related *F. spadicea*. [= C, F, FNA, G, GW, K, S, Z; < *F. spadicea* (Linnaeus) Vahl – RAB]

Fimbristylis decipiens Kral. Wet, disturbed areas. July-September. E. NC south to n. FL and west to e. TX. [= FNA, GW, K, Z]



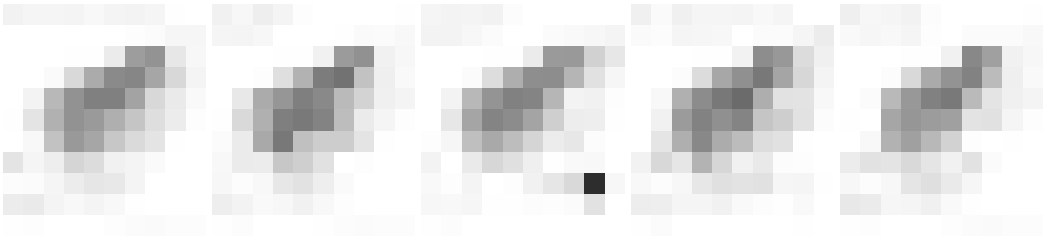
* ***Fimbristylis dichotoma*** (Linnaeus) Vahl. Wet, disturbed areas; presumably introduced, probably native of Asia. July-September. The species is now pantropical and subtropical. [= FNA, GW, K, Z; < *F. dichotoma* – RAB (also see *F. annua* and *F. tomentosa*); *? F. diphylla* (Retzius) Vahl – S]

* ***Fimbristylis littoralis*** Gaudichaud. Disturbed wet ground; native of Asia. July-September. Kral (1971) suggests that it may have been introduced into se. United States early, in association with rice. In North America, now ranging from Central America and the West Indies north to NC, KY, and AR. The name *F. miliacea* has been rejected as a nomen ambiguum (Brummitt 2005). [= K; = *F. miliacea* (Linnaeus) Vahl – RAB, C, FNA, GW, S, W, Z, misapplied?]

Fimbristylis perpusilla R.M. Harper ex Small & Britton, Harper's Fimbry. Drawdown zones of natural depression ponds or exposed banks of blackwater rivers. July-September. The "range" consists of geographically scattered and "irregularly apparent" populations, usually on the drawdown zones of natural ponds or rivers, in the Coastal Plain from DE and e. MD south through e. VA, se. NC, and ne. SC, to sw. GA, disjunct in the Cumberland Plateau of se. TN (Wofford & Jones 1988) and KY (Boone & Chester 2009). See Leonard (1981a, 1981b, 1987) for the first reports of the species in SC and NC. The species characteristically occurs on dry to moist banks exposed in summer by falling water levels, often with other diminutive annuals, such as *Hemicarpha micrantha*, *Oldenlandia uniflora*, *Juncus repens*, *Lindernia dubia*, *Eleocharis baldwinii*, and *Eragrostis hypnoides*. At known locations it does not appear every year; presumably it is present in a seedbank which germinates only under favorable hydrologic (and other?) conditions. [= C, FNA, GW, K, S, Z]

Fimbristylis puberula (Michaux) Vahl *var.* ***puberula***. Savannas, pine flatwoods, bogs, wet meadows or prairie-like areas, granite outcrops. July-September. Var. *puberula* ranges from Long Island, NY south to s. FL and west to TX, KS, and NE; var. *interior* (Britton) Kral ranges from NE south to TX and west to NM and AZ. [= C, FNA, K, Pa, Z; < *F. spadicea* (Linnaeus) Vahl – RAB, W; *? F. drummondii* (Torrey & Hooker) Böckler – F; > *F. puberula* – GW, S; > *F. anomala* Böckler – S]

* ***Fimbristylis schoenoides*** (Retzius) Vahl. Disturbed wetlands; native of Asia. Reported for sw. GA (Jones & Coile 1988) and also occurs in se. GA (B. Sorrie, pers. comm.). Also recently reported for Ocracoke Island, Hyde County, NC (Sorrie & LeBlond 2008). [= FNA, GW, K]



* ***Fimbristylis tomentosa*** Vahl. Wet, disturbed areas; presumably introduced, probably native of e. and se. Asia. July-September. Ranging north to NC, e. TN, and AR. [= FNA, GW, K, Z; < *F. dichotoma* – RAB]

Fimbristylis vahlii (Lamarck) Link. On exposed silty or clayey sediments. July. Primarily from MO south to MS and e. TX, but with scattered outliers as far away as NJ, SC (?), IL, and KS; also in western United States, Mexico, Central America. Note that the basis of the SC record is uncertain, and may be based on a misidentification of *F. perpusilla*. [= RAB, C, F, FNA, G, GW, K, S, Z]

Fuirena Rottbøll (Umbrella-sedge)

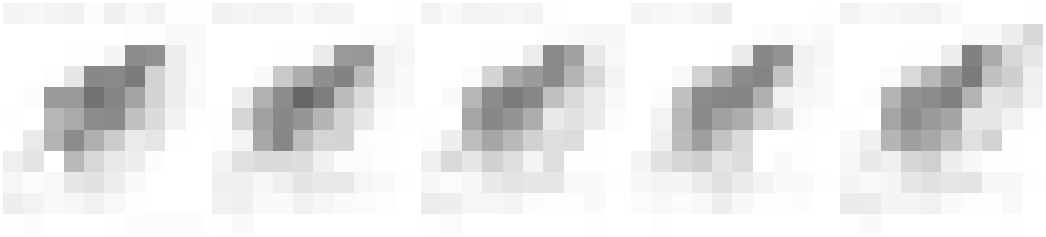
A genus of about 30 species, herbs, primarily in Africa and America, in tropical and warm temperate regions. References: Kral (1978a)=Z; Kral in FNA (2002b); Goetghebeur in Kubitzki (1998b).

1 Sheaths of leaves glabrous, the largest leaf blades 0-2 (-5) cm long; plant strongly rhizomatous, the culms usually about 10 cm apart.
  2 Blades of culm leaves <5 cm long; spikelets mostly lance-ovoid, sessile in terminal clusters and also often with additional sessile or peduncled clusters lower on the culm; involucral bract longer than the spikelets ..... ***F. longa***
  2 Blades of culm leaves very short (< 0.5 cm long); spikelets mostly ovoid, sessile in terminal clusters; subtending involucral bract shorter than the spikelets ..... ***F. scirpoidea***
1 Sheaths of leaves sparsely to densely hirsute, the largest leaf blades 10-15 cm long; plant more-or-less cespitose, annual or perennial, if perennial the rhizomes short and cormlike, the culms usually arising together.
  3 Perianth bristles no longer than the achene stipe (not nearly reaching halfway up the achene body), without barbs (sometimes very finely toothed, the teeth ascending); blades of the perianth scales with a blunt or short-apiculate apex ..... ***F. breviseta***
  3 Perianth bristles longer than the achene stipe, reaching the middle of or exceeding the achene body, strongly and retrorsely barbed; blades of the perianth scales with an acuminate to awned apex.
    4 Perianth bristles reaching 1/2 to 3/4 the length of the achene body; anthers about 1.0 mm long; blades of the perianth scales mostly acuminate; perennial ..... ***F. squarrosa***
    4 Perianth bristles as long as or exceeding the achene body; anthers about 0.5 mm long; blades of the perianth scales mostly awned or bearing a subapical bristle; annual
      5 Blades of the perianth scales acuminate, narrowed into an awn ..... ***F. pumila***
      5 Blades of the perianth scales rounded, retuse, or rarely acute at the tip, bearing a subapical bristle which is retrorsely barbed ..... ***F. simplex*** *var.* ***aristulata***

Fuirena breviseta (Coville) Coville in R.M. Harper, Short-bristled Umbrella-sedge. July-October. Carolina bays, savannas, ditches, other wet habitats. A Southeastern Coastal Plain endemic: se. VA south to s. FL and west to e. TX, primarily in the outer Coastal Plain. [= C, F, FNA, G, GW, K, S, Z; < *F. squarrosa* – RAB]

Fuirena longa Chapman, Chapman's Umbrella-sedge. Pond margins. Panhandle FL and sw. GA west to e. TX. Possibly a hybrid derivative of *F. breviseta* and *F. scirpoidea*. [= FNA, GW, K, S, Z]

Fuirena pumila (Torrey) Sprengel, Dwarf Umbrella-sedge. Depression ponds, savannas, ditches, other wet habitats. July-October. Primarily a species of the Southeastern Coastal Plain, ranging from se. MA south to s. FL and west to TX, and also disjunct in the lowlands around the Great Lakes (as in n. IN and s. MI). [= RAB, C, F, FNA, G, GW, K, Z; = *F. squarrosa* – S, misapplied]



Fuirena scirpoidea Michaux, Southern Umbrella-sedge. Natural lakes, pineland depression ponds, wet savannas. July-October. A Southeastern Coastal Plain endemic: se. GA (Jones & Coile 1988; Carter, Baker, & Morris 2009) and FL, west to se. TX, also in Cuba and apparently disjunct (or introduced?) in ne. NC and s. IL. Kral's (1978a) report of this species from ne. NC, where disjunct from the main body of the range in the deep South, needs further investigation. [= C, FNA, G, GW, K, S, Z]

Fuirena simplex Vahl *var.* ***aristulata*** (Torrey) Kral. Moist open areas. July-October. MO and NE south to w. KY, e. LA, and c. TX. [= FNA, K, Z; < *F. simplex* – GW]

Fuirena squarrosa Michaux, Hairy Umbrella-sedge. Savannas, seepages, streamhead pocosins, ditches, bogs, other wet habitats. July-October. NY (Long Island) south to n. FL, west to c. TX, inland to w. NC, w. TN, KY, s. AR, and se. OK, mainly on the Coastal Plain, but less strictly limited to it than our other species. [= C, F, FNA, G, GW, K, W, Z; < *F. squarrosa* – RAB; = *F. hispida* Elliott – S]

Isolepis R. Brown (Club-rush)

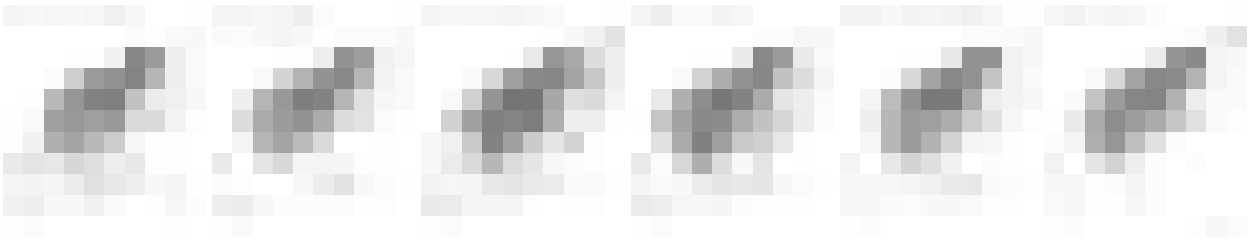
A genus of about 60 species, herbs, subcosmopolitan in distribution. Since *Isolepis* is more closely related to *Cyperus* than to *Scirpus*, in which it has often been included, its separation from *Scirpus* is clearly warranted. The generic delimitation of *Isolepis* in relation to *Ficinia* and *Scirpoides* is uncertain. References: Smith in FNA (2002b); Goetghebeur in Kubitzki (1998b).

1 Achenes 1.0-1.5 mm long; scales in middle of spikelet 1.8-2.0 mm long, with a short awn ..... ***I. carinata***
1 Achenes 0.7-0.9 mm long; scales in middle of spikelet 1.0-1.2 mm long, mucronate..... ***I. pseudosetacea***

Isolepis carinata Hooker & Arnott ex Torrey. Moist soils adjacent to granitic flatrocks, seepage areas, ephemeral pools, moist sandy sites, low fields, ditches. May-June. C. NC, TN, and se. KS south to Panhandle FL and c. TX; also in CA. [= FNA, K; = *Scirpus koilolepis* (Steudel) Gleason – RAB, C, F, G, GW, WH; = *S. carinatus* (Hooker & Arnott ex Torrey) A. Gray – S (not *S. carinatus* Sm.); = *I. koilolepis* Steudel]

Isolepis pseudosetacea (Daveau) Gandoger. Altamaha grit outcrops, moist soils. E. GA (Carter, Baker, & Morris 2009) west to sw. MO, AR, and c. TX. This species often grows intermixed with *I. carinata* and may be more widespread in our area. [= FNA; ? *Isolepis molesta* (M.C. Johnston) S.G. Smith – K; ? *Scirpus molestus* M.C. Johnston]

* *Isolepis setacea* (Linnaeus) R. Brown. On waste and ballast at Camden, NJ and Philadelphia, PA in the 1800s. [= FNA, K] {not yet keyed}



Kyllinga Rottbøll (Greenhead Sedge)

A genus of about 60 species, pantropical to warm temperate, especially in Africa. References: Delahoussaye & Thieret (1967)=Z; Tucker (1987)=Y; Tucker (1984)=X; Tucker in FNA (2002b); Goetghebeur in Kubitzki (1998b).

1 Scale keel winged, laciniate; anthers ca. 2 mm long ..... ***K. squamulata***
1 Scale keel smooth or denticulate; anthers 0.2-1.1 mm long.
  2 Plant a rhizomatous perennial, mat-forming, the culms arising singly along the rhizome; anthers 0.8-1.1 mm long.
    3 Achene 1.0-1.2 (-1.3) mm long; scale keel denticulate or smooth; stamen 2 (rarely 1); longest inflorescence bract erect ..... ***K. brevifolia***
    3 Achene 1.5-1.8 mm long; scale keel smooth; stamens 2-3; longest inflorescence bract horizontal to slightly reflexed ..... ***K. gracillima***
  2 Plant a cespitose annual or perennial, the culms arising clumped; anthers 0.2-0.5 mm long.
    4 Mature achene purple black, with stipe and apiculus contrastingly light in color; achene obovate, 0.7-0.8 (-0.9) mm wide; scale keel denticulate or smooth ..... ***K. odorata***
    4 Mature achene uniformly tan or light brown, not bicolored; achene oblong, 0.4-0.6 (-0.7) mm wide; scale keel denticulate (very rarely smooth) ..... ***K. pumila***

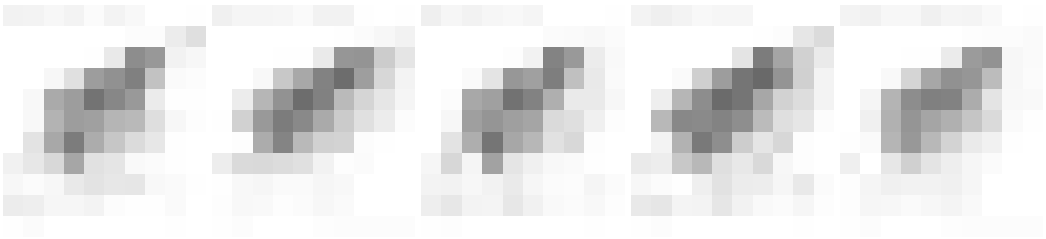
Kyllinga brevifolia Rottbøll, Perennial Greenhead Sedge. Moist soils of fields, ditches, lawns. June-September. Pantropical, north in North America to n. NC, se. OK, and CA. Likely to occur in s. VA. [= FNA, K, S, WH, X, Y; = *Cyperus brevifolius* – RAB, GW, Z; < *Cyperus brevifolius* (Rottbøll) Endlicher & Hasskarl – F, G]

* ***Kyllinga gracillima*** Miquel, Asiatic Greenhead Sedge. River sand bars, tidal marshes, tidal shores, moist soils of pastures and ditches; apparently introduced and native of e. Asia. See Bryson et al. (1996). *K. gracillima* Miquel (1866) appears to be the oldest valid combination in the genus *Kyllinga*, predating *K. brevifolioides* (Thieret & Delahoussaye) Tucker. Its distribution in North America is still somewhat obscure (because of confusion with *K. brevifolia*), but it is currently known from scattered locations in NC, SC, VA, CT, PA, MD, TN, AL, GA, NJ, DE, AR, MS, and KY. Reported for SC by Hill & Horn (1997), as *K. brevifolioides*. [= FNA, K; > *Cyperus brevifolioides* Thieret & Delahoussaye – RAB, C, GW, Pa, W, Z; < *C. brevifolius* (Rottbøll) Endlicher & Hasskarl – F; > *K. brevifolioides* (Thieret & Delahoussaye) Tucker – Y]

Kyllinga odorata Vahl, Whitehead Sedge. Moist soils of fields, ditches, lawns, shores of ponds and rivers, sand and gravel bars. July-September. Pantropical, north in North America to ne. NC and se. AR. Likely to occur in se. VA. [= K, S, WH, X, Y; = *Cyperus sesquiflorus* (Torrey) Mattfeld & Kükenthal – RAB, C, GW, Z]

Kyllinga pumila Michaux, Annual Greenhead Sedge. Moist soils of fields, ditches, lawns, shores of ponds and rivers. July-October. Pantropical, north in North America to e. PA, MO, and e. KS. [= K, S, WH, WV, X, Y; = *Cyperus tenuifolius* (Steudel) Dandy – RAB, C, F, G, GW, W, Z]

* ***Kyllinga squamulata*** Thonning ex Vahl, Crested Greenhead Sedge. Lawns, turf farms, athletic fields, golf courses, other disturbed areas; native of Asia. [= FNA, WH] {add to synonymy}



Lipocarpha R. Brown

A genus of about 35 species, herbs, pantropical and extending into warm temperate regions. Several recent authors have advocated submerging *Hemicarpha* in *Lipocarpha*, including Tucker (1987). References: Tucker (1987)=Z; Tucker in FNA (2002b); Goetghebeur in Kubitzki (1998b).

1 Spikes 2.5-10 (-12) mm long; anther ca. 0.5 mm long; stigmas 3 ..... ***L. maculata***
1 Spikes 2-5 (-8) mm long; anther 0.1-0.25 mm long; stigmas 2.
2 Culms 7-35 cm long; longest involucral bract spreading to reflexed; achenes 3.5-5× as long as wide ..... ***L. microcephala***
2 Culms 1-20 cm long; longest involucral bract more or less erect; achenes 1.5-2.5× as long as wide.
3 Scales about as long as the achene, with long awns ..... ***L. aristulata***
3 Scales reduced, shorter than the achene, awnless ..... ***L. micrantha***

*? ***Lipocarpha aristulata*** (Coville) G. Tucker. Moist ground; rare. Se. SC south to s. FL, west to the mw. and w. United States; the eastern occurrences may be adventive. [= FNA, K, WH, Z; = *Hemicarpha aristulata* (Coville) Smyth – F, GW; = *H. micrantha* var. *aristulata* Coville – C, G]

Lipocarpha maculata (Michaux) Torrey, American Lipocarpha. Ditches, moist exposed soil. July-September. Se. VA south to s. FL, west to AL. [= RAB, C, F, FNA, G, GW, K, S, WH, Z]

Lipocarpha micrantha (Vahl) G. Tucker. Riverbank draw-down zones, other moist sandy areas. July-August. ME west to ON and MN, south to s. FL and TX; south into tropical America. [= FNA, Pa, Z; = *Hemicarpha micrantha* (Vahl) Pax – RAB, F, GW, S; = *H. micrantha* var. *micrantha* – C; = *H. micrantha* var. *minor* (Schrader) Friedland – G; < *H. micrantha* – K, WH]

* ***Lipocarpha microcephala*** (R. Brown) Kunth. Cp (AL, FL?, GA): ditches; rare, native of Asia and Australia. [= FNA; < *H. micrantha* – K, WH]

Oxycaryum Nees

A monotypic genus of tropical and subtropical America and Africa. References: Bruhl in FNA (2002b).

* ***Oxycaryum cubense*** (Poeppig & Kunth) Palla, Cuban Bulrush. Swamps, marshes, ponds, ditches; aggressively weedy, probably adventive from the New World tropics. See Bryson et al. (1996) and Carter, Baker, & Morris (2009). [= FNA, K; = *Scirpus cubensis* Poeppig & Kunth – GW, S, WH] {not yet keyed}

Rhynchospora Vahl 1805 (Beaksedge, Beakrush)
(by Richard J. LeBlond)

A genus of about 250 species, subcosmopolitan, but concentrated in tropical and warm temperate America. See Thomas (1984) for the reasons for the inclusion of *Dichromena* in *Rhynchospora*. References: McMillan (2007)=Y; Gale (1944)=Z; Kral in FNA (2002b); Kral (1996, 1999); Goetghebeur in Kubitzki (1998b). Distributions given for tropical America are largely derived from Thomas (1992).

Identification notes: Measurements and descriptions of the achene are of the achene body only, *not* including the tubercle, unless otherwise indicated.

Key to groups

1 Tubercles 3-23 mm long; style simple or bifid only at the tip; [subgenus *Haplostylae*] ..... **Key A**
1 Tubercles < 3 mm long; style divided into 2 slender stigmatic branches; [subgenus *Diplostylae*].
2 Inflorescence bracts several, foliaceous, basally bright white, reflexed to horizontally spreading; [subgenus *Diplostylae*; section *Dichromena*] ..... **Key B**
2 Inflorescence bracts 0-several, capillary to foliaceous, green throughout (straminous in age), variously oriented.

3 Bristles present, plumose (at least proximally); [subgenus *Diplostylae*; section *Plumosae*] .....**Key C**
3 Bristles absent, or present and smooth or minutely barbed.
4 Bristles present, retrorsely barbed (at least distally), or antrorsely barbed and straplike (flattened); [subgenus *Diplostylae*; section *Albae*].....**Key D**
4 Bristles absent, or present and smooth, or antrorsely barbed and filiform.
5 Achene surface smooth, minutely pitted, or finely striate (not ridged, rugose, or reticulate); subgenus *Diplostylae*; sections *Chapmaniae*, *Fasciculares*, and *Fuscae*] .....**Key E**
5 Achene surface transversely ridged, rugose, or honeycombed-reticulate (sometimes faintly so); [subgenus *Diplostylae*; sections *Globulares*, *Harveyae*, *Mixtae*, *Psilocarya*, *Pusillae*, and *Rariflorae*] .....**Key F**

Key A - beaksedges with tubercles 3-23 mm long
[subgenus Haplostylae; sections Longirostres and Polycephalae]

1 Spikelets in 1-4 globose clusters; tubercle 3-5 mm long; leaf blades 2-8 mm wide; [section *Polycephalae*].....***R. tracyi***
1 Spikelets in > 4 paniculate or corymbose clusters; tubercle 10-23 mm long; leaf blades 6-20 mm wide; [section *Longirostres*].
2 Longest bristles shorter than the achene.
3 Achene 5.0-6.0 mm long, 2.8-3.3 mm wide.....***R. corniculata*** var. ***corniculata***
3 Achene 4.4-5.3 mm long, 2.4-2.8 mm wide.....***R. corniculata*** var. ***interior***
2 Longest bristles longer than or equaling the achene.
4 Plants cespitose; primary clusters with 10-50 (rarely 7 or fewer) densely clustered spikelets; achene (4.5-) 5-6 mm long.....***R. macrostachya***
4 Plants rhizomatous; primary clusters with 1-6 loosely clustered spikelets; achene (3.5-) 4.0-4.8 mm long.
5 Bristles 2-8 mm long, the central bristle longest on one face, shortest or absent on the other .....***R. careyana***
5 Bristles 7-12 mm long, essentially of equal length.....***R. inundata***

Key B - beaksedges with basally-white bracts (White-bracted Sedges) [subgenus *Diplostylae*; section *Dichromena*]

1 Inflorescence bracts 3-6 (-7); basal bract (1.4-) 2-5 mm wide, the white portion (2.5-) 9-25 mm long, tapering gradually into the green portion; rhizomes slender, straight, (0.6-) 0.7-1.7 (-2.1) mm in diameter; achene 1.0-1.2 mm wide; tubercle broadly truncate on achene.....***R. colorata***
1 Inflorescence bracts (5-) 6-10; basal bract 5-12 mm wide, the white portion 22-55 mm long, tapering abruptly into the green portion; rhizomes often bent and swollen at the nodes, 1.4-3.8 mm in diameter; achene 1.2-1.5 mm wide; tubercle decurrent on achene.....***R. latifolia***

Key C - beaksedges with plumose bristles [subgenus *Diplostylae*; section *Plumosae*]

1 Spikelets (4-) 5-8 mm long, borne singly or a few together in loose clusters, some or all spikelets on slender stalks; achene 1.7-2.6 mm long, 1.2-2.0 mm wide.
2 Achene obovoid, 1.7-2.0 mm long, 1.2-1.5 mm wide, the tubercle seated on its summit without a constriction or basal flange; longer bristles < ½ as long as the achene.....***R. galeana***
2 Achene broadly elliptic, 1.9-2.6 mm long, 1.5-2.0 mm wide, its summit constricted below a collar-like flange at the base of the tubercle; longer bristles three-fourths to exceeding the length of the achene .....***R. oligantha***
1 Spikelets 2-4 mm long, borne several to many in clusters, none of the spikelets on slender stalks; achene 1.3-2.2 mm long, 0.9-1.7 mm wide
3 Leaves 2-4 mm wide, slightly involute (V-shaped in ×-section); achene 2.0-2.2 mm long; [FL only] .....***R. pineticola***
3 Leaves 0.8-1.5 mm wide, strongly involute (and often appearing superficially terete); achene 1.3-1.8 mm long; [more widespread].....***R. plumosa***

Key D - beaksedges with bristles retrorsely barbed (at least distally)
or antrorsely barbed and straplike (flattened) [subgenus *Diplostylae*; section *Albae*]

1 Bristles 8-25, retrorsely barbed distally, antrorsely barbed proximally; spikelets white, turning tan with age.
2 Spikelets with 2-3 florets; bristles 8-12; achene 1.6-2.1 mm long, 0.9-1.3 mm wide .....***R. alba***
2 Spikelets with 1 floret; bristles 16-25; achene 2.0-2.4 mm long, 1.3-1.5 mm wide.....***R. macra***
1 Bristles 6 or fewer, either retrorsely or (rarely) antrorsely barbed their entire length; spikelets variously brown, rufous, or tan (or very rarely white).
3 Spikelets 1-fruited, the solitary achene terminating the axis; clusters 1-7, globose to turbinate.
4 Clusters globose to turbinate; achene (measured from base of bristles) 1.3-1.8 mm long, 0.65-0.95 mm wide; tubercle 0.7-1.6 mm long.
5 Clusters turbinate to hemispheric (rarely subglobose), the lowest spikelets usually spreading-ascending to spreading; larger leaves < 2 mm wide; achene 1.6-1.8 mm long; tubercle 1.0-1.6 mm long.....***R. chalarocephala***
5 Clusters globose to subhemispheric, the lowest spikelets usually reflexed; larger leaves > 2 mm wide; achene 1.3-1.6 mm long; tubercle 0.7-1.2 mm long.....***R. microcephala***
4 Clusters globose to hemispherical; achene (measured from base of bristles) 1.8-2.6 mm long, 1.1-1.8 mm wide; tubercle 1.4-2.4 mm long.
6 Achene 1.1-1.2 mm wide, 1.8 mm long.....***R. cephalantha*** *var.* ***attenuata***
6 Achene 1.2-1.8 mm wide, 2.1-2.6 mm long.....***R. cephalantha*** *var.* ***cephalantha***
3 Spikelets 1-5 fruited (if 1-fruited, then the axis terminated by a sterile floret); clusters 2-many, ovoid to turbinate (rarely globose).
7 Clusters numerous, usually 20 or more; tubercle 1.3-1.8 mm long; achene 1.1-1.4 mm wide, 1.5-2.0 mm long, the summit narrowly truncate, the faces umbonate, the margin thickened and wire-like; leaves 2.5-7 mm wide .....***R. glomerata*** var. ***glomerata***
7 Clusters 2-8; tubercle 0.4-1.2 mm long; achene 0.6-1.2 mm wide, 1.1-2.0 mm long, the summit more rounded than truncate, the faces lenticular, a wire-like margin narrow or not evident; leaves 0.2-3.5 mm wide.
8 Achene 0.6-0.8 mm wide, 1.1-1.3 mm long; tubercle 0.4-0.6 mm long; bristles more-or-less equaling the achene .....***R. knieskernii***

8 Achene 0.8-1.2 mm wide, 1.3-2.0 mm long; tubercle 0.8-1.6 mm long; bristles more-or-less equaling the tubercle.
9 Inflorescence typically with 1 terminal and 1 lateral cluster, the clusters ovoid, with 1-10 spikelets each; achene 1.8-2.0 mm long, 0.8-1.0 mm wide, 2-3 × as long as wide; leaves 0.2-0.4 mm wide ..... ***R. capillacea***
9 Inflorescence with 1-6 lateral clusters, the clusters turbinate with usually > 10 spikelets; achene 1.3-1.8 mm long, 0.9-1.2 mm wide, 1.5-2 × as long as wide; leaves 1.5-3.5 mm wide.
10 Longer bristles 0.4 mm shorter than to 0.3 mm longer than the tubercle; tubercle 0.9-1.4 (-1.6) mm long, on average 0.69× as long as achene body; glomerules 3-5 (-6), 6-13 mm wide; [widespread in our area] ..... ***R. capitellata***
10 Longer bristles 0.3-1.0 mm longer than the tubercle; tubercle 0.8-1.1 mm long, on average 0.57× as long as achene body; glomerules 4-8, 4-8 mm wide; [of the Coastal Plain] ..... ***R. leptocarpa***

Key E - beaksedges with bristles smooth, or antrorsely barbed and filiform, or absent, the achene surface smooth, minutely pitted, or finely striate
[subgenus Diplostylae; sections Chapmaniae, Fasciculares, and Fuscae]

1 Bristles 12; [section *Fasciculares*] ..... ***R. baldwinii***
1 Bristles 6 or fewer.
2 Leaves with a short taper at the tip, blunt to acute, but not long-acuminate; achene surface minutely pitted near the margin; [section *Chapmaniae*].
3 Basal leaves 4-6 mm wide, ciliate, rosulate; scales acuminate, the midrib ciliate; bristles 6, < ½ the length of the achene ..... ***R. ciliaris***
3 Largest basal leaves 2.5-3 mm wide, eciliate, not rosulate; scales aristate, the midrib eciliate; bristles 3-4, 1 or more equaling or exceeding the tubercle ..... ***R. solitaria***
2 Leaves long-acuminate at the tip; achene surface smooth or finely striate.
4 Bristles absent or 1-3 rudimentary; scales white to pale tan (or pale reddish-brown in *R. brachychaeta*); [section *Chapmaniae*].
5 Inflorescence composed of (1-) 2-3 turbinate to ellipsoid clusters; spikelets pale reddish-brown, (2.7-) 3-3.5 mm long; achenes usually 2 per spikelet ..... ***R. brachychaeta***
5 Inflorescence composed of 1 (-2) hemisphaeric to broadly turbinate cluster(s); spikelets white to pale brown, either 2-2.5 (-3) mm or (3.5-) 4-5.5 mm long; achenes 1 per spikelet.
6 Base of plant not bulb-like, not enclosed in bladeless sheaths; spikelets 2-2.5 (-3) mm long; achene 1.0-1.2 mm long, 0.8-1.0 mm wide ..... ***R. chapmanii***
6 Base of plant bulb-like, enclosed in bladeless sheaths; spikelets (3.5-) 4-5.5 mm long; achene 1.4-1.8 mm long, 1.2-1.5 mm wide ..... ***R. pallida***
4 Bristles present (if rudimentary, then 4-6); scales tan, rufous, or brown.
7 Achene 0.6-1.1 mm wide, pyriform, obovoid, or narrowly elliptic, pale to dark brown but not blackish; tubercle margin setose (smooth in *R. species 1*).
8 Inflorescence of 1 cluster; tubercle 0.3-0.4 mm long, the margin smooth ..... ***R. species 1***
8 Inflorescence of (1-) 2-4 (-10) clusters; tubercle 0.4-1.4 mm long, the margin setose; [section *Fuscae*].
9 Achene narrowly elliptic or narrowly obovoid, 1.2-1.5 mm long by 0.6-0.7 mm wide, twice as long as wide; tubercle 0.8-1.2 mm long ..... ***R. curtissii***
9 Achene broadly elliptic to obovoid or pyriform, < 2× as long as wide; tubercle 0.4-1.5 mm long.
10 Leaves 2-4 (-5) mm wide; stipe subtending achene 0.5-1.0 mm long ..... ***R. crinipes***
10 Leaves 0.2-1.5 (-2) mm wide; stipe subtending achene < 0.4 mm long.
11 Leaves to 1.5 (-2) mm wide; achene 1.0-1.7 mm long, 0.9-1.1 mm wide; tubercle 0.5-1.5 mm long.
12 Culms solitary to loosely cespitose by slender rhizomes; terminal internode straight; clusters turbinate to ovoid; achene 1.0-1.3 mm long, uniformly medium to dark brown; tubercle 0.7-1.5 mm long; bristles usually of two lengths, some equaling the tubercle, and some equaling or shorter than the achene ..... ***R. fusca***
12 Culms solitary to cespitose, without slender rhizomes; terminal internode often arched; clusters corymbose to hemispheric; achene 1.3-1.7 mm long, pale to reddish-brown, often translucent centrally, with a distinctly thickened wire-like margin; tubercle 0.5-1.0 mm long; all bristles more-or-less equaling the tubercle ..... ***R. harperi***
11 Leaves filiform, < 1 mm wide; achene 0.8-1.3 mm long, 0.6-0.9 mm wide; tubercle 0.4-0.8 mm long.
13 Culms without rhizomes; spikelets 2.5-4 mm long; achene translucent centrally; tubercle 0.4-0.6 mm long ..... ***R. filifolia***
13 Culms with delicate rhizomes; spikelets 5-7 mm long; achene uniformly opaque; tubercle 0.6-0.8 mm long ..... ***R. pleiantha***
6 Achene > 1 mm wide (except 0.8 mm wide in *R. fernaldii* with a blackish surface), suborbicular or broadly ellipsoid; tubercle margin smooth or roughened but not setose; [section *Fasciculares*].
14 Achene 0.8 mm wide, 0.9-1.0 mm long, blackish ..... ***R. fernaldii***
14 Achene 1.1-1.7 mm wide, 1.3-2.0 mm long, brown to dark brown.
15 Tubercle 1.0-2.6 mm long, long-attenuate to subulate ..... ***R. gracilenta***
15 Tubercle 0.2-0.8 mm long, triangular to triangular-attenuate or with a strap-like beak.
16 Bristles rudimentary to ½ as long as the achene body.
17 Larger leaves to 1 mm wide; mature culms to 4.5 dm long; floral fascicles 1 (-2); tubercle 0.2-0.5 mm long ..... ***R. debilis***
17 Larger leaves 2-4 mm wide; mature culms to 13 dm long; floral fascicles (1-) 2-4; tubercle 0.4-0.7 mm long ..... ***R. fascicularis***
16 Bristles > ½ as long to exceeding the achene body.
18 Basal leaves filiform to (rarely)1.3 mm wide, the longer approaching length of culm; tubercle narrowed above the base into a strap-like beak ..... ***R. wrightiana***
18 Basal leaves 1.3-4 mm wide, all much shorter than the culm; tubercle triangular to triangular-attenuate.
19 Longer bristles equaling to exceeding the achene body; achene body elliptic, 1.1-1.3 mm wide; tubercle triangular-attenuate; larger basal leaves 1.3-2.5 mm wide ..... ***R. distans***
19 Longer bristles < ½ as long to rarely exceeding achene body; achene suborbicular, 1.2-1.5 mm wide; tubercle triangular; larger basal leaves 2-4 mm wide ..... ***R. fascicularis***

Key F – beaksedges with bristles smooth, or antrorsely barbed and filiform, or absent,

the achene surface transversely ridged, rugose, or honeycombed-reticulate
[subgenus Diplostylae; sections Globulares, Harveyae, Mixtae, Psilocarya, Pusillae, Rariflorae]

1 Bristles absent (or apparently so at 10×); achene 0.5-0.7 mm wide; tubercle 0.1-0.2 mm long, skull-cap like; [section *Pusillae*].
2 Achene including tubercle 1.0-1.2 mm long, the achene surface evidently reticulate and obscurely transversely ridged, the body ellipsoid; bristles present, white, barely visible at 20×, the longest shorter than the achene body ..... ***R. thornei***
2 Achene including tubercle 0.6-0.9 mm long, the body obovoid; bristles absent.
3 Achene surface smooth, faintly reticulate, not transversely ridged ..... ***R. divergens***
3 Achene surface rough, distinctly transversely ridge ..... ***R. pusilla***
1 Bristles present or absent; if absent, then the achene > 1 mm long or > 0.7 mm wide, and tubercle triangular to subulate.
4 Culms and leaves filiform.
5 Achene including tubercle 1.0-1.2 mm long; tubercle minute, skullcap-like; [section *Pusillae*] ..... ***R. thornei***
5 Achene including tubercle 1.5-2.9 mm long; tubercle triangular to triangular-acuminate; [section *Rariflorae*].
6 Bristles subequaling to exceeding the tubercle; tubercle 0.75-1.4 mm long ..... ***R. stenophylla***
6 Bristles shorter than the achene body; tubercle 0.3-1.0 mm long.
7 Achene 1.3-1.6 mm long, 0.9-1.4 mm wide; tubercle 0.3-0.6 (-0.75) mm long; bristles 1/3-1/2(-4/5) as long as achene body ..... ***R. rariflora***
7 Achene 1.6-1.8 mm long, 1.35-1.5 mm wide; tubercle 0.6-1.0 mm long; bristles 2/3 to nearly as long as achene body ..... ***R. species 2***
4 Culms stouter; leaves wider, not filiform.
8 Achene faces flat or concave; when one face is concave, the opposite face is sometimes slightly convex (slightly biconvex *R. decurrens* and *R. microcarpa* are keyed here for convenience).
9 Achene at least twice as long as wide, elliptic-oblong; tubercle subulate, 0.8-1.2 mm long; [section *Mixtae*] ..... ***R. inexpansa***
9 Achene < twice as long as wide, obovate; tubercle triangular, 0.2-0.9 mm long.
10 Longer bristles exceeding the achene body.
11 Achene ±2.2 mm long, ±1.8 mm wide; tubercle ±0.9 mm long; [section *Globulares*] ..... ***R. punctata***
11 Achene 0.8-1.2 mm long, 0.7-1.2 mm wide; tubercle 0.2-0.5 mm long; [section *Mixtae*].
12 Larger leaves (3-) 4-6 mm wide; bristles exceeding tubercle; achene faces flattened ..... ***R. elliottii***
12 Larger leaves 1-3 (-4) mm wide, bristles half as long as achene to equaling tubercle; achene faces slightly convex ..... ***R. microcarpa***
10 Longer bristles shorter than to equaling achene body, or absent.
13 Larger leaves 4-5 mm wide; achene 1.4-1.6 mm wide; tubercle 0.6-0.8 mm long, abruptly rising from a flaring basal collar; [section *Globulares*] ..... ***R. compressa***
13 Larger leaves 1-3 (-4) mm wide; achene 0.7-1.3 mm wide; tubercle 0.15-0.5 mm long, without a flaring basal collar; [section *Mixtae*].
14 Bristles rudimentary or absent ..... ***R. perplexa***
14 Bristles one-half as long to equaling achene.
15 Achene 1.3-1.8 mm long, 0.9-1.2 mm wide, the faces flat with 10-12 transverse ridges ..... ***R. torreyana***
15 Achene 0.8-1.4 mm long, 0.7-1.2 mm wide, the faces slightly biconvex with 6-12 transverse ridges.
16 Clusters elongate; achene 1.0-1.4 mm long, 0.8-1.0 mm wide, narrowly obovate to elliptic, averaging 8-12 transverse ridges; most tubercle bases convexly seated on the achene summit and somewhat decurrent along the achene margins, the tubercle surface often whitish-waxy ..... ***R. decurrens***
16 Clusters usually compact; achene 0.8-1.2 mm long, 0.7-1.2 mm wide, suborbicular to elliptic, averaging 6-7 transverse ridges; most tubercle bases flat across the achene summit, not decurrent, the tubercle surface usually dark, not waxy ..... ***R. microcarpa***
8 Achenes biconvex or tumid.
17 Achene 1.4-4.2 mm long, 1.2-3.6 mm wide, the summit with a thickened bony to crustaceous rim surrounding the base of the tubercle; [section *Harveyae*].
18 Achene lenticular and transversely ridge, ±1.4 mm long, ±1.2 mm wide ..... ***R. culixa***
18 Achene tumid, lightly pitted or cancellate in a honeycomb pattern, 1.5-4.2 mm long, 1.4-3.6 mm wide.
19 Leaves 4-8 mm wide; achene 3.0-4.2 mm long, 3.0-3.6 mm wide ..... ***R. megalocarpa***
19 Leaves 2-4 mm wide; achene < 2.7 mm long and < 2.5 mm wide.
20 Achene 2.0-2.7 mm long, 2.0-2.5 mm wide ..... ***R. grayi***
20 Achene 1.5-1.8 mm long, 1.4-1.7 mm wide ..... ***R. harveyi***
17 Achene 0.7-1.8 mm long, 0.7-1.5 mm wide, the summit without a textured rim surrounding the base of the tubercle (if the base of the tubercle is rim-like, then it is distinguished from the summit of the achene by a constriction or articulation).
21 Bristles absent; achene 0.7-1.0 mm long; [section *Psilocarya*].
22 Scales broadly ovate, obtuse to sub-acute; achene strongly transversely ridged; tubercle depressed, broader than long; style not persistent ..... ***R. nitens***
22 Scales lance-ovate, acute; achene weakly transversely ridged; tubercle triangular-lanceolate, as long as broad or longer; style usually persistent ..... ***R. scirpoides***
21 Bristles present (occasionally detached in *R. decurrens* and *R. miliacea* with achenes 1.0-1.4 mm long).
23 Bristles not exceeding the achene body.
24 Cluster branches flexuous; bristles one-half as long to equaling the achene (or longer in *R. microcarpa*); achene slightly biconvex, 0.8-1.4 mm long, 0.7-1.0 (-1.2) mm wide; [section *Mixtae*].
25 Clusters elongate; achene narrowly obovate to elliptic, averaging 8-12 transversed ridges; most tubercle bases convexly seated on the achene summit and somewhat decurrent along the achene margins, the tubercle surface often whitish-waxy ..... ***R. decurrens***
25 Clusters usually compact; achene suborbicular to elliptic, averaging 6-7 transverse ridges; most tubercle bases flat across the achene summit, not decurrent, the tubercle surface usually dark, not waxy ..... ***R. microcarpa***
24 Cluster branches stiff; bristles ¾ or less as long as the achene; achene tumid above, somewhat compressed below, 1.0-1.8 mm long, 1.0-1.6 mm wide; tubercle conical-attenuate, the edges somewhat concave; [section *Globulares*].
26 Larger culm leaves to 5 mm wide; achenes (1.2-) avg. 1.45 (-1.85) mm long, (1.1-) avg. 1.4 (-1.75) mm wide; achene surface alveoli longitudinally narrow; tubercle 0.3-0.7 mm long, base 0.6-1.0 mm wide ..... ***R. recognita***

26 Larger culm leaves to 3 mm wide; achenes (1.0-) avg. 1.3 (-1.5) mm long and wide; if achene surface alveoli longitudinally narrow, then tubercle 0.2-0.4 mm long and base 0.5-0.7 mm wide (*R. globularis*).
27 Longer bristles ⅓-½ (-¾)× the length of the achene; achene surface alveoli longitudinally narrow (typically 0.02-0.05 mm wide between the longitudinal walls), the latitudinal walls raised into horizontal ridges; tubercle 0.2-0.4 mm long, the base 0.5-0.7 mm wide ..... ***R. globularis***
27 Longer bristles ⅔-1× the length of the achene; achene surface alveoli nearly as wide as long (typically 0.05-0.1 mm wide between the longitudinal walls), the latitudinal walls obscurely or not at all raised into horizontal ridges; tubercle 0.35-0.7 mm long, the base 0.7-0.9 mm wide ..... ***R. pinetorum***
23 Bristles equaling or longer than the tubercle.
28 Primary branches of the inflorescence spreading at right angles from the culm, each spikelet or small cluster on slender spreading or reflexed stalks; [section *Mixtae*] ..... ***R. miliacea***
28 Primary branches of the inflorescence ascending.
29 Spikelets 6-9 mm long; [section *Mixtae*] ..... ***R. odorata***
29 Spikelets < 5 mm long.
30 Tubercle 0.4-0.8 mm long, the edges setose or uneven with waxy or crusty irregular protuberances; [section *Mixtae*].
31 Achene obovate to suborbicular, 1.2-1.6 mm wide, latitudinal alveoli walls strongly raised into transverse ridges..... ..... ***R. caduca***
31 Achene slenderly obovoid, 0.8-1.0 mm wide, latitudinal alveoli walls weakly or not at all raised into transverse ridges ..... ***R. mixta***
30 Tubercle 0.2-0.5 mm long, the edges smooth.
32 Spikelets 3.5-4 mm long; bristles exceeding the tubercle; achene 1.3-1.5 mm long, 1.2-1.3 mm wide; [section *Globulares*] ..... ***R. saxicola***
32 Spikelets 2.5-3 mm long; longer bristles about equaling the tubercle; achene 0.8-1.2 mm long, 0.7-1.2 mm wide; [section *Mixtae*].
33 Inflorescence occupying the upper ¼-½ of the culm, the lowest 2-4 nodes barren ..... ***R. microcarpa***
33 Inflorescence occupying ⅔-¾ of the length of the culm, the lowest lateral panicle at the first or second node above the base ..... ***R. sulcata***

Rhynchospora alba (Linnaeus) Vahl, Northern White Beaksedge. Mountain bogs and fens, peaty situations in the Coastal Plain, such as low pocosins in peat domes or large Carolina bays, and floating peat mats in limesink (doline) ponds and bay lakes, possibly also in seepage bogs with abundant *Sphagnum*, generally occurring in the most open, harshest, and peatiest areas. July-October. Circumboreal, in North America from NL (Labrador) west to AK, south to SC, TN, TN, IL, SK, ID, and CA; disjunct in se. GA (Charlton Co., at the Okefenokee Swamp) (Williges & Loftin 1995), s. AL (Escambia Co.; specimen at CLEMS), and the mountains of Puerto Rico. [= C, F, FNA, G, GW, K, Pa, RAB, W, WV, Y, Z; = *Rynchospora alba* – S]

Rhynchospora baldwinii A. Gray, Baldwin's Beaksedge. Wet savannas, seepages. July-August. Se. NC south to s. FL and west to LA. [= C, FNA, K, GW, RAB, WH, Y, Z; = *Rynchospora baldwinii* – S]

Rhynchospora brachychaeta C. Wright. Cypress ponds, other depressions. E. SC south to Panhandle FL and s. AL and s. MS; Cuba. Reported for SC (McMillan 2007). Kral in FNA considers this species possibly adventive, but McMillan (2007) provides good reasons for considering it native in our area. [= FNA, K, Y, Z; < *Rynchospora wrightiana* – S] {not yet keyed}

Rhynchospora caduca Elliott, Angle-stem Beaksedge. Savannas, hardwood swamps, other wet areas. July-September. E. and c. VA south to s. FL and west to TX, OK, and AR, north in the interior to sc. TN. This species is found at a few sites in the mountains of GA. See notes under *R. miliacea*. [= C, F, FNA, G, GW, K, RAB, W, WH, Y, Z; > *Rynchospora caduca* – S; > *Rynchospora patula* A. Gray – S]

Rhynchospora capillacea Torrey. Calcareous wetlands. NL (Newfoundland) west to SK, south to sw. VA, ne. TN, and n. AR. [= C, F, FNA, G, K, Pa, Y, Z]

Rhynchospora capitellata (Michaux) Vahl, Brownish Beaksedge. Bogs and fens, seepages, and wet rock outcrops in the Mountains and upper Piedmont, also in wet habitats in the Coastal Plain of ne. NC and e. VA. July-September. Widespread in e. North America, south to nc. GA. The only common beaksedge in the Mountains of our area. A somewhat similar species, *R. knieskernii*, occurs north of our area, but should be looked for here; they are discussed at the end of this genus. Sorrie (2000) has clarified the relationships and distinctions of this taxon with *R. leptocarpa*. [= C, F, G, Pa, W, WV, Y; < *R. capitellata* – FNA, GW, K, RAB, Z; = *Rynchospora capitellata* – S]

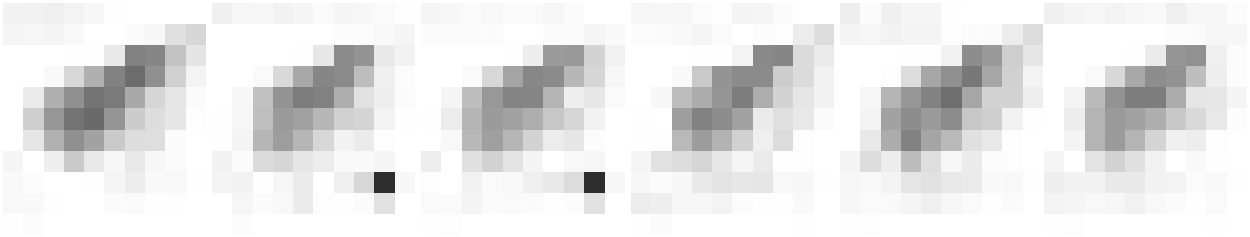
Rhynchospora careyana Fernald, Carey's Horned Beaksedge. Limesink (doline) depression ponds and in intermittently flooded depression meadows. July-September. Apparently ranging from se. NC south to FL, but the range poorly known because of confusion with *R. inundata*, from which it is perhaps not specifically distinct. [= FNA, K, Y; < *R. inundata* – RAB, WH; < *R. corniculata* – GW (listed in synonymy under *R. corniculata* in GW, but would actually key to *R. inundata)*; = *Rynchospora careyana* – S]

Rhynchospora cephalantha A. Gray *var.* ***attenuata*** Gale, Small Bunched Beaksedge. Savannas, sandhill seeps, openings in streamhead pocosins. July-October. The range of this variety is poorly known; is reported by Z from NC, SC, AL, and MS. Recent collections from MD and VA extend the range. See discussion in Sorrie et al. (1997). [= Y, Z; < *R. cephalantha* – C, FNA, GW, K, RAB; < *Rynchospora axillaris* – S]

Rhynchospora cephalantha A. Gray *var*. ***cephalantha***, Common Bunched Beaksedge. Savannas. July-October. S. NJ south to s. FL and west to LA. Often weedy, this species occurs commonly along wet roadsides, powerline corridors, and the like. [= Y; < *R. cephalantha* – C, FNA, GW, K, RAB, WH; > *R. cephalantha* var. *cephalantha* – F, G, Z; > *R. cephalantha* var. *pleiocephala* Fernald & Gale – F, G, Z; < *Rynchospora axillaris* (Lamarck) Britton – S]

Rhynchospora chalarocephala Fernald & Gale, Loose-head Beaksedge. Savannas, limesink ponds, and swamps, often weedy and occurring in abundance on wet roadsides and in powerline corridors. July-September. S. NJ south to c. FL and west to LA; disjunct in nw. GA (Jones & Coile 1988) and sc. TN (Coffee County). [= C, F, FNA, G, GW, K, RAB, W, WH, Y, Z; ? – S]

Rhynchospora chapmanii M.A. Curtis, Chapman's Beaksedge. Savannas, seepage bogs, sandy margins of limesink (doline) ponds, and other wet, acid habitats. July-September. Se. NC south to s. FL and west to e. LA; Belize, Nicaragua. [= FNA, GW, K, RAB, WH, Y, Z; = *Rynchospora chapmanii* – S]



Rhynchospora ciliaris (Michaux) C. Mohr, Fringed Beaksedge. Savannas, sandhill seeps. July-September. Se. NC south to s. FL and west to LA. [= FNA, GW, K, RAB, WH, Y, Z; = *Rynchospora ciliaris* – S]

Rhynchospora colorata (Linnaeus) H. Pfeiffer, Narrowleaf Whitetop Sedge. Wet savannas, ditches, dune swales. May-September. Primarily a Southeastern Coastal Plain endemic: se. VA south to FL and west to TX; Mexico (Tabasco, Chiapas, Yucatán), Belize, Guatemala, Costa Rica, Venezuela; West Indies. [= C, FNA, K, WH, Y; = *Dichromena colorata* (Linnaeus) H. Pfeiffer – F, G, GW, RAB, S]

Rhynchospora compressa Carey ex Chapman. Savannas. S. SC south to Panhandle FL, west to e. LA. This species was reported for SC (Kartesz 1999), based on the South Carolina Plant Atlas (http://cricket.biol.sc.edu/herb/); McMillan (pers. comm.) states that the record is in error, based on a misidentified specimen. The species occurs in sc. GA (Jones & Coile 1988) and has since been found in SC by McMillan (2003). [= FNA, GW, K, WH, Y, Z; = *Rynchospora compressa* – S]

Rhynchospora corniculata (Lamarck) A. Gray *var*. ***corniculata***, Short-bristle Horned Beaksedge. Pondcypress savannas in Carolina bays, swamp forests, other wetlands. July-September. Var. *corniculata* ranges from DE south to FL and west to LA, extending north into KY and MO; also in the West Indies. Var. *interior*, possibly not worth recognition, is distinguished by a shorter and narrower achene, the summit barely broader than the base of the tubercle, and occurs in the Mississippi drainage. [= C, F, G; < *R. corniculata* (Lamarck) A. Gray – FNA, GW, K, RAB, WH, Y; < *Rynchospora corniculata* – S]

Rhynchospora crinipes Gale, Alabama Beaksedge. Sand-clay bars and peaty stream banks of blackwater streams. July-September. Sc. NC (Sorrie et al. 1997) through sc. GA to FL Panhandle, west to s. AL; very scattered in occurrence. This very rare species is related to *R. filifolia*, but is a coarser plant, readily distinguishable by characters of the achene, culm, and leaves. Anderson (1988) discusses its systematics, habitat, and rarity. [= FNA, GW, K, WH, Y, Z]

Rhynchospora culixa Gale, Georgia Beaksedge. Pine savannas, flatwoods. GA and FL. [= K, Y, Z; = *R. harveyi* W. Boott var. *culixa* (Gale) Kral – FNA; < *R. harveyi* – WH]

Rhynchospora curtissii Britton. Pine flatwoods and bogs. An East Gulf Coastal Plain endemic, in Panhandle FL, AL, and s. MS (Sorrie & Leonard 1999); also reported from SC by Kral (1996) and for NC and SC by Kartesz (1999), but specimens so annotated are misidentified. [= FNA, GW, K, WH, Y, Z; = *Rynchospora smallii* – S]

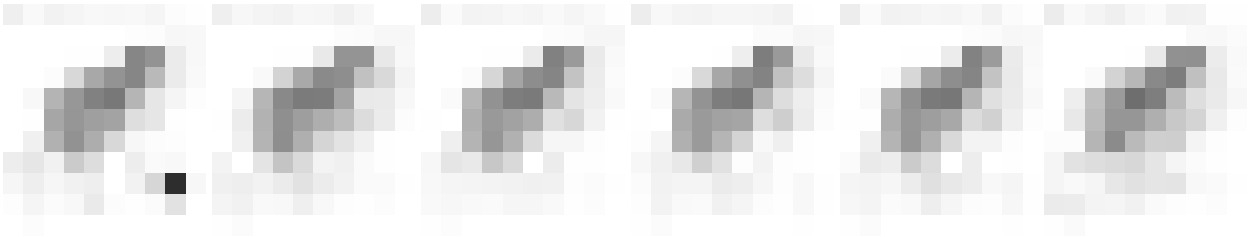
Rhynchospora debilis Gale, Savanna Beaksedge. Savannas, sandhill seeps. July-September. Se. VA south to n. peninsular FL and west to se. TX (Brown & Marcus 1998). Like a small version of *R. fascicularis*, often with several ascending, cespitose culms, each terminated by a single glomerule. [= C, F, FNA, GW, K, RAB, WH, Y, Z]

Rhynchospora decurrens Chapman, Swamp-forest Beaksedge. Swamp forests and river marshes, especially along blackwater rivers. July-August. Se. NC south to c. peninsular FL and west to s. MS (Sorrie & Leonard 1999). [= FNA, GW, K, RAB, WH, Y, Z; = *Rynchospora decurrens* – S]

Rhynchospora distans (Michaux) Vahl. Savannas and limesink ponds. June-September. Se. VA south to s. FL and west to s. MS (Sorrie & Leonard 1999); West Indies. Appearing to merge with *R. wrightiana* on the outer Coastal Plain of NC. [= Y; = *Rhynchospora fascicularis* (Michaux) Vahl var. *distans* (Michaux) Chapman – F, K, Z; < *R. fascicularis* – FNA, G, GW, RAB, WH; = *Rynchospora distans* – S]

Rhynchospora divergens Chapman ex M.A. Curtis, White-seeded Beaksedge. Wet savannas, especially in exposed sands. May-September. Se. NC south to s. FL and west to se. TX; Bahamas, Mexico (Chiapas), Belize. *R. divergens*, *R. pusilla*, and *R. thornei* are all small, grass-like plants, very similar in appearance to one another. [= FNA, GW, K, RAB, WH, Y; = *Rynchospora divergens* – S]

Rhynchospora elliottii A. Dietrich, Elliott's Beaksedge. Savannas, ditches, other wet habitats, often weedy. July-September. Se. NC south to c. peninsular FL and west to e. TX. The achenes are typically flat or concave on one face, and flat or slightly convex on the other. See note under *R. microcarpa*. [= FNA, GW, K, WH, Y; = *R. schoenoides* (Elliott) Wood – RAB, Z; = *Rynchospora schoenoides* – S]



Rhynchospora fascicularis (Michaux) Vahl, Fascicled Beaksedge. Savannas, limesink ponds, ditches. June-September. Se. VA south to s. FL and west to se. TX; West Indies. [= Y; = *Rhynchospora fascicularis* (Michaux) Vahl var. *fascicularis* – F, K, Z; < *R. fascicularis* – FNA, G, GW, RAB, WH; = *Rynchospora fascicularis* – S]

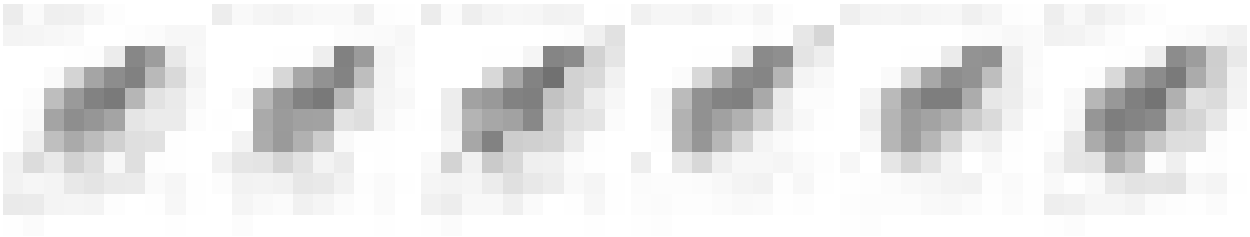
Rhynchospora fernaldii Gale, Fernald's Beaksedge. Pine flatwoods. S. GA south to s. FL, west to s. MS. [= FNA, GW, K, WH, Y, Z]

Rhynchospora filifolia A. Gray, Threadleaf Beaksedge. Sandy shores of limesink (doline) depressions, especially at the lower margin, savannas. July-September. S. NJ south to c. FL and west to e. TX; Cuba, Mexico (Tabasco), Belize, Nicaragua. [= C, F, FNA, G, K, RAB, WH, Y, Z; < *R. filifolia* – GW; = *Rynchospora filifolia* – S]

Rhynchospora fusca (Linnaeus) Aiton f., Brown Beaksedge. Atlantic white-cedar swamps, sea-level fens, fens. Circumboreal, in North America from NL (Labrador) west to SK, south to NJ, e. PA (Rhoads & Block 2007), MD, DE, WV (FNA; Harmon, Ford-Werntz, & Grafton 2006), IN, IL, and MN. [= C, F, FNA, G, K, Pa, Y, Z]

Rhynchospora galeana Naczi, W. Knapp, & Gerry Moore, Short-bristle Beaksedge. Wet savannas. July-September. Se. NC south to s. FL and west to s. MS; West Indies. This species will colonize disturbances (roadsides, powerline corridors), but not aggressively. The leaf tips of *R. galeana* are acute and minutely serrulate, while those of the closely related *R. oligantha* are blunt and smooth; these characters are, however, often difficult to determine. See Naczi, Knapp, and Moore (2010) for discussion of the need to replace the name *R. breviseta* because of an earlier-named Asian species. [= *R. breviseta* (Gale) Channell – FNA, GW, K, RAB, WH, Y (later homonym) ; < *R. oligantha* – F, G; < *Rynchospora oligantha* – S; = *R. oligantha* A. Gray var. *breviseta* Gale – Z]

Rhynchospora globularis (Chapman) Small, Globe Beaksedge. Sandy or peaty depressions, wet ditches, powerline corridors, savannas. June-September. Apparently ranges from DE south to s. FL and west to c. TX and OK; north in the interior to nc. TN; also allegedly in n. CA. Both *R. globularis* and *R. pinetorum* tend to produce shorter plants with smaller glomerules than *R. recognita*. Occasional achenes of *R. globularis* exhibit the wide alveoli of *R. pinetorum* near the base or summit, with little or no horizontal ridging, but centrally have narrow alveoli with pronounced horizontal ridges. The opposite condition occasionally occurs in *R. pinetorum* achenes, with narrow alveoli and horizontal ridging basally or at the summit, but wide alveoli and little or no ridging centrally. [= Y; < *R. globularis* – RAB, W; = C, F, FNA, G, K, WH, Z; < *R. globularis* var. *globularis* – GW; = *Rynchospora globularis* – S]



Rhynchospora glomerata (Linnaeus) Vahl *var*. ***glomerata***, Clustered Beaksedge. Cp (DE, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): savannas, bogs, other wet habitats; common (rare in Mountains, rare in DE). July-September. Var. *glomerata* ranges from s. NJ south to ne. FL, FL Panhandle, and west to e. TX, and inland in KY, TN, AR, and KS. Var. *angusta* Gale occurs in AR, LA, and e. TX. It is distinguished primarily by a narrower and longer gynophore. [= Y, Z; < *R. glomerata* – C, F, FNA, G, GW, K, RAB, W, WH; < *Rynchospora glomerata* – S]

Rhynchospora gracilenta A. Gray, Slender Beaksedge. Cp (DE, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (NC, SC, VA): savannas, bogs; uncommon (rare in Piedmont and Mountains). July-September. NJ south to ne. FL, FL Panhandle, and west to e. TX, north in the inland to nc. TN and AR; Cuba, Mexico (Chiapas), Belize, Nicaragua. [= C, F, FNA, G, GW, K, Pa, RAB, W, WH, Y, Z; = *Rynchospora gracilenta* – S]

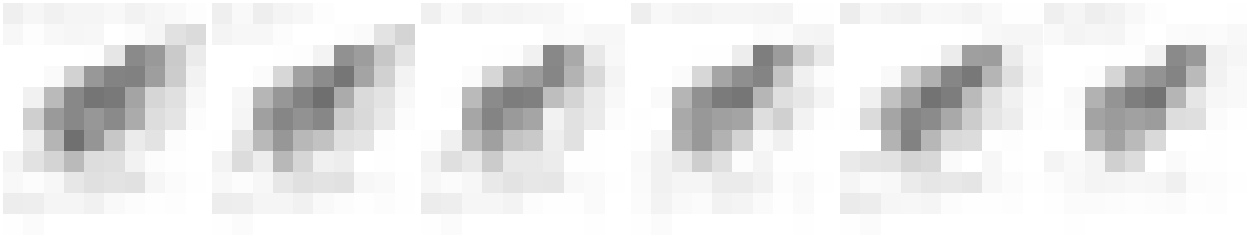
Rhynchospora grayi Kunth, Gray's Beaksedge. Cp (FL, GA, NC, SC, VA): sandhills and other dry, sandy sites; uncommon. June-September. VA south to s. FL, west to TX. [= C, F, FNA, G, K, RAB, WH, Y, Z; = *Rynchospora grayi* – S]

Rhynchospora harperi Small, Harper's Beaksedge. Cp (DE, FL, GA, NC, SC): peaty limesink depression ponds (dolines), from standing water to the upper margins of the pond-shore; rare. July-September. Se. NC south to sc. peninsular FL and west to s. AL and s. MS (Sorrie & Leonard 1999); disjunct in DE and MD; disjunct in Belize. See Nelson (1993) for first SC record, and LeBlond (1997) for additional information on the species, especially its distribution. [= FNA, K, WH, Y, Z; < *R. filifolia* – GW; = *Rynchospora harperi* – S]

Rhynchospora harveyi W. Boott, Harvey's Beaksedge. Cp (FL, GA, NC, SC, VA), Mt (GA, NC), Pd (NC): savannas in the Coastal Plain, seepage bogs in the Sandhills, bogs in the Mountains and Piedmont; rare. July-August. Se. VA south to ne. FL,

FL Panhandle, and west to TX and OK, and north in the interior to nc. TN and MO. [= C, F, G, GW, K, RAB, W, Y, Z; = *R. harveyi* var. *harveyi* – FNA; = *Rynchospora harveyi* – S; < *R. harveyi* – WH]

Rhynchospora indianolensis Small. Cp (AL): roadside ditches; rare. Coastal Plain of TX; recently also found in s. AL. Kral in FNA mentions that *R. indianolensis* may be conspecific with the Cuban *R. scutellata*. [= FNA; = *Rynchospora indianolensis*; < *R. scutellata* Grisebach] {add to synonymy; not yet keyed}



Rhynchospora inexpansa (Michaux) Vahl, Nodding Beaksedge. Wet savannas, streamhead pocosins where frequently burned, usually in peaty situations, often weedy, colonizing disturbances. July-September. Se. VA south to ne. FL, FL Panhandle, and west to e. TX, AR, and se. OK (Singhurst, Mink, & Holmes 2012); West Indies. [= C, F, FNA, G, GW, K, RAB, WH, Y, Z; = *Rynchospora inexpansa* – S]

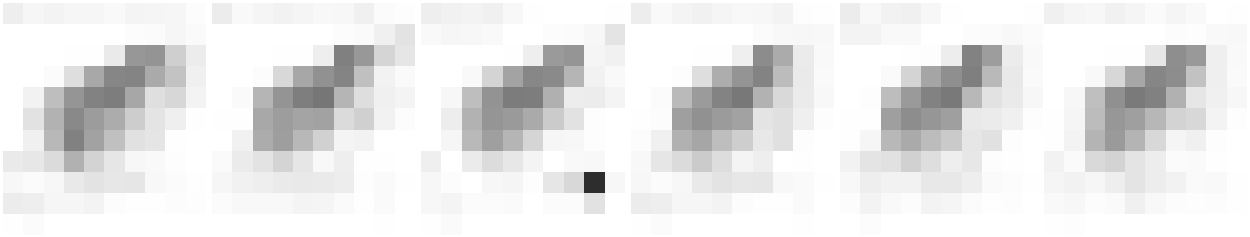
Rhynchospora inundata (Oakes) Fernald, Narrow-fruit Horned Beaksedge. In water of limesink dolines and clay-based Carolina bays. usually found in shallow water or at the lower margins of pond-shores, typically producing large colonies. July-September. Apparently ranging from e. MA south to s. FL and west to e. TX (the range, however, obscured by confusion with *R. careyana*) (Singhurst, Mink, & Holmes 2010). The relation of this species to *R. careyana* and to more northern entities of *R. inundata* remain unresolved. [= C, F, FNA, G, GW, K, Y; < *R. inundata* – RAB, WH; = *Rynchospora inundata* – S]

Rhynchospora knieskernii Carey. Pinelands. Moist sandy/peaty swales. Endemic in NJ and DE. It has been reported, in error, from SC. [= C, F, FNA, G, K, Y, Z]

Rhynchospora latifolia (Baldwin ex Elliott) W.W. Thomas, Broadleaf Whitetop Sedge. Wet savannas. May-September. A Southeastern Coastal Plain endemic: se. NC south to s. FL and west to se. TX; disjunct in sc. TN (Coffee County). [= FNA, K, Y; = *Dichromena latifolia* Baldwin ex Elliott – GW, RAB, S]

Rhynchospora leptocarpa (Chapman ex Britton) Small. Seepage bogs, pocosins, especially in openings. E. NC south to ne. FL, Panhandle FL, west to se. LA, in the Coastal Plain. It appears that *R. leptocarpa* is a valid species, a southeastern Coastal Plain relative of the more northern and montane *R. capitellata* (Sorrie 2000). Its occurrence in NC is reported by Sorrie et al. (1997). [= WH, Y; < *R. capitellata* – FNA, GW, K, RAB, Z; = *Rynchospora leptocarpa* – S]

Rhynchospora macra (C.B. Clarke) Small, Southern White Beaksedge. *Sphagnum* bogs in frequently-burned streamhead pocosins, and in sandhill seepage bogs. July-September. Sc. NC south to ne. FL, FL Panhandle, and west to se. TX; Nicaragua, Puerto Rico. *R. macra* is a robust southern relative of *R. alba*. Like *R. alba* and *R. pallida*, it has scales which are at first bright white, "fading" in age to a medium tan or light brown. These three species are thus superficially most distinctive (from other *Rhynchospora*) in June, July, and August. The occurrence of this species in NC and SC is discussed by Sorrie et al. (1997). [= FNA, GW, K, WH, Y, Z; = *Rynchospora macra* – S]



Rhynchospora macrostachya Torrey ex A. Gray, Tall Horned Beaksedge. Marshes, swamps, upland depression ponds, other wetlands. July-September. E. MA south to ne. FL and west to e. TX, north in the interior to sc. TN, s. MI, MO, and KS; disjunct (historically) in s. ME. This is most readily distinguished from *R. corniculata*. *R. inundata*, and *R. careyana* by the large glomerules composed of numerous spikelets. The recognition of varieties does not seem to be warranted. [= C, FNA, G, GW, K, RAB, WH, Y; > *R. macrostachya* var. *colpophila* Fernald & Gale – F; > *R. macrostachya* var. *macrostachya* – F; = *Rynchospora macrostachya* – S]

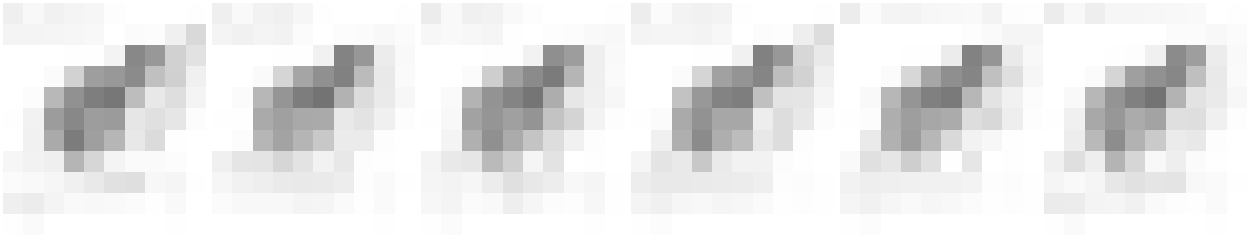
Rhynchospora megalocarpa A. Gray, Sandhill Beaksedge. Xeric sandhills. June-August. Se. NC south to s. FL, west to MS. [= FNA, K, RAB, WH, Y, Z; = *Rynchospora dodecandra* Baldwin ex A. Gray – S]

Rhynchospora microcarpa Baldwin ex A. Gray, Southern Beaksedge. Swamp forests, clay-based Carolina bays. July-August. E. NC south to s. FL and west to TX; West Indies (Cuba, Puerto Rico), Bahamas, Belize. This species is easily confused with *R. elliottii* and *R. perplexa*. *R. elliottii* is distinguished by leaves 4-6 mm wide, bristles longer than the tubercle, flattish achene faces, and a tubercle that is longer than broad. *R. microcarpa* and *R. perplexa* have leaves 1-3 mm wide and tubercles as broad as long or broader. In *R. microcarpa*, the achene is biconvex and the bristles are half as long as the achene to equaling the tubercle. In *R. perplexa*, the achene faces are flattish and the bristles are absent or rudimentary (< ½ as long as the achene). [= F, FNA, GW, RAB, WH, Y, Z; < *R. microcarpa* – K (also see *R. sulcata*); > *Rynchospora edisoniana* Britton in Small – S; > *Rynchospora microcarpa* – S]

Rhynchospora microcephala (Britton) Britton ex Small, Small-headed Beaksedge. Savannas, sandhill-pocosin ecotones. July-October. S. NJ south to s. FL and west to MS; Cuba. [= C, F, FNA, G, GW, K, RAB, WH, Y, Z; = *Rynchospora microcephala* – S; = *R. cephalantha* A. Gray var. *microcephala* (Britton) Kükenthal]

Rhynchospora miliacea (Lamarck) A. Gray, Millet Beaksedge. Swamp forests, including maritime swamp forests. July-August. Se. VA south to s. FL and west to LA; West Indies. The inflorescence branches of *R. mixta* and (less commonly) *R. caduca* can spread at right angles from the culm, superficially resembling *R. miliacea*. The three can be separated by tubercle length: the tubercle of *R. miliacea* is 0.2-0.4 mm long, while those of *R. mixta* and *R. caduca* are 0.4-0.9 mm long. [= C, F, FNA, G, GW, K, RAB, WH, Y, Z; = *Rynchospora miliacea* – S]

Rhynchospora mixta Britton in Small, Mingled Beaksedge. Swamp forests, marshes. June-August. Ne. NC south to c. peninsular FL and west to TX. See notes under *R. miliacea*. [= FNA, GW, K, RAB, S, WH, Y, Z; > *Rynchospora mixta* – S; > *Rynchospora prolifera* Small – S]



Rhynchospora nitens (Vahl) A. Gray, Short-beak Beaksedge. Wet savannas, limesink (doline) ponds, ditches, disturbed wet areas, often weedy. July-August. Primarily a Coastal Plain endemic: MA south to s. FL and west to se. TX; lowlands around the Great Lakes; West Indies, Belize, Nicaragua. [= C, FNA, K, WH, Y; = *Psilocarya nitens* (Vahl) Wood – F, G, GW, RAB, S]

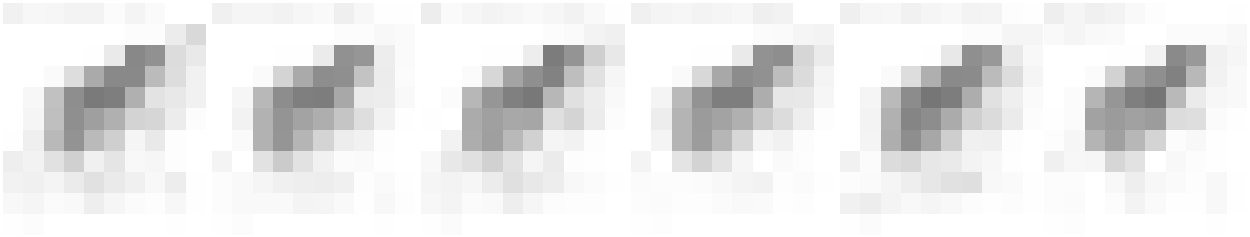
Rhynchospora odorata C. Wright ex Grisebach, Fragrant Beaksedge. Maritime swamp forests and maritime wet grasslands. June-August. E. NC south to s. FL; West Indies and Bahamas. First reported for SC by Nelson & Kelly (1997). [= F, FNA, GW, K, RAB, WH, Y, Z; = *Rynchospora stipitata* Chapman – S]

Rhynchospora oligantha A. Gray, Feather-bristle Beaksedge. Wet savannas, sandhill-pocosin ecotones, sandhill seepage bogs, sea-level fens, usually in rather peaty, acid places. July-August. S. NJ south to ne. FL, Panhandle FL, and west to se. TX; Belize, Nicaragua. The leaf tips of *R. oligantha* are blunt and smooth, while those of the closely related *R. galeana* are acute and minutely serrulate; these characters are often difficult to determine, however. Considered to be absent between NC and NJ prior to its discovery in e. VA (Fleming & Ludwig 1996). [= C, FNA, GW, K, RAB, WH, Y; < *R. oligantha* – F, G (presumably including *R. galeana*); < *Rynchospora oligantha* – S; = *R. oligantha* var. *oligantha* – Z]

Rhynchospora pallida M.A. Curtis, Pale Beaksedge. Savanna-pocosin and sandhill-pocosin ecotones, peaty seepage bogs, usually growing in or near *Sphagnum*. July-September. Long Island, NY south through NJ to nc. SC, primarily in NJ and NC. Like *R. alba* and *R. macra*, it has scales which are at first bright white, "fading" in age to a medium tan or light brown. These three species are thus superficially most distinctive (from other *Rhynchospora*) in June, July, and August. The bristle characters separate the three species easily. See Nelson (1993) for first SC record. [= C, F, FNA, G, GW, K, RAB, Y, Z; = *Rynchospora pallida* – S]

Rhynchospora perplexa Britton in Small, Pineland Beaksedge. Savannas, sandhill seepage bogs. July-September. E. NC south to ne. FL, FL Panhandle, and west to TX, and north in the interior to ec. TN; West Indies. Var. *virginiana* Fernald, alleged to be endemic to se. VA, is alleged to differ in several characters, including larger spikelets (2.5-3.0 mm long vs. 2.0-2.5), the achene tubercles broadly rounded at the tip (rather than deltoid and acute). Also see note under *R. microcarpa*. [= C, FNA, G, GW, K, RAB, WH, Y, Z; > *R. perplexa* var. *perplexa* – F; > *R. perplexa* var. *virginiana* Fernald – F; = *Rynchospora perplexa* – S]

Rhynchospora pineticola C.B. Clarke, Pinebarren Beaksedge. Sandhills, scrub, other dry sandy pinelands. May-November. Ne. FL and e. Panhandle FL south to s. FL; Cuba. [= FNA, K, Y; = *Rynchospora intermedia* (Chapman) Britton – S; = *Rhynchospora intermedia* (Chapman) Britton – WH, Z]



Rhynchospora pinetorum Small, Small's Beakrush. Wet calcareous savannas, maritime wet grasslands. June-September. FL west to MS (Sorrie & Leonard 1999) and LA, apparently disjunct to se. NC and ne. SC, and also in the West Indies. See note under *R. globularis*. [= Y; = *R. globularis* (Chapman) Small var. *pinetorum* (Small) Gale – FNA, GW, K, Z; = *Rynchospora pinetorum* – S; < *R. globularis* – WH]

Rhynchospora pleiantha (Kükenthal) Gale, Coastal Beaksedge. Sandy margins of limesink depression ponds (dolines), typically in shallow water or at the lower margins of pond-shores. July-September. Se. NC south to c. peninsular FL, and Panhandle FL, west to se. AL; also in Cuba. [= FNA, GW, K, RAB, WH, Y, Z; = *Rynchospora fusca* – S, misapplied]

Rhynchospora plumosa Elliott, Plumed Beaksedge. Savannas, sandhill-pocosin ecotones, especially where the sandy surface dries out in summer (on spodosols such as the Leon soil series). July-August. NC south to s. FL and west to se. TX; West Indies (Cuba), Belize, Honduras, Nicaragua. *R. semiplumosa* of s. GA and n. FL needs additional evaluation but is included here. [= FNA, GW, K, RAB, WH, Y; > *Rynchospora plumosa* – S; > *Rynchospora semiplumosa* A. Gray – S] {add Z synonymy}

Rhynchospora punctata Elliott, Pineland Beaksedge. Wet savannas, pitcherplant bogs. S. GA south to ne. FL. [= FNA, GW, K, WH, Y, Z; = *Rynchospora punctata* – S]

Rhynchospora pusilla Chapman ex M.A. Curtis, Dwarf Beaksedge. Wet savannas, especially in exposed wet sands of disturbed ground, such as roadsides. June-September. E. NC south to s. FL and west to e. TX; West Indies, Mexico (Tabasco, Chiapas), Belize, Guatemala, Nicaragua. *R. pusilla*, *R. divergens*, and *R. thornei* are all small, grass-like plants, very similar in appearance to one another. [= FNA, GW, K, WH, Y; = *R. intermixta* C. Wright – RAB; = *Rynchospora intermixta* – S]

Rhynchospora rariflora (Michaux) Elliott, Few-flower Beaksedge. Wet savannas, seepage bogs in the Sandhills, bogs in the Piedmont. July-September. S. NJ south to s. FL and west to e. TX; inland in ec. TN; West Indies, Belize, Honduras, Nicaragua. Resembling *R. galeana* and *R. oligantha*, but the spikelets conspicuously smaller. [= C, F, FNA, G, GW, K, RAB, WH, Y, Z; = *Rynchospora rariflora* – S]

Rhynchospora recognita (Gale) Kral, Cymose Beakrush. Wet to dry low grounds, diabase glades, ditches, powerline corridors, savannas, moist seepage on rock outcrops, other wet areas. June-September. NJ south to FL, west to TX, north in the interior to nc. TN and around the Great Lakes; CA; West Indies; and Central America. As explained by Kral (1999), this taxon appears to warrant specific status. [= FNA, K, Pa, Y; = *R. globularis* (Chapman) Small var. *recognita* Gale – C, F, G, WV, Z; < *R. globularis* – RAB, W, WH; < *R. globularis* var. *globularis* – GW; = *Rynchospora cymosa* Elliott – S, misapplied]

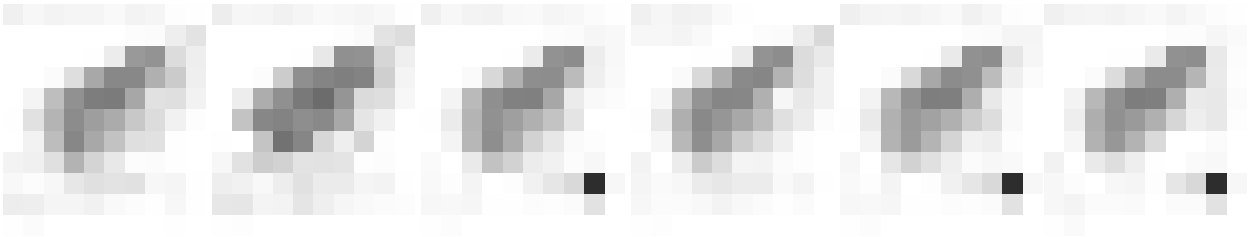
Rhynchospora saxicola Small. Seepages on granitic outcrops and Altamaha Grit glades. W. SC south into the Piedmont and rarely Coastal Plain of c. GA and ne. and ec. AL (Kral 1999). [= Y; = *R. globularis* (Chapman) Small var. *saxicola* (Small) Kükenthal – FNA, K; = *Rynchospora saxicola* – S]

Rhynchospora scirpoides (Torrey) Grisebach, Long-beak Beaksedge. Limesink ponds, usually at the lower margins of pond-shores, wet savannas, beaver ponds, and other wetlands with "drawdown" hydrology. July-September. Se. MA south to n. peninsular FL, Panhandle FL, s. MS (Sorrie & Leonard 1999), se. OK, and TX (Singhurst, Bridges, & Holmes 2007); disjunct in the lowlands around the Great Lakes. [= C, FNA, K, WH, Y; = *Psilocarya scirpoides* Torrey – GW, RAB, S; > *Psilocarya scirpoides* var. *grimesii* Fernald & Griscom – F, G; > *Psilocarya scirpoides* var. *scirpoides*– F, G]

Rhynchospora solitaria R.M. Harper, Autumn Beaksedge. Wet, sandy/peaty depressions. Known from a few sites in the Gulf Coastal Plain of GA (Colquitt, Irwin, Tift, and Turner counties) (Sorrie 1998b) and SC (Berkeley County) (McMillan, pers.comm. and specimen at NCU). It resembles a delicate *R. ciliaris*; its distinctiveness is well described in Bridges & Orzell (1992). It should be sought in seepage bogs in the fall-line sandhills and in wet savannas of the outer Coastal Plain. [= FNA, GW, K, Y, Z; = *Rynchospora solitaria* – S]

Rhynchospora species 1. Cp (MS). [= Y] {not yet keyed or mapped}

Rhynchospora species 2, Croatan beaksedge. Wet pine savanna and pocosin ecotone, known from a single spodosol savanna site in Croatan National Forest, and growing with *Ctenium aromaticum*, *Pinguicula caerulea*, *Sarracenia flava*, *Dionaea muscipula*, *Zenobia pulverulenta*, *Polygala ramosa*, and *Eriocaulon decangulare* var. *decangulare*. Plants may mature by mid-spring, and are very similar in habit to *R. rariflora*. [= Y]



Rhynchospora species 3. Mt (GA): Coosa Valley prairies; rare. Under study by Jim Allison. {not yet keyed or mapped}

Rhynchospora stenophylla Chapman, Coastal Bog Beaksedge. Peaty seepage bogs, streamhead pocosins, savanna-pocosin ecotones, usually growing in *Sphagnum*, especially where frequently burned. July-September. Se. NC south to nw. FL and west to s. MS; disjunct in se. VA (Southampton Co.) (Belden et al. 2004). Reported for GA by Sorrie (1998b). [= FNA, GW, K, RAB, WH, Y, Z; = *Rynchospora stenophylla* – S]

Rhynchospora sulcata Gale, Grooved Beaksedge. Limesink ponds (dolines). June-July. Se. SC south to GA (Jones & Coile 1988) and c. peninsular FL and Panhandle FL; West Indies; Central America. [= Y; > *R. sulcata* – GW, RAB, WH, Z; > *R. brittonii* Gale – Z; < *R. microcarpa* Baldwin ex A. Gray – K]

Rhynchospora thornei Kral, Thorne's Beaksedge. In open sands in savannas underlain by marl, and nearby roadsides, moist limestone barrens and prairies (GA). Known from about 35 locations, in Coastal Plain of NC, SC, GA, ne. FL, Panhandle FL, and AL; also in Ridge and Valley region of AL and GA, and Black Belt region of AL. *R. thornei*, *R. divergens*, and *R. pusilla* are all small, grass-like plants, very similar in appearance to one another, and they frequently co-occur. Recently discovered in SC (Georgetown Co.) by McMillan (2003). [= FNA, K, WH, Y]

Rhynchospora torreyana A. Gray, Torrey's Beaksedge. Savannas, seepage bogs, often weedy. July-September. Se. MA south to GA. [= C, F, G, GW, K, RAB, Y, Z; = *Rynchospora torreyana* – S]

Rhynchospora tracyi Britton, Tracy's Beaksedge. Cypress savannas and graminoid-dominated depressions, in small, clay-based Carolina bays or shallow limesink ponds (dolines), typically in shallow water or at the lower margins of pond-shores.

June-September. A Southeastern Coastal Plain endemic: s. NC south to s. FL, west to s. MS (Sorrie & Leonard 1999); disjunct in sw. LA; West Indies, Belize. [= FNA, K, GW, RAB, WH, Y; = *Rynchospora tracyi* – S]

Rhynchospora wrightiana Böckler, Wright's Beaksedge. Wet savannas. July-September. Se. VA south to c. FL and west to s. AL; West Indies. Appearing to merge with *R. fascicularis* var. *distans* on the outer Coastal Plain of NC. Leaves are most frequently filiform and < 1 mm wide; rarely flat and to 1.3 mm wide. [= FNA, GW, K, RAB, WH, Y, Z; < *Rynchospora wrightiana* – S (also see *R. brachychaeta*)]

Schoenoplectiella K. Lye 2003 (Bulrush)

A genus of ca. 45 species, annual (rarely perennial) herbs, subcosmopolitan, but especially tropical/subtropical and Asian. As demonstrated by Lye (2003), Jung & Choi (2010), Muasya et al. (2009), and Shiels & Monfils (2012), *Schoenoplectiella* is morphologically, genetically, and phylogenetically distinct from *Schoenoplectus* and warrants generic status. The circumscription corresponds to *Schoenoplectus* sections *Supini* and *Actaeogeton*. References: Shiels & Monfils (2012)=Z; Lye (2003); Muasya et al. (2009); Jung & Choi (2010).

1 Perianth bristles absent; achenes 1.2-1.6 mm long, transversely rugose; plants bearing solitary pistillate (amphicarpic) flowers enclosed in the basal leaf sheaths, these differing in many ways from the "normal" flowers of the terminal inflorescence; [section *Supini* {of *Schoenoplectus*}].
  2 Achenes biconvex to obscurely trigonous, the faces convex ..... ***S. erecta*** *ssp.* ***raynalii***
  2 Achenes biconvex, with a planar or concave area on the adaxial surface ..... ***S. hallii***
1 Perianth bristles 5-6; achenes 1.5-2.0 mm long, smooth, finely pitted, or finely papillose; plants with only "normal" terminal inflorescence; [section *Actaeogeton* {of *Schoenoplectus*}].
  3 Culms 2-3 mm thick, acutely triangular in ×-section..... ***S. mucronata***
  3 Culms 1-2 mm thick, cylindric in ×-section.
    14 Achenes 1.75-2.0 mm long, unequally biconvex (rounded on both faces, but less so on one than the other), rounded-obovate, broadly cuneate at the base, rounded at the apex ..... ***S. purshiana***
    14 Achenes 1.5-1.8 mm long, planoconvex (nearly flat on 1 face), obovate, cuneate at the base, subtruncate at the apex ..... ***S. smithii***

Schoenoplectiella erecta (Poiret) K. Lye *ssp.* ***raynalii*** (Schuyler) Beentje. Sandy or peaty, seasonally wet soils (such as on pond shores). September-October. Apparently ranging from SC south to c. peninsular FL and sw. GA; also in the tropics of both hemispheres. [= *Schoenoplectus erectus* (Poiret) Palla ex J. Raynal ssp. *raynalii* (Schuyler) K. Lye – FNA, K; < *Scirpus hallii* A. Gray – RAB, misapplied; ? *Scirpus erismaniae* Schuyler – GW; = *Scirpus erectus* Poiret var. *raynalii* (Schuyler) B.F. Hansen & Wunderlin – WH; < *Scirpus erectus* Poiret]

Schoenoplectiella hallii (A. Gray) K. Lye, Sharpscale Bulrush. Pond shores in peaty sands. It has also been reported for our area by RAB, and is apparently included in our area by C, as *Scirpus supinus* Linnaeus var. *hallii* (A. Gray) A. Gray, and by others; at least some of these reports are misidentifications of the similar *S. erectus*. It is reported for sw. GA by Jones & Coile (1988) and Smith in FNA (2002b). It is very similar to *S. erectus*, differing in having the spikelet scales yellow brown (vs. reddish brown) and achenes concave on the ventral surface (vs. bulging on the ventral surface). [= *Schoenoplectus hallii* (A. Gray) S.G. Smith – FNA, K; = *Scirpus supinus* Linnaeus var. *hallii* (A. Gray) A. Gray – C; = *Scirpus hallii* A. Gray]

* ***Schoenoplectiella mucronata*** (Linnaeus) J. Jung & H.K. Choi, Rough-seed Bulrush. Ponds, ditches, ricefields, disturbed wet ground; native of Eurasia. September. Weed (native of Eurasia) in rice fields and other disturbed situations, known from old collections in PA, NJ, NY and more recently from VA (Virginia Botanical Associates 2009), KY, and TN. [= *Schoenoplectus mucronatus* (Linnaeus) Palla – FNA, K, Pa; = *Scirpus mucronatus* Linnaeus]

Schoenoplectiella purshiana (Fernald) K Lye, Bluntscale Bulrush. Marshes. Late June-August; July-October. ME west to MN, south to nc. GA (Jones & Coile 1988), AL, MS, TN, and KY. Often divided into two varieties based on the presence or absence of perianth bristles (see synonymy). [= *Schoenoplectus purshianus* (Fernald) M.T. Strong – FNA, K, Z; = *Scirpus purshianus* Fernald – C, F, GW, RAB, W, WV; > *Scirpus smithii* var. *williamsii* (Fernald) Beetle – G; > *Schoenoplectus purshianus* var. *purshianus* – Pa; ? *Scirpus debilis* Pursh – S, misapplied; > *Schoenoplectiella purshiana* var. *purchiana* – Z; > *Schoenoplectiella purshiana* var. *williamsii* (Fernald) Shiels & Monfils – Z; ? *Scirpus juncoides* Roxburg var. *digynus* (Böckler) T. Koyama; > *Scirpus juncoides* var. *williamsii* (Fernald) T. Koyama]

Schoenoplectiella smithii (Fernald) Shiels & Monfils, Smith's Bulrush, Bluntscale Bulrush. Gravelly intertidal beaches, millponds, Atlantic white-cedar swamps. July; Late July-August. QC west to MN, south to NJ, DE, ne. VA, PA, n. OH, and IL. Reported from mountains of sw. VA. The varieties recognized in *Schoenoplectus* by Smith in FNA (2002b) and transferred to *Schoenoplectiella* by Shiels & Monfils (2012) are of uncertain value; all three are in or approach our area. Var. *smithii* (south to DE, NJ, and PA) has perianth bristles absent or rudimentary. Var. *levisetus* (with a historic occurrence in VA) has 1-4 perianth bristles, much shorter than to equaling the achene, the bristles smooth or sparsely retrorsely barbed. Var. *setosus* (with records from NC, DE, and MD) has 4-6 perianth bristles, as long as or longer than the achene, and densely retrorsely barbed. [= *Schoenoplectus smithii* (A. Gray) Soják – K, Z; = *Scirpus smithii* A. Gray – C, F; > *Scirpus smithii* var. *smithii* – G; > *Schoenoplectus smithii* var. *smithii* – FNA, Pa; > *Schoenoplectus smithii* var. *setosus* (Fernald) S.G. Smith – FNA; > *Schoenoplectus smithii* var. *levisetus* (Fernald) S.G. Smith – FNA; > *Schoenoplectiella smithii* var. *smithii* – Z; > *Schoenoplectiella smithii* var. *leviseta* (Fassett) Shiels & Monfils – Z; > *Schoenoplectiella smithii* var. *setosa* (Fernald) Shiels & Monfils – Z]

Schoenoplectus (Reichenbach) Palla 1888 (Bulrush)

A genus of about 50 species, herbs, cosmopolitan in distribution. Micromorphologic and anatomic studies have confirmed earlier opinions based on morphology that *Schoenoplectus* is not closely related to *Scirpus* (Strong 1994, Smith 1995, Schuyler, pers. comm.). Most investigators now also favor the separation of *Bolboschoenus* from *Schoenoplectus* (Pignotti & Mariotti 2004). References: Strong (1994)=Z; Smith (1995)=Y; Smith in FNA (2002b); Goetghebeur in Kubitzki (1998b); Pignotti & Mariotti (2004). [also see *Bolboschoenus* and *Schoenoplectiella*]

1 Main involucral bracts 2-8, spreading and foliaceous (the inflorescence thus appearing terminal); rhizomes bearing ovoid tubers; bristles persistent on the achene; achenes 2.5-5 mm long (including body and apiculus) ..... **[**see ***Bolboschoenus*****]**
1 Main involucral bract 1 (rarely with an additional 1-2 lateral bracts), erect and terete or triangular, appearing as a continuation of the culm (the inflorescence thus appearing lateral, though in some species the longer inflorescence branches may overtop the bract); rhizomes not bearing tubers; bristles falling from the achene; achenes 1.0-4.5 mm long (including body and apiculus).
2 Spikelets on stalks of varying lengths, at least some clearly not sessile.
3 Culms distinctly triangular in cross-section, more sharply so above than below, nearly terete near the base; [section *Malacogeton*] .... ***S. etuberculatus***
3 Culms terete throughout, or obscurely triangular above; [section *Schoenoplectus*].
4 Spikelets appearing dull gray-brown, the scales copiously covered with red-brown dots (as seen at 10×) 6-15 mm long; lower and middle scales (3.0-) 3.5-4.0 mm long; culms firm, not easily compressed ..... ***S. acutus*** *var.* ***acutus***
4 Spikelets appearing reddish-brown, the scales not obviously dotted (as seen at 10×), 6-11 mm long; lower and middle scales (2.0-) 2.5-3.0 (-3.5) mm long; culms soft, easily compressed.
5 Perianth bristles plumose; spikelets acute; culms obscurely triangular near the inflorescence ..... ***S. californicus***
5 Perianth bristles retrorsely barbed; spikelets obtuse; culms terete throughout their length..... ***S. tabernaemontani***
2 Spikelets all sessile, in a cluster at one point (rarely with 1 or 2 short branches to 5 mm long).
6 Spikelet solitary; leaves numerous; plant usually aquatic, the culms and leaves flaccid, supported by the water; [section *Malacogeton*]... ..... ***S. subterminalis***
6 Spikelets (1-) 2-several; leaves 1-4; usually of wet places, but the culms stiff and erect, not floating.
7 Cespitose annual or perennial; culms terete (or acutely triangular in *Schoenoplectiella mucronata*), 1-6 dm tall .... [see ***Schoenoplectiella***]
7 Rhizomatous perennial; culms triangular in cross-section, usually 5-20 dm tall.
8 Leaves elongate, > ½ as long as the culms; achenes trigonous; styles 3-branched; [section *Malacogeton*]..... ***S. torreyi***
8 Leaves short, < ½ as long as the culms; achenes plano-convex; styles 2 (-3) branched; [*Schoenoplectus pungens* complex of section *Schoenoplectus*].
9 Sides of the culm strongly concave, wing-angled; culms 3-10 mm in diameter; main involucral bract 1-2.5 (-6) cm long; spikelet scale with apical notch 0.1-0.4 mm deep ..... ***S. americanus***
9 Sides of the culm flat, slightly concave, or slightly convex; culms 1-6 mm in diameter; main involucral bract (1-) 3-20 cm long; spikelet scale with apical notch (0.3-) 0.5-1 mm deep.
10 Spikelets 3-35; achenes 1.9-2.6 mm long, biconvex; styles 2-fid ..... ***S. deltarum***
10 Spikelets 1-5 (-10); achenes (2.0-) 2.5-3.5 mm long, biconvex or trigonous; styles 2-3-fid ..... ***S. pungens*** *var.* ***pungens***

Schoenoplectus acutus (Muhlenberg ex Bigelow) Á. Löve & D. Löve *var.* ***acutus***, Hardstem Bulrush, Great Bulrush. Marshes. June-early August; August-October. The species is widespread in temperate North America; var. *acutus* is restricted to e. North America. [= FNA, K, Pa, Y; = *Scirpus acutus* Muhlenberg ex Willdenow – RAB, C, F, G, GW, W, WV; *? Schoenoplectus lacustris* Linnaeus ssp. *glaucus* (Smith) Hartman]

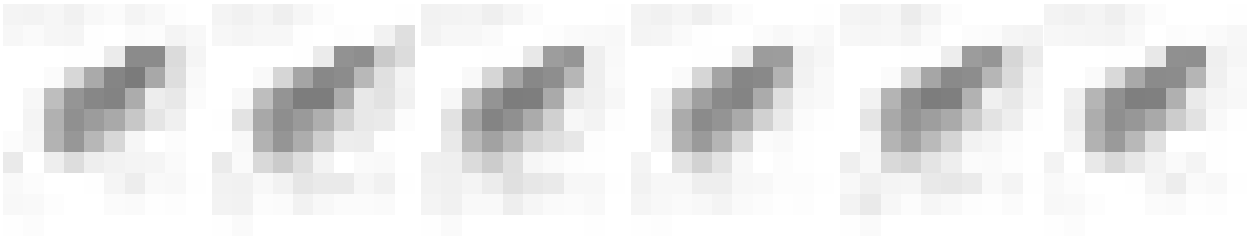
Schoenoplectus americanus (Persoon) Volk ex Schinzius & R. Keller, Olney Threesquare. Tidal freshwater to brackish marshes. Late May-June; June-September. NS west to WA, south to South America. Schuyler (1974) discusses the need to replace the name *S. olneyi* (as traditionally applied) with *S. americanus*, traditionally applied to what must now be called *S. pungens*. Because of this nomenclatural change, the interpretation of much information and records is now uncertain. [= FNA, K, Z; = *Scirpus americanus* Persoon – C, WH; = *Scirpus olneyi* – RAB, F, G, GW, S]

Schoenoplectus californicus (C.A. Meyer) Soják, Giant Bulrush, Southern Bulrush, Tule. Marshes. SC south to s. FL, west to TX, and extending s. into the New World tropics; on the west coast, from CA southward. [= FNA, K; = *Scirpus californicus* (C.A. Meyer) Steudel – GW, S, WH]

Schoenoplectus deltarum (Schuyler) Soják, Delta Bulrush. Brackish marshes and other wetlands. AL and FL west to KS and TX. [= FNA, K; = *Scirpus deltarum* Schuyler]

Schoenoplectus etuberculatus (Steudel) Soják, Swamp Bulrush, Canby's Bulrush. Beaver ponds, on peat in small depression ponds, in flowing blackwater streams. July-August; August-September. DE south to c. peninsular FL and west to e. TX (the distribution rather discontinuous); substantially disjunct in s. MO and RI. The hybrid *S. etuberculatus* × *subterminalis* has been collected in Hoke Co, NC and Lexington County, SC; it has sterile, malformed achenes. [= FNA, K, Z; = *Scirpus etuberculatus* (Steudel) Kuntze – RAB, C, F, G, GW, S, WH]

Schoenoplectus heterochaetus (Chase) Soják, Slender Bulrush. Fresh marshes and lakes. June-August. VT and QC west to AB, south to NY, PA, w.KY, TX, and CA. [= FNA, K, Pa; = *Scirpus heterochaetus* Chase – C, F, G]



Schoenoplectus pungens (Vahl) Palla *var.* ***pungens***, Common Threesquare, Chairmaker's Rush, Swordgrass. Marshes, rocky river beds. Mid May-June; June-September. The species is circumboreal, ranging in North America from NL (Newfoundland) west to AK, south to South America; var. *pungens* is widespread. This taxon has traditionally had the name *Scirpus americanus* applied to it; this name, however, is properly applied to the traditional *Scirpus olneyi*. *Schoenoplectus pungens* (or *Scirpus pungens*) becomes the correct name for this plant (Schuyler 1974). [= FNA, K, Y; < *Scirpus americanus* – RAB, F, G, GW, S, W, WV, misapplied; = *Scirpus pungens* Vahl var. *pungens* – C; < *Scirpus pungens* – Pa, WH; < *Schoenoplectus pungens* – Z]

Schoenoplectus subterminalis (Torrey) Soják, Swaying Rush, Water Bulrush. Beaver ponds, bogs, blackwater creeks, in highly acid water. May-June; June-August. NL (Newfoundland) west to s. AK, south to se. NC, nc. SC, MO, UT (?), and n. CA (the distribution discontinuous, especially southward). The hybrid *S. etuberculatus* × *subterminalis* has been collected in Hoke Co, NC and Lexington County, SC; it has sterile, malformed achenes. [= FNA, K, Z; = *Scirpus subterminalis* Torrey – RAB, C, F, G, GW, S, W]

Schoenoplectus tabernaemontani (C.C. Gmelin) Palla, Softstem Bulrush, Great Bulrush. Marshes, sedge meadows, streambeds, riverbeds, calcareous fens. June-September. NL (Newfoundland) west to AK, south to South America; also in Europe. [= FNA, K, Pa, Y; ? *Scirpus validus* Vahl – C, F, G, GW, RAB, S; > *Scirpus validus* var. *validus* – F; > *Scirpus validus* var. *creber* Fernald – F, WV; = *Scirpus tabernaemontani* K.C. Gmelin – W, WH; ? *Schoenoplectus validus* (Vahl) A. & D. Löve – Z; ? *Schoenoplectus lacustris* Linnaeus ssp. *validus* (Vahl) T. Koyama var. *validus*; = *Scirpus lacustris* Linnaeus var. *tabernaemontani* (C.C. Gmelin) Döll]

Schoenoplectus torreyi (Olney) Palla, Torrey's Bulrush, Torrey's Threesquare. Sinkhole ponds. July-September. NB west to MB, south to NJ, PA, WV, w. VA, MO, and NE. Known in VA only from natural ponds in Augusta and Rockingham counties. [= FNA, K, Pa, Z; = *Scirpus torreyi* Olney – C, F, G, W]

Schoenus Linnaeus 1753 (Blacksedge, Bogrush)

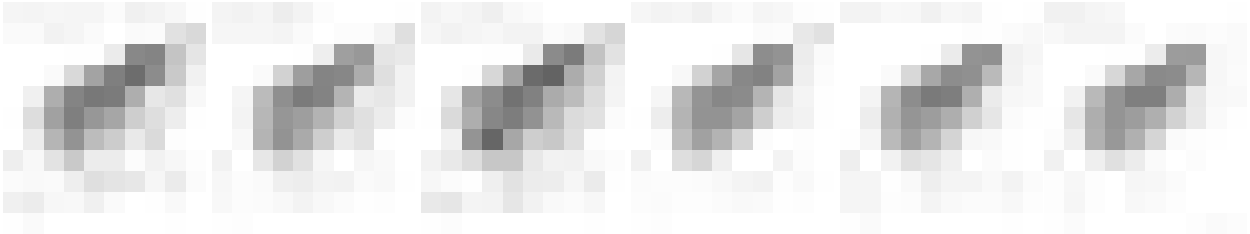
A genus of about 100 species, herbs, mainly of Australia and Malesia. References: Goetghebeur in Kubitzki (1998b).

Schoenus nigricans Linnaeus, Blacksedge, Black Bog-rush. Marshes, calcareous bogs, wet flatwoods, always with either calcareous or saline influence. April-July. Panhandle FL, TX, CA and AZ south into Mexico; West Indies; Old World tropics and subtropics. [= FNA, GW, K, S, WH]

Scirpoides Scheuchzer ex Séguier (Round-headed Bulrush)

A genus of ca. 5 species, herbs, of tropical and warm temperate Europe, Africa, and nw. Asia. References: Goetghebeur in Kubitzki (1998b).

* ***Scirpoides holoschoenus*** (Linnaeus) Soják, Round-headed Bulrush. Ore piles; probably only a waif, native of Eurasia. [= K2; = *Scirpus holoschoenus* Linnaeus]



Scirpus Linnaeus 1753 (Bulrush)

A genus of about 20 species, herbs, of circumboreal distribution, also with species in Australia, Malaysia, and South America. The complex of species including *S. atrovirens*, *S. georgianus*, *S. hattorianus*, *S. flaccidifolius* are difficult to identify, and some have doubted their validity. Although further work on this group is needed, they do generally appear to behave as biological species despite their morphological similarity. Schuyler (1967) writes that "the remaining species in the key differ in minute characteristics and often the most satisfactory means of identification is by carefully comparing specimens of them. Despite the close morphological similarity of these species, their characteristics are reasonably constant even in areas where they coexist and

occasionally hybridize." References: Whittemore & Schuyler in FNA (2002b); Schuyler (1967)=Z; Strong (1994)=Y;. Key adapted from C, FNA, GW, and Z. [also see *Bolboschoenus*, *Isolepis*, *Oxycaryum*, *Schoenoplectiella*, *Schoenoplectus*, and *Trichophorum*]

1 Bristles smooth, without teeth along the margins, strongly contorted and greatly exceeding the achenes when extended.
2 Scales usually with prominent green midribs; mature bristles mostly contained within the scales; achenes1.0-1.3 mm long, brown to purplish-brown when mature.
3 Perianth bristles (extended) shorter than, equal to, or slightly exceeding the achene; mature culms lax, the inflorescences lopping over to (or nearly to) the ground, with 2-3 lateral inflorescences in addition to the terminal one; rays of the inflorescence scabrous throughout their lengths, ascending to divergent, with axillary bulblets ..... ***S. lineatus***
3 Perianth bristles (extended) exceeding the achene by 2-3×; mature culms rigid, nearly upright, with 0-2 lateral inflorescences in addition to the terminal one; rays of the inflorescence glabrous for most of their lengths (moderately scabrous toward outer end), ascending, lacking axillary bulblets..... ***S. pendulus***
2 Scales usually with inconspicuous midribs; mature bristles exceeding the scales and giving the inflorescence a woolly appearance; achenes 0.6-1.0 mm long, whitish, pale, brown, dark brown or black.
4 Plants colonial by elongate rhizomes; scales 2-3.1 mm long; achenes reddish-brown; [NJ northward]..... ***S. longii***
4 Plants cespitose in tussocks; scales 1.1-2.2 mm long; achenes tan to whitish; [collectively widespread].
5 Achenes maturing August-September; spikelets in dense cymes of 2-15, the central spikelet sessile, the others either sessile or pedicellate; [widespread]..... ***S. cyperinus***
5 Achenes maturing June-July; spikelets in open cymes, the central spikelet sessile, the others pedicellate; [NJ, PA, WV, OH, and KY northward].
6 Achenes maturing late June to early July; scales usually blackish, at least toward the tip; involucral bracts solid black at base; [WV northward]..... ***S. atrocinctus***
6 Achenes maturing July; scales pale brown (rarely some black along the midrib); involucral bracts brownish at base (sometimes bordered with black); [n. NJ, OH, c. KY, and MO northward] ..... ***S. pedicellatus***
1 Bristles with retrorse or antrorse teeth along the margins, strongly contorted to nearly straight, shorter than to greatly exceeding the achenes when extended (or bristles absent or nearly so in *S. georgianus*).
7 Spikelets all solitary with distinct pedicels; mature scales with broad green midribs; achenes with protruding angles and concave sides..... ..... ***S. divaricatus***
7 Spikelets all or mostly in glomerules with the pedicels scarcely developed; mature scales with midribs not usually green; achenes less sharply trigonous, the sides convex, flat, or slightly concave.
8 Culms with 10-20 leaves; spikelets broadly ovate; scales reddish-brown and, excluding the tips, about as wide as long..... ***S. polyphyllus***
8 Culms with 2-10 leaves; spikelets broadly ovate to narrowly ovate; scales brown or black and, excluding the tips, mostly longer than wide.
9 Bristle teeth thick-walled and sharp-pointed, densely arranged almost to the base of the bristle.
10 Plants cespitose with short, brownish rhizomes; leaf sheaths green throughout; scales broadest above the middle; achenes 0.6-0.8 mm wide ..... ***S. ancistrochaetus***
10 Plants spreading with long, reddish rhizomes having conspicuous nodes and internodes; lower leaf sheaths red-tinged near their bases; scales usually broadest below the middle; achenes (0.6-) 0.8-1.0 mm wide.
11 Styles 3-fid; achenes trigonous, with poorly-developed receptacles from which the bristles readily detach; [widespread] .... ***S. expansus***
11 Styles 2 (-3)-fid; achenes biconvex with well-developed receptacles with persistent bristles; [from NJ, WV, and KY northward] ***S. microcarpus***
9 Bristle teeth thin-walled and with rounded tips, mostly restricted to the upper 2/3 of the bristle (or bristles absent or nearly so in *S. georgianus*).
12 Bristles 0-3, shorter than the achenes; teeth, if present, concentrated near the tips of the bristles ..... ***S. georgianus***
12 Bristles usually 5-6, shorter than to slightly longer than the achenes; teeth extending basally from the tips of all or at least some of the bristles.
13 Scales 1.6-2.8 mm long, terminating in a flattened or terete awn 0.4-0.6 (1.2) mm long..... ***[S. pallidus]***
13 Scales 1.0-2.1 mm long, terminating in a mucro 0.1-0.3 (-0.4) mm long.
14 Mature culms lax and reclining with the inflorescences lopping over to (or nearly to) the ground; glomerules usually with < 15 spikelets; lower scales of spikelets slightly mucronate, blackish..... ***S. flaccidifolius***
14 Mature culms upright or nearly so; glomerules frequently with > 15 spikelets; lower scales of spikelets mucronate, blackish or brownish.
15 Lower leaf blades and sheaths usually nodose-septate; spikelets ovate or narrowly ovate; scales mostly brownish; longer bristles frequently exceeding the achenes; achenes 1.0-1.3 mm long..... ***S. atrovirens***
15 Lower leaf blades and sheaths nearly smooth; spikelets broadly ovate or ovate; scales mostly blackish; longer bristles usually shorter than or about equaling the achenes; achenes 0.8-1.1 mm long..... ***S. hattorianus***

Scirpus ancistrochaetus Schuyler, Northeastern Bulrush. Mountain ponds. July-September. VT, MA, and NY south to PA, e. WV, and w. VA. See Bartgis (1992) and Schuyler (1962) for additional information on this species. [= FNA, K, Pa, Z; < *S. atrovirens* var. *atrovirens* – C]

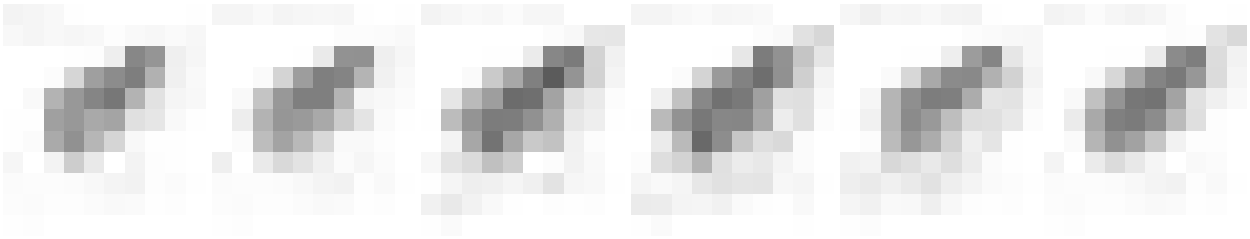
Scirpus atrocinctus Fernald. Bogs, wet meadows. Late June-early July. NL (Newfoundland) and NL (Labrador) west to NT and BC, south to n. NJ, WV (Grant, Hampshire, Harrison, Pendleton, Pocahontas, Randolph, and Tucker counties), IL, IA, SD, WY, and WA. [= FNA, F, K, Pa, WV; < *S. cyperinus* (Linnaeus) Kunth – C, G]

Scirpus atrovirens Willdenow, Black Bulrush. Marshes. Late June-September. NL (Newfoundland) west to MN, south to GA and TX; disjunct in AZ. [= FNA, K, Pa, Z; < *S. atrovirens* – GW, RAB, S, W; < *S. atrovirens* var. *atrovirens* – C, F, G, WV]

Scirpus cyperinus (Linnaeus) Kunth, Woolgrass Bulrush. Marshes, ditches, beaver ponds, disturbed wet ground. (July-) August-September. NL (Newfoundland) west to BC, south to c. peninsular FL, e. TX, and OR. The varieties may be worthy of recognition. [= FNA, GW, K, Pa, RAB, W, WH; < *S. cyperinus* – C; > *S. cyperinus* var. *cyperinus* – F, WV; > *S. cyperinus* var. *pelius* Fernald – F, WV; > *S. rubricosus* Fernald – F, WV; > *S. cyperinus* – G, S; > *S. eriophorum* Michaux – G, S]

Scirpus divaricatus Elliott. Swamp forests. July-September. Se. VA south to Panhandle FL, west to e. TX, s. TN, and s. MO. [= RAB, C, F, FNA, G, GW, K, S, WH, Z]

Scirpus expansus Fernald, Woodland Bulrush. Bogs, marshes, streambeds. July-September. ME west to MI, south to ne. GA and OH. [= C, F, FNA, G, GW, K, Pa, RAB, W, Z; < *S. sylvaticus* Linnaeus – S, misapplied; = *S. expanus* – WV, misspelling]



Scirpus flaccidifolius (Fernald) Schuyler, Reclining Bulrush. Bottomlands. July-September. Endemic to se. VA and ne. NC. Ludwig (1993) found the following characters to be most useful in distinguishing *S. flaccidifolius* from *S. georgianus* growing in the same region: bristles 1.2-1.4 mm long (vs. absent or mostly < 0.2, rarely to 1.0 mm long in *S. georgianus*), spikelets 1.5-2.1 mm wide (vs. 1.1-2.2 mm wide), spikelets 3-9 (-12) per glomerule (vs. 4-23), and inflorescence rays 5.5-17.9 cm long (vs. 3.5-13.5 cm long). Bristle length was the only character which consistently separated the 2 species; other characters showed overlapping values of possibly statistical value. [= FNA, K, Z; < *S. atrovirens* var. *atrovirens* – C; = *S. atrovirens* Willdenow var. *flaccidifolius* Fernald – F]

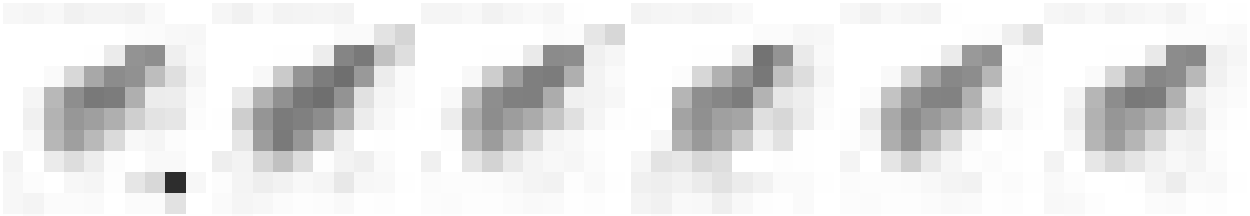
Scirpus georgianus R.M. Harper, Georgia Bulrush. Marshes, wet areas, ditches; common. July-September. PE west to NE, south to GA and e. TX. [= FNA, K, Pa, S, Z; < *S. atrovirens* – GW, RAB, W; < *S. atrovirens* var. *atrovirens* – C; = *S. atrovirens* Willdenow var. *georgianus* (R.M. Harper) Fernald – F, G, WV]

Scirpus hattorianus Makino, Northern Bulrush. Seepages, ditches, marshes, mostly at moderate to high elevations. June-September. NL (Newfoundland) to w. ON and WI, south to MD, NC, OH, and IN. [= FNA, K, Pa, Z; < *S. atrovirens* – GW, RAB, W; < *S. atrovirens* var. *atrovirens* – C, F, G, WV]

Scirpus lineatus Michaux. Swamp forests over coquina limestone ("marl"). May-July. Se. VA south to c. peninsular FL, west to LA. Reported for a single county (Tucker County) in WV (Harmon, Ford-Werntz, & Grafton 2006). [= C, FNA, GW, K, WH, Z; = *S. fontinalis* R.M. Harper – RAB, F, S; > *S. fontinalis* var. *virginiana* Fernald – G]

Scirpus longii Fernald. Marshes. NS south to s. NJ. Also reported as occurring in e. NC by Radford, Ahles, & Bell (1968) and Fernald (1950); this report is in error. [= FNA, C, F, G, K]

Scirpus microcarpus J. & K. Presl. Marshes. June-July. NL (Newfoundland) and NL (Labrador) west to AK, south to n. NJ, e. WV (Monongalia, Pocahontas, Randolph, and Tucker counties), KY, IL, IA, NE, NM, AZ, and CA. [= FNA, C, K, Pa; > *S. rubrotinctus* Fernald – F, G, WV]



Scirpus pallidus (Britton) Fernald, Cloaked Bulrush. Marshes. ON west to BC, south to WI, MO, TX, NM, AZ, OR. Possibly disjunct (and if so, probably introduced) in se. PA (reported by Rhoads & Klein [1993] but not by Rhoads & Block [2007]) and NJ (Kartesz [1999, 2010], with no definite county location). [= F, FNA, K; = *S. atrovirens* Willdenow var. *pallidus* Britton – C, G] {rejected as part of our flora; not mapped}

Scirpus pedicellatus Fernald. Marshes. July. NL (Newfoundland), ON and MN south to n. NJ, OH, c. KY, and MO. [= F, FNA, K, Pa; < *S. cyperinus* (Linnaeus) Kunth – C, G]

Scirpus pendulus Muhlenberg. Mt (GA, VA, WV), Pd (DE, NC, SC, VA), Cp (DE, FL, NC, SC, VA): wet ground over limestone, diabase, or other circumneutral rocks; rare. June-July. ME west to MN, SD, and CO, south to NC, ne. FL, NM, and n. Mexico. [= C, FNA, GW, K, Pa, W, WH, Z; = *S. lineatus* – RAB, F, G, S, WV, misapplied]

Scirpus polyphyllus Vahl. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, VA): marshes, mountain bogs; common (rare in DE Coastal Plain). July-September. MA and VT west to IL and s. MO, south to nc. GA (Jones & Coile 1988) and AL. [= C, F, FNA, G, GW, K, Pa, RAB, S, W, WV, Z]

Scleria P.J. Bergius 1765 (Nutrush)
(by Richard J. LeBlond)

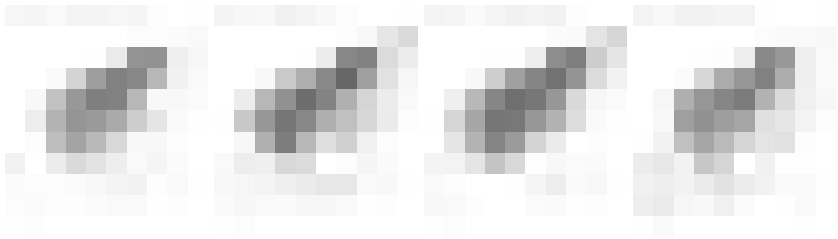
A genus of about 250 species, herbs, pantropical, and locally extending into warm temperate regions. This treatment attempts to recognize the stablest and most distinctive *Scleria* entities. Intermediate and otherwise difficult-to-classify specimens are occasionally encountered within some species groups, suggesting hybridization or incomplete speciation. This is particularly true within the *S. ciliata/pauciflora* group (here boldly treated as four species and two varieties). This complex genus likely will continue to challenge and exasperate those who study it. References: Kessler (1987)=Z; Fairey (1967)=Y; Reznicek, Fairey, & Whittemore in FNA (2002b); Core (1936); Goetghebeur in Kubitzki (1998b).

Identification notes: *Scleria* superficially resembles *Rhynchospora* in the field, but mature specimens are readily recognized by the terete white, gray, or black bony achenes. Hardened achenes are necessary for reliable identification to species. In the key, achene length includes hypogynium when present. The scale character applies only to the ultimate bracteate structure clasping the achene.

1 Base of achene without hypogynium (a circular, angular, lobed, or tuberculate disk differing in texture and structure from the achene body), the achene base constricted, pitted, and/or ribbed, but appearing as a continuation of the achene body.
2 Inflorescence of 2-9 sessile clusters along an axis up to 13 cm long, the individual spikelets 2-5 mm long; bracts (at least above proximal cluster) setaceous.
3 Plants perennial with rhizomes; leaf blades usually pubescent, 1.5-5 mm wide; bract and scale margins long-ciliate; spikelets 4-5 mm long; achenes smooth.....***S. distans***
3 Plants annual with fibrous roots; leaf blades glabrous, 0.5-2 mm wide; bract and scale margins eciliate; spikelets 2-3 (-4) mm long; achenes reticulate-papillose to reticulate-verrucose .....***S. verticillata***
2 Inflorescence of a single cluster, the individual spikelets 4-10 mm long; bracts foliaceous.
4 Triangular base of achene lacking pits in the three concave sides; achene 3-4 mm long.....***S. baldwinii***
4 Triangular base of achene with a pair of pits on each of the three sides; achene 2-3 mm long.....***S. georgiana***
1 Base of achene with hypogynium.
5 Achene body smooth (often longitudinally ribbed); hypogynium with 0, 8, or 9 tubercles.
6 Hypogynium with 8 or 9 minutely papillate tubercles .....***S. oligantha***
6 Minutely papillate portion of hypogynium continuous, not divided into separate tubercles.
7 Achene 1-2 mm long; culm 1-2 mm wide at base; leaves 1-3 mm wide.....***S. minor***
7 Achene 2-4 mm long; culm 2.5-6 mm wide at base; leaves 5-9 mm wide.
8 Plants cespitose to short-rhizomatous; sheaths brown or straminous to reddish, glabrous to glabrate on the ventral surface except for a pubescent and usually thickened summit; inflorescences terminal and lateral; achenes 2.0-3.3 mm long, (1.12-) avg. 1.25 (-1.38× as long as wide; hypogynium surface with laterally and apically rounded papillae; [of wet to mesic pinelands].....***S. triglomerata***
8 Plants long-rhizomatous or cespitose; sheaths purple to reddish, the ventral surface uniformly pubescent; inflorescences terminal only or terminal and lateral; achenes 2.5-4.0 mm long, (1.35-) avg. 1.45 (-1.54)× as long as wide; hypogynium surface with rounded or flattened papillae; habitats various.
9 Plants usually cespitose; inflorescence terminal and lateral (a few culms in a clump can be terminal only); hypogynium surface with laterally flattened and apically triangular-acute to acuminate papillae, often resembling shards of glass or porcelain; [of coastal hammocks, oak woods near saltwater, and blackwater swamps] ..... ***S. flaccida***
9 Plants usually long-rhizomatous; inflorescence terminal only; hypogynium surface with laterally and apically rounded papillae; [mostly of dry to dry-mesic pinelands and barrens].....***S. nitida***
5 Achene reticulate or papillose, rarely smooth (most often from apparent abortion or abnormal development); hypogynium with 3 tongue-shaped lobes, or 3 or 6 tubercles.
10 Hypogynium of 3 tongue-shaped lobes appressed to the underside of the achene (appearing nearly bract-like); achene reticulate, the pits generally squarish or rectangular and arranged regularly in rows, rarely smooth (apparently by abortion or abnormal development).
11 Achene pubescent (occasionally becoming glabrate); lower lateral inflorescences on long, filiform, usually drooping peduncles; bract of the uppermost lateral inflorescence usually reaching from 1/3-3/4 the length of the terminal internode; terminal internode 6-30 cm long .....***S. muehlenbergii***
11 Achene glabrous; lower lateral inflorescences sessile or on short-erect peduncles; bract of the uppermost lateral panicle usually reaching 3/4 the length of to exceeding the terminal internode; terminal internode 3-8 cm long.....***S. reticularis***
10 Hypogynium with 3 or 6 tubercles; achene papillose, sometimes reticulate (if so, the pits generally variable in shape and not forming regular rows), or rarely smooth.
12 Achenes 1.5-2 mm long, the hypogynium with 6 paired but distinctly separate tubercles.
13 Culms, leaves, and bracts copiously villous-cilliate with spreading hairs 0.5-1 mm long..... ***S. pauciflora*** *var.* ***caroliniana***
13 Culms, leaves, and bracts glabrous or sparsely hirtellous, but not copiously villous-ciliate..... ***S. pauciflora*** *var.* ***pauciflora***
12 Achenes 2.0-3.6 mm long, the hypogynium with 3 tubercles, these often 2-lobed, the lobes united (becoming separate in *S.* species 1 with achenes smoothish and > 2.5 mm long).
14 Achenes 2-2.5(-3) mm long, 1.5-2.0(-2.3) mm wide; larger leaves 1-3.5 mm wide; culms, sheaths, blades, and bracts glabrous to moderately pubescent or ciliate.
15 Culms and/or sheaths hairy; blades and bracts ciliate; plants of loamy sands (e.g., ultisols) .....***S. ciliata*** *var.* ***ciliata***
15 Culms, sheaths, blades, and bracts glabrous; plants of sandy soils (e.g., spodosols)..... ***S. ciliata*** *var.* ***glabra***
14 Achenes 2.6-3.3(-3.6) mm long, 2.0-2.6 mm wide; larger leaves 3-7 mm wide; culms, sheaths, blades, and bracts moderately to densely pubescent and/or ciliate; plants usually of loamy soils (e.g., ultisols and alfisols).
16 Herbage pubescent between as well as along primary sheath and adaxial leaf surface nerves and culm angles; most pistillate scales pubescent with appressed hairs 0.1 (-0.2) mm long, the keel similarly pubescent or ciliate with hairs (0.1-)0.2 mm long; achene body distinctly papillose, 2.0-2.4 (-2.5) mm wide, averaging 2.2 mm, the length:width ratio 1.2-1.5 (-1.7); hypogynium with 3 usually lobed tubercles .....***S. elliottii***
16 Herbage pubescence restricted to primary sheath and leaf surface nerves and culm angles; pistillate scales glabrous, the keel ciliate with glutinous hairs, the longer 0.5-1.0 mm; achene body smoothish, uneven with low, broad non-papillose rises, (2.3-) 2.4-2.6 mm wide, averaging 2.5 mm, the length:width ratio 1.1-1.25; hypogynium with 3 deeply lobed tubercles, or 6 paired but separate tubercles.....***S. species 1***

Scleria baldwinii (Torrey) Steudel, Baldwin's Nutrush. Cp (FL, GA, NC, SC): wet savannas, under *Pinus serotina*, *P. palustris*, and/or *Taxodium ascendens*; uncommon (rare in GA, NC, and SC). June-July. Se. NC south to s. FL and west to se. TX; also in Cuba and the Bahamas (Sorrie & LeBlond 1997). *S. baldwinii* is a more robust plant, with larger achenes, than *S. georgiana*. [= RAB, FNA, K, GW, WH]

Scleria ciliata Michaux var. ***ciliata***, Hairy Nutrush. Cp, Pd (GA, NC, SC, VA), Mt (NC, SC), {FL}: wet to dry sandy thickets and flatwoods, typically on sandy soil; frequent, rare in the mountains, rare in VA (VA Rare). May-August. VA south to FL, west to MO and TX, and in the West Indies, Mexico, and Central America. [= FNA, S, Y; < *S. ciliata* – RAB, C, F, G, GW, W; < *S. ciliata* var. *ciliata* – K, WH] {not yet mapped}



Scleria ciliata Michaux var. ***glabra*** (Chapman) Fairey, Smooth Nutrush. Savannas and flatwoods. NC south to FL, west to TX. *S. ciliata* var. *curtissii* (Britton) Kessler (=*S. pauciflora* Muhl. ex Willd. var. *curtissii* (Britton) Fairey) is currently of uncertain taxonomic standing. It is distinguished by its reticulate, non-papillose achenes, but such a condition has been observed in achenes with the hypogynium lobing of both *S. ciliata* and *S. pauciflora* (as suggested by the synonymy), and may only represent a form or condition. [= FNA, Y, K; > *S. brittonii* Core ex Small – S; < *S. ciliata* – RAB, C, F, G, GW, W; < *S. ciliata* var. *glabra* – K, WH; > *S. ciliata* var *curtissii* (Britton) Kessler – Z; > *S. pauciflora* Muhl. ex Willd. var. *curtissii* (Britton) Fairey – K] {not yet mapped}

Scleria distans Poiret in J. Lamarck et al., Riverswamp Nutrush. Moist sandy or peaty soil of pine savannas and flatwoods, boggy areas, and wet openings along roads. May-October. GA south to s. FL west to TX; West Indies; Mexico, Central and South America; Africa. [= FNA, WH; ? *S. hirtella* Swartz – GW, K, S, Y, Z, misapplied]

Scleria elliottii Chapman, Broad-leaved Hairy Nutrush. Savannas, flatwoods, pine-oak woodlands, meadows, bogs, and clay-based Carolina bays, typically on loamy sands. May-September. VA south to FL, west to TX, MO, OK. The descriptions of *S. elliottii* in S and of *S. ciliata* Michaux var. *elliottii* (Chapman) Fernald in F do not include the entity here treated as *S. species 1*. [= S; = *S. ciliata* Michaux var. *elliottii* (Chapman) Fernald – F, FNA, Y; < *S. ciliata* var. *ciliata* – K, WH; < *S. ciliata* – RAB, C, G, GW, W] {not yet mapped}

Scleria flaccida Steudel, Flaccid Nutrush. Blackwater swamps, coastal hammocks, oak woods and thickets near saltwater. Scattered along the outer Coastal Plain from se. VA to s. FL and west to LA. This is a poorly known species, with more locations likely to be found upon re-examination of *S. triglomerata* and *S. nitida* specimens. The often pendulus and capillary lateral peduncles suggest *S. oligantha*, another swamp species. *S. oligantha* is most readily separated by its 8-9-lobed hypogynium with minute rounded papillae. [= F. < *S. triglomerata* Michaux – RAB, C, FNA, GW, K, S, WH; < *S. nitida* – G]

Scleria georgiana Core, Georgia Nutrush. Pine savannas, cypress savannas, depression meadows, mostly on the outer Coastal Plain. June-August. E. NC south to s. FL, west to TX; and in the West Indies, Central and South America. See note under *S. baldwinii*. [= RAB, FNA, GW, K, WH; = *S. gracilis* Elliott – S (name preoccupied)]

Scleria lithosperma (Linnaeus) Swartz. Wet pine savannas. S. FL and s. LA south into Mexico, Central America and South America; West Indies; tropical Asia and Africa. [= FNA, GW, S, WH] {not yet keyed}

Scleria minor W. Stone, Slender Nutrush. Wet savannas and peaty seepages in the Coastal Plain and Sandhills, bogs in the Mountains. June-August. NJ south to FL, west to se. TX. [= RAB, C, F, FNA, G, K, Pa, W; < *S. triglomerata* – GW, S]

Scleria muehlenbergii Steudel, Pitted Nutrush. Open wet sand, pine savannas and flatwoods, depression meadows, cypress savannas, limesink ponds, bogs. June-September. NY (Long Island), NJ, and NC south to FL, west to TX, north in the interior to MO and IN; also in the West Indies, Bahamas (Sorrie & LeBlond 1997), Mexico, and Central America. *S. muehlenbergii* is adapted to a variety of freshwater wetland habitats, while *S. reticularis* is primarily restricted to the drawdown zones of limesink (doline) ponds and clay-based Carolina bays. Also see notes under *S. reticularis*. In normal specimens, the achene reticulation ridges are sharp-edged and steeply sloped (compare *S. reticularis*). The achene pubescence is often tawny, and achenes appearing superficially glabrous often have a tawny residue under magnification. [= FNA, K; < *S. reticularis* Michaux – RAB, C, GW, W, WH; = *S. muhlenbergii* – F, orthographic variant; = *S. reticularis* var. *pubescens* Britton – G; = *S. setacea* Poiret – S]

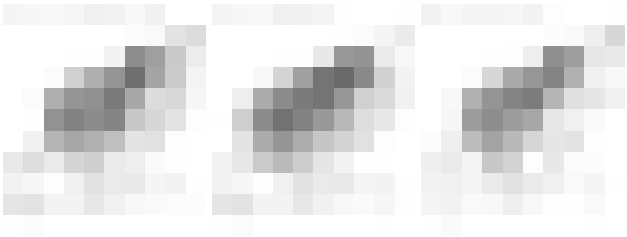
Scleria nitida Willdenow, Shining Nutrush. Cp (DE, FL, NC, SC, VA), Mt (NC, SC, VA), Pd (DE, NC, SC, VA) {FL, GA?}: dry sandy or rocky soil of pine/scrub oak woodlands, ridgetop forests at lower elevations in the Mountains such as pine/oak heaths, and heath balds; uncommon (rare in DE). May-October. MA, VA, and KY south to FL, west to LA and MO (also see note under *S. triglomerata*). [= F; < *S. nitida* – G; < *S. triglomerata* Michaux – RAB, C, FNA, GW, K, S, W, WH] {not yet mapped}

Scleria oligantha Michaux, Few-flowered Nutrush. Dry to moist forests and woodlands, swamp forests. June-September. NJ and MO south to c. peninsular FL and TX, also in Puerto Rico, Mexico, and Central America. The long, filiform, arching lateral peduncles are distinctive. [= RAB, C, F, FNA, G, GW, K, S, W, WH]

Scleria pauciflora Muhlenberg ex Willdenow *var*. ***caroliniana*** A. Wood, Carolina Nutrush. Cp (GA, NC, SC, VA?): savannas; uncommon. June-September. NH west to MI, south to n. FL, TN, and MO. [= F, FNA, G, K; < *S. pauciflora* – RAB, C, GW, S, W] (not yet mapped}

Scleria pauciflora Muhlenberg ex Willdenow *var*. ***pauciflora***, Papillose Nutrush. Cp (GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): wet to dry pine flatwoods, pine savannas, depression meadows; common (rare in WV). June-September. NJ west to KS, south to FL and TX, also in Cuba. Typification of *S. pauciflora* is controversial and unresolved at this time (Fairey & Whittemore 1999). [= F, FNA, G, K; < *S. pauciflora* – RAB, C, GW, S, W] {not yet mapped}

Scleria reticularis Michaux, Netted Nutrush. Limesink ponds, clay-based Carolina bays. June-September. MA south to FL, west to TX, north to IN, MI, and WI. Reports from Mexico are based on *S. muehlenbergii*. See notes under *S. muehlenbergii*. In normal specimens, the achene reticulation ridges are soft-edged and obliquely sloped. Occasional stipitate-capitate fungal growth on the achene has been mistaken for pubescence (a condition perhaps restricted to herbarium specimens), apparently contributing to the unwarranted agglomeration of this distinctive taxon and *S. muehlenbergii*. There is controversy about typification of the name *Scleria reticularis* (Camelbeke, Reznicek, & Goetghebeur 2003). [= F, FNA, K, S; < *S. reticularis* – RAB, C, GW, W, WH (also see *S. muehlenbergii)*; = *S. reticularis* var. *reticularis* – G]



Scleria species 1, Smooth-seeded Hairy Nutrush. Wet savannas shallowly underlain by coquina limestone in the Coastal Plain, and apparently in diabase glades and barrens in the Piedmont. May-September. Currently known only from Granville, Onslow, and Pender counties, NC. In the Coastal Plain, it is associated with other narrow endemics such as *Thalictrum cooleyi*, *Allium species 1*, and *Carex lutea.*

Scleria triglomerata Michaux, Tall Nutrush. Wet to mesic flatwoods, savannas, and hardwood forests. May-September. VT and ON west to MN, south to s. FL and TX. *S. triglomerata* sensu lato also occurs in Puerto Rico and Mexico, and may include *S. nitida* and *S. flaccida*. [= F, G; < *S. triglomerata* – RAB, C, FNA, GW, K, S, W, WH, WV]

Scleria verticillata Muhlenberg ex Willdenow, Savanna Nutrush. Wet calcareous savannas of the outer coastal plain, freshwater marshes and maritime wet grasslands on barrier islands influenced by salt spray and shell deposits, wet calcareous or mafic fens or seepages in the mountains, calcareous grasslands. July-September. MA and ON west to MN, south to FL and TX, also in the West Indies, Mexico, Central and South America. This species is a distinct calciphile, with only scattered occurrences in most of our area. The roots are strongly fragrant. [= RAB, C, F, FNA, G, GW, K, S, WH]

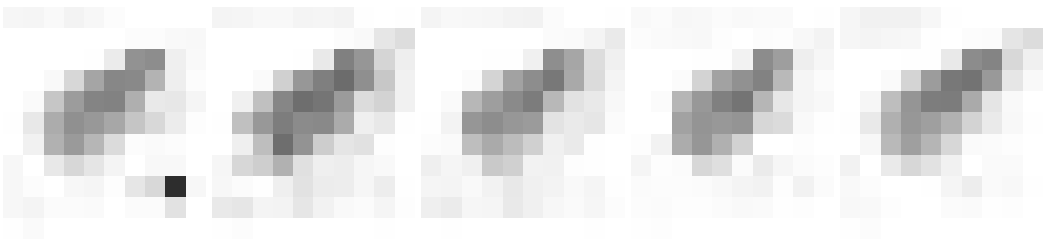
Trichophorum Persoon (Deergrass)

A genus of about 10 species, herbs, primarily circumboreal, but with disjunct occurrence in montane tropical Asia and montane tropical South America. *Trichophorum* has long been recognized as distinct from *Scirpus* by many authors (especially in Europe and Asia). Molecular and other studies have clearly confirmed that these species are more closely allied to *Eriophorum* than to *Scirpus*, and their removal from *Scirpus* creates a more natural classification (Strong 1994). *Trichophorum* resembles *Eriophorum* in most morphologic characters, and shares with it a generally boreal and north temperate distribution. *Trichophorum alpinum* (Linnaeus) Persoon demonstrates previous confusion over the affinities of the group; it has been variously treated (by those who do not recognize *Trichophorum*) as *Eriophorum alpinum* Linnaeus or *Scirpus hudsonianus* (Michaux) Fernald. References: Crins in FNA (2002b); Strong (1994)=Z; Goetghebeur in Kubitzki (1998b).

1 Culms terete or nearly so, smooth; [(in our area) of moderate to high elevation cliffs] ..... ***T. caespitosum*** *ssp.* ***caespitosum***
1 Culms sharply triangular in cross-section, the angles scabrous; [plants of low to moderate elevation forests, woodlands, and bluffs] ..... ***Tr planifolium***

Trichophorum caespitosum (Linnaeus) Schur *ssp.* ***caespitosum***, Deergrass, Deerhair Bulrush. Cliffs receiving fog/cloud deposition and seepage, mostly at high elevations, over amphibolite, granite, gneiss, or schist, notably at Grandfather Mountain, Roan Mountain, Whiteside Mountain, and Chimney Rock. July-September. A circumboreal tundra and alpine species, south in North America to the mountains of New England and fens in NY, and to n. IL, MN, montane UT, and OR, common in wet tundra and on alpine summits, disjunct (from NY) to about a dozen sites in the Southern Appalachians of w. NC, e. TN, sw. SC, and ne. GA (Jones & Coile 1988). The disjunct southern occurrences are certainly relicts of a more widespread distribution during the Pleistocene. Reported for South Carolina by Hill & Horn (1997) and Hill (1999). [< *Trichophorum caespitosum* – K; > *Scirpus cespitosus* var. *callosus* Bigelow – RAB, F, G; < *Scirpus cespitosus* Linnaeus – C, W; < *Trichophorum cespitosum* – FNA, orthographic variant; < *Scirpus caespitosus* – S; *? Baeothryon cespitosum* (Linnaeus) A. Dietrich]

Trichophorum planifolium (Sprengel) Palla. Woodlands, bluffs, forests. May-June. ME west to ON, south to sc. VA, e. WV, KY, OH, and se. MO. See Crins (1989a) for an interesting discussion of this species. [= FNA, K, Pa, Z; = *Scirpus verecundus* Fernald – C, F, G, W, WV; = *Scirpus clintonii* – S, misapplied]



106. POACEAE (R. Brown) Barnhart 1895 *or GRAMINEAE* A.L. de Jussieu 1789 (Grass Family) [in POALES]

A family of about 670 genera and 10,000 species, herbs (and some shrubs and trees), cosmopolitan. Tribal classification largely follows FNA (2003a, 2007a), with some changes based on subsequent research, as for instance in the Chloridoideae (Peterson, Romaschenko, & Johnson 2010a). References: Flora of North America Editorial Committee (2003a, 2007a)=FNA; Hitchcock and Chase (1950)=HC; Blomquist (1948); Peterson, Romaschenko, & Johnson (2010a, 2010b). Key to genera adapted in large part from FNA.

1 Plant a shrub or tree (the culms perennial, woody, to 25 m tall), with complex branching systems from the upper nodes; leaves strongly dimorphic, those of the main culm sheathing, those of the branches or culm tips pseudopetiolate ..... **Key A (woody grasses – tribe *Bambuseae*)**
1 Plant an herb (the culms annual, not truly woody, to 5 m tall), lacking complex branching systems from the upper nodes; leaves not dimorphic, none of them pseudopetiolate.
2 Plant a robust grass, culms usually > 2 m tall and usually > 5 mm in diameter at the base ..... **Key B (robust herbaceous grasses)**
2 Plant a small to medium grass, culms < 2 m tall and usually also < 5 mm in diameter at the base.
3 Spikelets **either** modified into asexual, purplish bulblets, **or** partially or wholly concealed either by spines, hooks, and/or involucres, or by being imbedded in a fleshy rachis or cob.
4 Fertile spikelets **either** absent (spikelets modified into asexual, purplish bulblets) **or** variously spiny or bead like ..... **Key C (bur, bead, or bulblet grasses)**
4 Fertile spikelets embedded in a fleshy rachis (resembling a rattail) or a cob ..... **Key D (rattail or cob grases)**
3 Spikelets apparent, not covered, concealed, embedded, or modified by spines, hooks, or involucres.
5 Spikelets 2-flowered, often dorsally compressed, falling entire at maturity (the abscission below the glumes), the upper floret usually bisexual, the lower one male or sterile.
6 Glumes often as long as or longer than the lemmas and conceling the florets; spikelets usually arranged in obvious pairs or triplets, with 1 spikelet sessile or shortly pedicellate and the other 1 (or 2) spikelets pedicellate (the pedicellate sometimes vestigial or absent ..... **Key E (grasses of tribe *Andropogoneae*)**
6 Glumes (the lower or both) shorter than the lemmas (or the glumes absent); spikelets not organized in pairs or triplets ..... **Key F (grasses of tribe *Paniceae*)**
5 Spikelets 1-, 2-, or many-flowered, usually terete or somewhat laterally compressed, **either** abscising at maturity above the glumes **or** if 2-flowered then both florets bisexual, or the upper sterile.
7 Inflorescence of one or more spikes, the spikelets sessile (or very short-pedicelled) on the spike axis, 1-more per node, characteristically in 2-more ranks (these either on opposite sides of the axis or crowded on one side), the individual spikelets borne more-or-less touching one another.
8 Spikelets borne in a single terminal spike or raceme (an extension of the culm), usually 2-ranked on opposite sides of the axis ..... **Key G (wheat grasses, mainly of tribe *Triticeae*)**
8 Spikelets borne on 1-many spikes (the spikes themselves arranged digitately, subdigitately, or racemosely on the culm) in 2 (or more) rows; spikelets often on one side of the spike axis ..... **Key H (finger grasses)**
7 Inflorescence paniculate, sometimes somewhat to very congested, but then not as above.
9 Spikelets with a single bisexual floret, and no staminate, sterile, or reduced florets present.
10 Glumes absent or reduced to tiny rudiments; palea 1-keeled; [of wetlands] ..... **Key I (rice grasses, of tribe *Oryzeae*)**
10 Glumes present; palea various; [habitats various].
11 Inflorescences dense and spikelike, symmetrical, cylindrical or ovoid, unbranched ..... **KeyJ (dense spike grasses)**
11 Inflorescences loose and open, or if relatively dense, then with discernible branches, and thus lobed or asymmetrical.
12 Lemmas awnless ..... **Key K (grasses with 1 floret and unawned lemmas)**
12 Lemmas awned ..... **Key L (grasses with 1 floret and awned lemmas)**
9 Spikelets with 2-many florets, including bisexual, staminate, reduced, or sterile flowers.
13 Glumes (one or both) nearly equaling or surpassing the most apical lemma of the spikelet, therefore partially or completely concealing the florets ..... **Key M (grasses with 2+ florets, these concealed by glumes)**
13 Glumes (both) shorter than the most apical lemma of the spikelet, therefore the florets largely visible ..... **Key N (grasses with 2+ florets, these readily visible)**

Key A – bamboo grasses (woody trees and shrub grasses) (tribe *Bambuseae*)

Identification notes: key based on Stapleton (2007). Other genera are grown and may be expected to persist and vegetativelt spread in our area.

1 Rhizomes pachymorph, having root-bearing internodes thicker than the culm; culms usually in single clumps ..... ***Bambusa***
1 Rhizomes leptomorph, root-bearing internodes thinner than the culm; culms solitary or in many connected clumps.
2 Mid-culm branches consistently 2, unequal, rarely with a smaller central third branch ..... ***Phyllostachys***
2 Mid-culm branches not consistently 2, initially 1-9.
3 Dwarf bamboos, < 1 (-1.5) m tall.
4 Leaf blade margins not or only slightly bleached in winter, terminal blade parallel to shoot axis, blades often variegated ..... ***Pleioblastus***
4 Leaf blade margins more or less bleached in winter, terminal blade often angled from shoot axis, blades usually not variegated ..... ***[Sasa]***
3 Medium-stature to tall bamboo, > 1 m tall.
5 Mid-culm branches initially 5-9 ..... ***Pleioblastus***
5 Mid-culm branches initially 1-3 (-5).
6 Mid-culm branches (1-) 2-7; branches and leaves small to medium relative to culm size; [native] ..... ***Arundinaria***
6 Mid-culm branches 1 (-3); branch and leaves often very large relative to culm size; [alien].
7 Leaf blade margins not bleached in winter, terminal blade parallel to shoot axis; culm buds initially open or closed ..... ***Pseudosasa***
7 Leaf blade margins bleached in winter, terminal blade often deflexed from shoot axis; culm buds initially closed ..... ***[Sasa]***

Key B – robust herbaceous grasses

1 Inflorescence an array of spikes, the spikelets closely imbricate in 2 rows along the rachis of the spikes, the spikes alternate along the primary inflorescence axis; [tribe *Zoysieae*; subtribe *Sporobolinae*] ..... ***Spartina***
1 Inflorescence otherwise, **either** the spikelets embedded or in grooves in an thickened rachis, **or** the inflorescence a slender or broad panicle.
2 Spikelets embedded in the thickened rachis (the inflorescence thus like an ear of corn), or fitting into grooves in the thickened rachis (the inflorescence thus cylindrical and resembling a rat's tail).
3 Spikelets unisexual, with male and female spikelets in separate inflorescences or in different parts of the same inflorescence; [tribe *Andropogoneae*].
4 Racemes of mixed sex (female below, male above) ..... ***Tripsacum***
4 Racemes of single sex ..... ***Zea***
2 Spikelets not embedded or fitting into grooves in the rachis, the inflorescence a slender or broad panicle (the spikelets visibly separate and often pedicelled).
5 Spikelets with a single floret, this unisexual (either pistillate or staminate); plants with aerenchymatous culms, [plants of seasonally or tidally flooded wetlands]; [tribe *Oryzeae*].
6 Pistillate spikelets on the upper branches of the panicle, staminate spikelets on the lower branches; lemmas and paleas clasping along their margins; plants annual ..... ***Zizania***
6 Pistillate and staminate spikelets intermingled on the sam branches of the inflorescence; lemma margins free; plants perennial ..... ***Zizanopsis***
5 Spikelets with 2 or more florets, at least some of these bisexual; plants without aerenchymatous culms, [plants of uplands or temporarily to seasonally flooded wetlands].
7 Spikelets with 2-8 florets, these bisexual.
8 Leaves primarily basal; [tribe *Danthonieae*] ..... ***Cortaderia***
8 Leaves cauline; [tribe *Arundineae*].
9 Lemmas pilose; rachilla glabrous; plants short-rhizomatous (somewhat clumped); culms to 10 m tall; [plants of uplands or saturated or temporarily flooded wetlands] ..... ***Arundo***
9 Lemmas glabrous; rachilla sericeous; plants long rizomatous; culms to 4 m tall; [plants of uplands or saturated, tidally flooded, or seasonally flooded wetlands] ..... ***Phragmites***
7 Spikelets almost always with 2 florets, the lower florets sterile or staminate (sometimes reduced to lemmas or completely absent).
10 Spikelets falling separately, not attached to rachis segments, stalks, or bristles; spikelets <2× as long as wide; [tribe *Paniceae*].
11 Spikelets (at least the terminal) subtended by 1-many stiff, terete bristles ..... ***Setaria***
11 Spikelets not subtended by stiff bristles.
12 Fertile lemma rugose with cross-venation ..... ***Megathyrsus***
12 Fertile lemma smooth or hairy, not rugose ..... ***Panicum***
10 Spikelets falling with attached rachis segments, stalks, or bristles; spikelets >3× as long as wide; [tribe *Andropogoneae*].
13 Pedicelled spikelet similar to the sessile spikelet, both fertile.
14 Spikelets falling in pairs together with sections of the disarticulating rachis ..... ***Saccharum***
14 Spikelets falling separately from the persistent rachis ..... ***Miscanthus***
13 Pedicelled spikelet differing from the sessile in shape and sex (sometimes represented only by a pedicel).
15 Inflorescence of 2-13 digitate (whorled) racemes borne at the summit of a peduncle, the peduncle subtended by a raceme sheath ..... ***Andropogon***
15 Inflorescence a panicle, the branches not subtended by sheaths.
16 Pedicelled spikelet represented by pedicel only; apex of sheath bearing 2 auricles 1-10 mm long; [native] ..... ***Sorghastrum***
16 Pedicelled spikelet present, staminate; apex of sheath truncate; [alien] ..... ***Sorghum***

Key C – bur, bead, or bulblet grasses of various tribes

1 Fertile spikelets absent (spikelets modified into asexual, purplish bulblets) **or** variously spiny or bead like; [tribe *Poeae*] ..... ***Poa***
1 Fertile spikelets variously spiny or bead-like.
2 Pistillate spikelets concealed within a hard, beadlike shell, this white, black, or variously colored; [tribe *Andropogoneae*] ..... ***Coix***
2 Spikelets concealed in a variously spiny bur, this green or tan, sometimes with pink or purple shading.
3 Bur formed from accrescent branchlets, with fewer and less regularly arranged straight prickles (these typically retrorsely scabrous); [tribe *Paniceae*] ..... ***Cenchrus***
3 Bur formed from an enlarged glume, with 5-7 rows of hooked prickles; [tribe *Cynodonteae*; subtribe *Traginae*] ..... ***Tragus***

Key D – rattail or cob grasses

1 All spikelets unisexual, the pistillate and staminate spikelets either in separate inflorescences, or the pistillate spikelets below the staminate spikelets in the same inflorescence; leaves 9-120 mm wide; [tribe *Andropogoneae*].
2 Pistillate spikelets below the staminate in the same inflorescence ..... ***Tripsacum***
2 Pistillate and staminate spikelets in separate inflorescences, the pistillate inflorescences axillary, staminate inflorescences terminal ..... ***Zea***
1 Some spikelets bisexual; leaves 1-25 mm wide.
3 Spikelets with 2-7 florets, the lower bisexual and fertile, the upper sometimes sterile; [tribe *Triticeae*] ..... ***Aegilops***
3 Spikelets with at most 2 florets, the lower staminate or sterile, the upper bisexual, staminate, or sterile.
4 Culms 2-45 cm tall; leaves 1-5 mm wide; plants annual (perennial in *Eremochloa* and *Stenotaphrum*).
5 Plants obviously and prominently rhizomatous (*Eremochloa*) or stoloniferous (*Stenotaphrum*); lower glume with pectinate margins (*Eremochloa*) or irregularly toothed (*Stenotaphrum*)
6 Plant rhizomatous; lower glume with pectinate margins; [commonly naturalized turf grass and roadside weed]; [tribe *Andropogoneae*] ..... ***Eremochloa***
6 Plant stoloniferous; lower glume irregularly toothed; [naturalized turf grass and allegedly also native]; [tribe *Paniceae*] .....

.....***Stenotaphrum***
5 Plants annual; lower glume with smooth and cartilaginous margins (or absent); [rare waifs]; [tribe *Poeae*].
7 Spikelets with 1(-2) glume.....***Hainardia***
7 Spikelets with 2 glumes .....***Parapholis***
4 Culms 30-400 cm tall; leaves 2-25 mm wide; plants annual or perennial; [tribe *Andropogoneae*].
8 Lower glumes of the sessile spikelets rough, rugose, pitted, tuberculate or alveolate between the keels.
9 Perennial (cespitose or rhizomatous); sessile spikelets ovate; lower glumes of the sessile spikelet rugose or pitted; [native] .....
.....***Coelorachis***
9 Annual; sessile spikelets hemispheric; lower glumes of the sessile spikelet alveolate; [alien weed].....***Hackelochloa***
8 Lower glumes of the sessile spikelets smooth or scabrous.
10 Pedicels at least partially fused to the rame axes.....***Rottboellia***
10 Pedicels appressed, but not fused, to the rame axes
11 Pedicellate spikelets 1-3 mm long .....***Coelorachis***
11 Pedicellate spikelets 4-8 mm long .....***Elionurus***

Key E – grasses of tribe *Andropogoneae* (also including grasses also keyed in Keys B, C, and D)

1 Leaves ovate-lanceolate, 2-10 cm long, 2.5-7× as long as wide; plants weak-stemmed annuals, branching, decumbent, rooting at the lower nodes; [alien weeds].
2 Leaves cordate-clasping at base; spikelets not paired, unaccompanied by a vestige.....***Arthraxon***
2 Leaves tapering to a broadly cuneate base; spikelets paired (one of the pair sometimes vestigial).....***Microstegium***
1 Leaves lanceolate to linear, either longer or proportionately narrower; plants either perennial or coarse annuals with erect and mostly unbranched culms.
3 Spikelets embedded in the thickened rachis (the inflorescence thus like an ear of corn), or fitting into grooves in the thickened rachis (the inflorescence thus cylindrical and resembling a rat's tail), or the pistillate inflorescences enclosed in a hard, bead-like, pearly-white, modified bract.
4 Spikelets unisexual, with male and female spikelets in separate inflorescences or in different parts of the same inflorescence.
5 Internode narrower than and more-or-less enclosed by the female spikelet.....***Coix***
5 Internode broader than and more-or-less enclosing the female spikelet.
6 Racemes of mixed sex, female flowers below, and male above.....***Tripsacum***
6 Racemes of single sex, the female inflorescences (“ears”) borne on axillary branches, the male inflorescences (“tassels”) terminal on the culm .....***Zea***
4 Spikelets, or at least one of each pair, bisexual.
5 Culms 2-45 cm tall; leaves 1-5 mm wide; plants perennial, obviously and prominently rhizomatous; lower glume with pectinate margins; [commonly naturalized turf grass and roadside weed].....***Eremochloa***
5 Culms 30-400 cm tall; leaves 2-25 mm wide; plants annual or perennial, cespitose or short-rhizomatous; lower glume winged or not, but not pectinate.
6 Lower glumes of the sessile spikelets rough, rugose, pitted, tuberculate or alveolate between the keels.
7 Perennial (cespitose or rhizomatous); sessile spikelets ovate; lower glumes of the sessile spikelet rugose or pitted; [native].....
.....***Coelorachis***
7 Annual; sessile spikelets hemispheric; lower glumes of the sessile spikelet alveolate; [alien weed] .....***Hackelochloa***
6 Lower glumes of the sessile spikelets smooth or scabrous.
8 Pedicels at least partially fused to the rame axes .....***Rottboellia***
8 Pedicels appressed, but not fused, to the rame axes
9 Pedicellate spikelets 1-3 mm long.....***Coelorachis***
9 Pedicellate spikelets 4-8 mm long.....***Elionurus***
3 Spikelets not embedded or fitting into grooves in the rachis, the rachis slender (the spikelets visibly separate and often pedicelled).
10 Pedicelled spikelet similar to the sessile spikelet, both fertile.
11 Spikelets falling in pairs together with sections of the disarticulating rachis.....***Saccharum***
11 Spikelets falling separately from the persistent rachis.
12 Panicle contracted, spikelike; glumes membranous .....***Imperata***
12 Panicle loose; glumes cartilaginous or coriaceous .....***Miscanthus***
9 Pedicelled spikelet differing from the sessile in shape and sex (sometimes represented only by a pedicel).
13 Spikelets awned, the awn 10-20 cm long.
14 First glume lacking glands; panicle open, the branches 5-8 cm long.....***Chrysopogon***
14 First glume with a row of punctate, concave glands; panicle contracted, spikelike.....***Heteropogon***
13 Spikelets awned or not, if awned the awn < 5 cm long.
15 Inflorescence a panicle, the branches not subtended by sheaths.
16 Pedicelled spikelet represented by pedicel only; apex of sheath bearing 2 auricles 1-10 mm long; [native].....***Sorghastrum***
16 Pedicelled spikelet present, staminate; apex of sheath truncate; [alien].....***Sorghum***
15 Inflorescence of 1-13 digitate (whorled) racemes borne at the summit of a peduncle, the peduncle subtended by a raceme sheath.
17 Racemes 1 per peduncle and raceme sheath .....***Schizachyrium***
17 Racemes 2-13 per peduncle and raceme sheath.
18 Pedicels of the pedicelled (reduced or absent) spikelets terete or slightly flattened and grooved on one side only .....
.....***Andropogon***
18 Pedicels of the pedicelled (reduced or absent) spikelets strongly flattened and grooved on both sides, the central portion thin or membranous.....***Bothriochloa***

Key F – grasses of tribe *Paniceae* (also including grasses keyed as well in Keys B, C, D, and H)

1 Inflorescences spikelike branches, the spikelets partially embedded in the rachises.....***Stenotaphrum***
1 Inflorescences panicles or spikes (if spikes, the spikelets not embedded.

2 Spikelets (at least the terminal) subtended by 1-many stiff, terete bristles.
3 Bristles persistent on the inflorescence, each spikelet disarticulating above the bristles ..... ***Setaria***
3 Bristles falling with the spikelets at maturity (the disarticulation at the base of the fascicles).
4 Bristles glabrous, retrorsely scabrous, or strigose, usually at least some bristles fused > ½ their lengths ..... ***Cenchrus***
4 Bristles plumose or antrorsely scabrous, free or fused < ½ their lengths ..... ***Pennisetum***
2 Spikelets not subtended by stiff bristles.
5 Inflorescences of spikelike branches 1-3.7 cm long, the branch extending 2.5-4 mm beyond the attachment of the distal spikelets ..... ***Setaria***
5 Inflorescences not as above.
6 Upper florets laterally compressed ..... ***Melinis***
6 Upper florets dorsally compressed.
7 Lower glumes or lower lemmas awned.
8 Leaves > 10× as long as wide; ligules absent or of hairs ..... ***Echinochloa***
8 Leaves < 8× as long as wide; ligules present, membranous or of hairs.
9 Lower glumes unawned or very shortly so; upper glumes ciliate-margined; plants erect or basally decumbent ..... ***Alloteropsis***
9 Lower glumes awned; upper glumes not ciliate-margined; culms traling; plants strongly trailing, rooting at the nodes ..... ***Oplismenus***
7 Lower glumes and lower lemmas unawned.
11 Lemma margins flat, hyaline; lower glumes absent or < ¼ the length of the upper glume.
12 Subterranean (cleistogamous) inflorescence present; aerial inflorescences with elongate rachises; spikelets of the aerial inflorescences often sterile; spikelets glabrous; leaves either with a white cartilaginous margin or prominently ciliate; [of the Coastal Plain] ..... ***Amphicarpum***
12 Subterranean inflorescences absent; aerial inflorescences **either** with digitate or subdigitate branches and glabrous spikelets, **or** with elongate rachises and conspicuously pubescent spikelets; spikelets of the aerial inflorescences fertile; spikelets glabrous, ciliate, or pubescent; leaves various (often not as above); [collectively widespread]
13 Inflorescence a narrow panicle with the branches strongly ascending to appressed; spikelets ellipsoid to obovoid; [of Coastal Plain pinelands] ..... ***Anthenantia***
13 Inflorescence **either** a panicle with digitate or subdigitate clusters of spikelike branches **or** a broad panicle with widely divergent branches; [widespread] ..... ***Digitaria***
11 Lemma margins not hyaline, frequently involute; lower glumes various (absent, < ¼ the length, to longer than the upper glume).
14 Spikelets subtended by a cuplike callus ..... ***Eriochloa***
14 Spikelets not subtended by a cuplike callus.
15 Leaves primarily lacking ligules (at least the upper, and often all, leaves without ligules, if vestigial ligules present, these of hairs) ..... ***Echinochloa***
15 Leaves with ligules, these either membranous or of hairs.
16 Lower (sterile) palea indurate and expanding the spikelet at maturity, as long as the lower (sterile) lemma; lower and upper florets standing apart from one another at maturity; outer surface of the upper (fertile) palea with compound papillae ..... ***Steinchisma***
16 Lower (sterile) palea membranous, not expanding the spikelet at maturity, usually shorter than lower (sterile) lemma, or absent; lower and upper florets closely appressed at maturity; outer surface of the upper (fertile) palea lacking compound papillae.
17 Inflorescence of 1-sided, spikelike primary branches.
18 Spikelets with lower lemmas (and lower glumes, if present) adjacent to the branch axes.
19 Lower glumes absent ..... ***Axonopus***
19 Lower glumes present on at least most spikelets ..... ***Urochloa***
18 Spikelets with upper lemmas (and upper glumes, if present) adjacent or appressed to the branch axes.
20 Both glumes absent from all or most spikelets ..... ***Reimarochloa***
20 Upper or both glumes present on all spikelets.
21 Lower glumes usually absent; upper lemmas smooth to slightly rugose ..... ***Paspalum***
21 Lower glumes present; upper lemmas rugose and verrucose ..... ***Urochloa***
17 Inflorescence **either** paniculate with well-developed secondary branchlets **or** if the primary branches spikelike, then the spikelets not borne in a 1-sided arrangement on the spicate branches.
22 Inflorescences dense, the spikelets obscuring most of the internal branches ..... ***Sacciolepis***
22 Inflorescences open panicles, or if narrowed, all or or nearly all the panicle branches readily visible.
23 First glume 5-7.5 mm long, nearly as long as sterile lemma; fertile lemma 1/3 length of sterile lemma; rachilla prolonged between the florets ..... ***Phanopyrum***
23 First glume shorter, or if this long, then at most 3/4 length of sterile lemma; fertile lemma > ½ the length of the sterile lemma; rachilla not prolonged between the florets.
24 Plant developing a terminal ("spring") inflorescence usually before mid-summer, followed by lateral ("autumnal") inflorescences from lower, mid, and/or upper nodes, these often included or hidden among the fascicles of smaller "autumnal" leaves; often developing a rosette of overwintering basal leaves ..... ***Dichanthelium***
24 Plant developing a terminal inflorescence usually after mid-summer, the lateral inflorescences, when present, from the upper nodes, usually appearing at the same time as the terminal panicle, and not hidden by dense fascicles of smaller leaves; plants lacking a rosette of overwintering basal leaves.
25 Spikelets tuberculate ..... ***Panicum***
25 Spikelets smooth, not tuberculate.
26 Panicle < 2 cm wide at maturity.
27 Spikelets > 4.5 mm long; first glume > 2.4 mm long; ligule 4-6 mm long; [of coastal dunes] ..... ***Panicum***
27 Spikelets < 4 mm long; first glume < 2.1 mm long; ligule < 2 mm long; [not of coastal dunes].
28 Blades involute, 1.5-4 mm wide; culms wiry ..... ***Coleataenia***
28 Blades flat, the larger 6-20 mm wide; culms stout.

29 Panicles constricted, 0.3-1.6 cm wide; spikelets subsessile to short-pediceled; summit of fertile palea not enclosed by fertile lemma ..... ***Panicum***
29 Panicles > 1 cm wide; spikelets short to long-pediceled; summit of fertile palea enclosed by fertile lemma..... ***Coleataenia***
26 Panicle > 2 cm wide at maturity.
30 Fertile lemmas rugose with cross-venation between the main parallel veins ..... ***Megathyrsus***
30 Fertile lemmas not rugose.
31 Lower primary panicle branches in whorls of 4-7 at the nodes, stiffly spreading, naked on the proximal ½, the axils strongly pilose; lower culm internodes appressed papillose-pubescent; first glume acuminate, ½ as long as spikelet; fertile lemma chestnut brown at maturity..... ..... ***Panicum***
31 Plants without the above combination of characters.
32 Plants from a cluster of fibrous roots, without rhizomes or hard knotty crowns, annual..... ..... ***Panicum***
32 Plants with rhizomes or hard knotty crowns, perennial.
33 Plants with hard crowns, lacking rhizomes; fertile lemma 1.2-1.6 mm long ..... ***Coleataenia***
33 Plants with rhizomes; fertile lemma 1.6-4 mm long.
34 Rhizomes about 1 cm thick with pubescent scale-like leaves; lower portion of culm hard, nearly woody ..... ***Panicum***
34 Rhizomes less than 1 cm thick with glabrous scale-like leaves; culms not woody.
35 First glume truncate apically ..... ***Panicum***
35 First glume acute to obtuse.
36 Culms slightly compressed below; ligules 0.5 mm long or less; spikelet pedicels appressed, the spikelets subsecund, usually some obliquely bent above the first glume; fertile lemma 1.8-2.2 mm long..... ***Coleataenia***
36 Culms terete; ligules 1-6 mm long; at least some spikelet pedicels spreading, spikelets not at all secund, essentially straight; fertile lemma 2-4 mm long..... ..... ***Panicum***

Key G – wheat grasses of tribe *Triticeae* (and a few unrelated mimics)

1 Spikelets 2-7 at all or most nodes; [tribe *Triticeae*].
2 Spikelets 3 at each node (the central spikelets usually sessile, the lateral pedicellate)..... ***Hordeum***
2 Spikelets 2-5 at each node (if 3, all 3 sessile).
3 Lemmas rounded (sometimes slightly keeled towards the tip, but not scabrous); [common natives and aliens]..... ***Elymus***
3 Lemmas strongly keeled, the keel scabrous; [cultivated grass, rare as a waif or weakly naturalized]..... ***Secale***
1 Spikelets 1 at all or most nodes.
4 Spikelets borne on peduncles 0.5-2 mm long; [tribe *Brachypodieae*]..... ***Brachypodium***
4 Spikelets sessile.
5 Spikelets (not including the awns) >3× as long as the rachis internodes, strongly divergent (at nearly 90° to the rachis); [very rare alien]; [tribe *Triticeae*]..... ***Agropyron***
5 Spikelets (not including the awns) <3× as long as the rachis internodes.
6 Glumes subulate to narrowly lanceolate, narrowing from below midlength, with 1 (-3) veins at midlength; [tribe *Triticeae*] .... ***Pascopyrum***
6 Glumes broader, narrowing from beyond midlength, with 3-9 veins at midlength.
7 Spikelets placed edgewise to the rachis; first glume lacking except in the terminal spikelet; [tribe *Poeae*] ..... ***Lolium***
7 Spikelets placed flatwise to the rachis; first glume present; [tribe *Triticeae*].
8 Plants annuals; glumes often with lateral teeth or awns; glumes rounded or keeled; [aliens, rare out of cultivation].
9 Glumes rounded; spikelets in some species embedded into the thickened rachis..... ***Aegilops***
9 Glumes keeled; spikelets never embedded in a thickened rachis..... ***Triticum***
8 Plants perennials; glumes without lateral teeth or awns; glumes keeled; [natives or aliens].
10 Glumes acute to acuminate (and often awned); [common natives and aliens]..... ***Elymus***
10 Glumes truncate, obtuse, or acute; [rare aliens]..... ***Thinopyrum***

Key H – finger grasses

1 Spikelets 2-flowered, often dorsally compressed, falling entire at maturity (the abscission below the glumes), the upper floret usually bisexual, the lower one male or sterile; [tribe *Paniceae*]
2 Lemma margins not hyaline, frequently involute; lower glumes various (absent, < ¼ the length, or longer than the upper glume)..... ..... ***Digitaria***
2 Lemma margins hyaline, flat; lower glumes absent or < ¼ the length of the upper glume.
3 Spikelets with lower lemmas (and lower glumes, if present) adjacent to the branch axes.
4 Lower glumes absent..... ***Axonopus***
4 Lower glumes present on at least most spikelets ..... ***Urochloa***
3 Spikelets with upper lemmas (and upper glumes, if present) adjacent or appressed to the branch axes.
5 Both glumes absent from all or most spikelets ..... ***Reimarochloa***
5 Upper or both glumes present on all spikelets.
6 Lower glumes usually absent; upper lemmas smooth to slightly rugose ..... ***Paspalum***
6 Lower glumes present; upper lemmas rogose and verrucose..... ***Urochloa***
1 Spikelets 1-, 2-, or many-flowered, usually terete or somewhat laterally compressed, **either** abscising at maturing above the glumes **or** if 2-flowered then both florets bisexual, or the upper sterile; [tribes *Cynodonteae* and *Zoysieae*]

7 Spikes normally solitary (rarely 2), divergent at the summit of the culm; second glume with a recurved spine arising from the back; fresh plants aromatic with a citrus odor; [tribe *Cynodonteae*; subtribe "incertae sedis"]..... ***Ctenium***
7 Spikes normally 2 or more, alternate, digitate, subdigitate, or verticillate along the main inflorescence axis; second glume lacking a recurved spine; fresh plants not aromatic with a citrus odor.
8 Spikes arranged along the central inflorescence axis alternately, solitary at each node.
9 Spikelets with 1 bisexual floret, sometimes also with modified male, sterile, or rudimentary florets above the fertile floret.
10 Spikelets with modified male, sterile, or rudimentary florets above the fertile floret; [plants of uplands]; [tribe *Cynodonteae*; subtribe *Boutelouinae*]..... ***Bouteloua***
10 Spikelets lacking any modified florets; [plants of wetlands, primarily saline and coastal]; [tribe *Zoysieae*; subtribe *Sporobolinae*] .. .. ***Spartina***
9 Spikelets with 2 or more bisexual florets (sometimes also with additional reduced florets); [tribe *Cynodonteae*; subtribe *Eleusininae*].
12 Ligules 4-8 (-15) mm long, acute to attenuate, entire (lacerate only by tearing) ..... ***Diplachne***
12 Ligules 0.3-5.4 mm long, truncate to obtuse, erose or entire.
13 Lemmas 3-veined; ligule (0.2-) 0.5-5.5 (-7.0) mm long; apex erose or entire..... ***Dinebra***
13 Lemmas 5-veined; ligule 0.8-2.2 mm long, apex erose..... ***Disakisperma***
8 Spikes arranged along the central inflorescence axis in a digitate, subdigitate, or verticillate manner, all or most nodes with 2 or more spikes; [tribe *Cynodonteae*].
14 Spikelets with 1 fertile floret (there may also be 1 or more sterile florets); [tribe *Cynodonteae*; subtribe *Eleusininae*].
15 Spikelets lacking sterile florets ..... ***Cynodon***
15 Spikelets with 1 or more sterile florets.
16 Lowest lemmas awned (rarely unawned); upper glumes acute to acuminate, mucronate or short-awned..... ***Chloris***
16 Lowest lemmas unawned (or with an awn to 1.2 mm long); upper glumes truncate or bilobed, sometimes short-awned from between the lobes ..... ***Eustachys***
14 Spikelets with 2 or more fertile florets.
17 Spikes to 7 cm long, terminating in a point (the spikes acuminate); [tribe *Cynodonteae*; subtribe "incertae sedis"]..... ..... ***Dactyloctenium***
17 Spikes to 22 cm long, terminating in a functional or rudimentary spikelet (the spikes acute to obtuse); [tribe *Cynodonteae*; subtribe *Eleusininae*].
18 Lemmas glabrous..... ***Eleusine***
18 Lemmas pubescent, at least towards the base.
19 Lemma apices obtuse to truncate or emarginate..... ***Disakisperma***
19 Lemma apices acute..... ***Leptochloa***

Key I – rice grasses, of tribe *Oryzeae* (also including grasses keyed as well in Key B)

1 Lemma margins free; plants perennial.
2 Plants **either** < 1 m tall **or** a floating aquatic with lax stems to 1.5 m long ..... ***Luziola***
2 Plants 1-4 m tall, emergent, the stems stout, not lax..... ***Zizaniopsis***
1 Lemmas and paleas clasping along their margins; plants annual or perennial.
3 Spikelets either pistillate or staminate, the upper branches of the panicle with pistillate spikelets, the lower branches with staminate spikelets; grains terete..... ***Zizania***
3 Spikelets bisexual; grains laterally flattened.
4 Glumes absent and also lacking glume-like sterile florets subtending the floret; lemmas and paleas pectinately ciliate-hispid on the margins; [native]..... ***Leersia***
4 Glumes absent or greatly reduced, glume-like sterile florets subtending the fertile floret; lemmas and paleas glabrous or pubescent, but not pectinately ciliate hispid on the margins; [introduced]..... ***Oryza***

Key J – dense spike grasses

1 Lemma 8-11.5 (-14) mm long; [tribe *Poeae*]..... ***Ammophila***
1 Lemma 0.5-6 mm long.
2 Glumes awned; [tribe *Poeae*].
3 Glume awns prominently pilose..... ***Lagurus***
3 Glume awns not hairy
4 Glume awn 0.7-3 mm long; lemmas not awned ..... ***Phleum***
4 Glume awn 3-8 mm long; lemmas awned ..... ***Polypogon***
2 Glumes unawned.
5 Lemmas much shorter than the glumes; [tribe *Poeae*] ..... ***Gastridium***
5 Lemmas about equaling or longer than the glumes.
6 Lemmas about equaling the glumes; [tribe *Poeae*]..... ***Alopecurus***
6 Lemmas longer than the glumes; [tribe *Zoysieae*; subtribe *Sporobolinae*] ..... ***Crypsis***

Key K – grasses with 1 floret and unawned lemmas

1 Spikelets 18-32 mm long; [tribe *Poeae*] ..... ***Avena***
1 Spikelets 0.7-10.8 mm long.
2 Florets rigid, shining; glumes and lemmas rounded in ×-section, not keeled; spikelets 2.5-5 mm long; [tribe *Poeae*]..... ***Milium***
2 Florets soft, papery; glumes and lemmas keeled in ×-section; spikelets 0.7-10.8 mm long.
3 Florets with a conspicuous tuft of hairs on the callus; [tribe *Zoysieae*; subtribe *Sporobolinae*] ..... ***Calamovilfa***
3 Florets not conspicuously hairy on the callus.
4 Lemma 1-veined; ligule of hairs; grain becoming mucilaginous when wet; [tribe *Zoysieae*; subtribe *Sporobolinae*] ..... ***Sporobolus***

4 Lemma 1-5-veined; ligule a membrane (the summit sometimes ciliolate); grain not becoming mucilaginous when wet.
5 Lemmas faintly 5-veined; lower glume longer than the lemma; palea much shorter than the lemma (or absent); [tribe *Poeae*] ..... ***Agrostis***
5 Lemmas strongly 3-veined; lower glume shorter than (rarely equaling) the lemma; palea about equaling the lemma; [tribe *Cynodonteae*; subtribe *Muhlenbergiinae*] ..... ***Muhlenbergia***

{add *Polypogon*}

Key L – grasses with 1 floret and awned lemmas

1 Lemma awn 3-branched (the lateral 2 sometimes very reduced compared to the central); [tribe *Aristideae*] ..... ***Aristida***
1 Lemma awned with a simple awn.
2 Upper glumes present, 1-veined; lower glumes absent or much shorter than the upper glumes and veinless; [tribe *Brachyelyteae*] ..... ***Brachyelytrum***
2 Both glumes present, 1-many-veined.
3 Lemma hardened, distinctly different than the glumes in texture when mature; [tribe *Stipeae*].
4 Rhizomatous perennials; primary leaves cauline (the basal leaves < 2 cm long or merely represented by sheaths), 8-16 mm wide..... ***Patis***
4 Cespitose perennials; primary leaves basally disposed, 0.2-10 mm wide.
5 Leaves > 4 mm wide.
6 Florets 2.5-3.5 mm long; awns 3.4 mm long; [alien, rarely naturalized]..... ***Piptatherum***
6 Florets 5-13 mm long; awns **either** 7-15 **or** 30-120 mm long; [aliens or natives].
7 Leaves 2-8 mm wide, not twisted at the base; awns 30-120 mm long..... ***Nassella***
7 Leaves 4-10 mm wide, the base twisted so that the abaxial surface is uppermost; awns 7-15 mm long..... ***Oryzopsis***
5 Leaves < 4 mm wide.
8 Florets 6-13 mm long; awns 30-120 mm long.
9 Palea flat, shorter than or equal to the lemma; lemma margin convolute or not overlapping; [alien species, rare in our area]... ***Nassella***
9 Palea grooved, longer than the lemma; lemma margins involute, fitting into the paleal groove; [native species, collectively widespread in our area] ..... ***Piptochaetium***
8 Florets 1.5-4.5 mm long; awns 1-35 mm long
10 Leaves 0.2-0.6 mm wide; florets 1.5-2.5 mm long; awns 15-35 mm long..... ***Nassella***
10 Leaves 0.5-10 mm wide; florets 2.2-4.5 mm long; awns 1-15 mm long.
11 Leaves 0.5-1.8 mm wide; central vein of the lemma not prominent; [native species]..... ***Piptatheropsis***
11 Leaves 2-10 mm wide; [rare alien species]..... ***Piptatherum***
3 Lemma neither hardened nor distinctly different than the glumes in texture when mature.
12 Spikelets 18-32 mm long; [tribe *Poeae*] ..... ***Avena***
12 Spikelets 1.1-8 mm long.
13 All spikelets sessile or subsessile and arrayed along inflorescence axes (racemes) divergent from the central axis (but not both overlapping one another and clearly ranked on one side of the axis, so as to be keyed under Key H).
14 Lower glumes 0.9-4 mm long; spikelets disarticulating below the glumes, the spikelet falling as a whole; spikelets appressed to divergent from the raceme axes; sheaths not strongly overlapping; [tribe *Cynodonteae*; subtribe *Eleusininae*] ..... ***Dinebra***
14 Lower glumes (2-) 3.5-7 mm long; spikelets disarticulating above the glumes (which remain on the inflorescence); spikelets strongly appressed to the raceme axes; sheaths strongly overlapping (at least on the upper culm), hiding the culm; [tribe *Cynodonteae*; subtribe "*incertae sedis*"]..... ***Gymnopogon***
13 Spikelets pedicellate and arrayed in a more complex and open panicle.
15 Lemma surrounded by a tuft of callus hairs; [tribe *Poeae*] ..... ***Calamagrostis***
15 Lemma not surrounded by callus hairs.
16 Spikelets articulated below the glumes, the spikelet falling intact, leaving a naked pedicel; [tribe *Poeae*] ..... ***Cinna***
16 Spikelets articulated above the glumes, the floret falling, leaving the glumes attached to the pedicels.
17 Lemmas faintly 5-veined; awn from the back of the lemma; lower glume longer than the lemma; palea much shorter than the lemma (or absent); [tribe *Poeae*]..... ***Agrostis***
17 Lemmas strongly 3-veined; awn from the tip of the lemma; lower glume shorter than (rarely equaling) the lemma; palea about equaling the lemma; [tribe *Cynodonteae*; subtribe *Muhlenbergiinae*]..... ***Muhlenbergia***

{add to key: *Apera*, *Limnodea*, *Polypogon*, *Zoysia*}

Key M – grasses with 2+ florets, these exceeded and usually concealed by the glumes

1 Spikelets disarticulating below the glumes, the spikelets falling as a whole or in clusters; [tribe *Poeae*] ..... ***Holcus***
1 Spikelets disarticulating above the glumes, the glumes remaining attached to the pedicel.
2 Spikelets dimorphic, paired, each pair consisting of a lower spikelet with sterile florets and an upper spikelet one with fertile florets; [tribe *Poeae*] ..... ***Cynosurus***
2 Spikelets monomorphic.
3 Spikelets each with 1 fertile (bisexual) floret, with 1-several sterile florets, either towards the base or towards the tip of the spikelet.
4 Fertile floret basal, with 1-several sterile florets towards the tip of the spikelet; [tribe *Cynodonteae*; subtribe "*incertae sedis*"]..... ***Gymnopogon***
4 Fertile floret terminal, with 1-several sterile florets towards the base of the spikelet (the sterile florets sometimes knoblike or like tufts of hairs, and not obviously like florets); [tribe *Poeae*].
5 Spikelets with 2 florets, the lower floret staminate and of similar size as the upper, pistillate or bisexual floret; lemma of the lower floret awned; lemma of the upper floret unawned or awned..... ***Arrhenatherum***
5 Spikelets with 2-3 florets, the lower 1-2 florets staminate or sterile, either highly reduced to knobs or tufts of hairs, or shorter than to longer than the terminal, bisexual floret; lemma of the lower florets **either** awned **or** unawned; lemma of the upper floret unawned.

6 Lower sterile florets 2, shorter than to exceeding the bisexual floret; fresh leaves with sweet vanilla odor when crushed; lemma of the lower florets awned or unawned ..... ***Anthoxanthum***
6 Lower sterile florest 1-2, either highly reduced to knobs or tufts of hairs, or consisting of linear to lanceolate lemmas up to ¾ as long as the bisexual floret; all lemmas unawned ..... ***Phalaris***
3 Spikelets each with 2 or more fertile florets.
7 Spikelets 18-50 mm long; glumes 9-11-veined; [tribe *Poeae*] ..... ***Avena***
7 Spikelets 2.5-20 mm long; glumes 1-7-veined.
8 Lemma awns apical or dorsal (arising from the apex of the lemma or from the back of the lemma in its upper half).
9 Spikelets 7-20 mm long, with 3-12 florets; ligule of hairs; lemma awn 5-15 mm long; [collectively widespread in our area]; [tribe *Danthoniae*] ..... ***Danthonia***
9 Spikelets 5-7.5 mm long, with 2 (-3) florets; ligule membranous, 0.5-4 mm long; lemma awn 3-8 mm long; [rare disjunct ona few high elevation peaks, disjunct from the north]; [tribe *Poeae*] ..... ***Trisetum***
8 Lemma awns basal (arising from the lower half of the lemma); [tribe *Poeae*].
10 Rachilla glabrous, not prolonged beyond the upper floret; spikelets 1.7-3.8 mm long ..... ***Aira***
10 Rachilla hairy, prolonged beyond the upper floret as a bristle; spikelets 2.5-7 mm long
11 Lemma awn 4-8 mm long, geniculate, exserted beyond the tips of the glumes; lemmas minutely scabrous, dull; leaf blades involute, appearing filiform (rounded in cross-section); ligule 0.5-3 (-5) mm long ..... ***Avenella***
11 Lemma awn 2-3 mm long, straight or nearly so, scarcely (or not at all) exserted beyond the tips of the glumes; lemmas smooth, shiny; leaf blades flat or folded at the midvein (V-shaped in cross-section); ligule 3-10 (-17) mm long ..... ***Deschampsia***

Key N – grasses with 2+ florets, these readily visible by extending past the glumes

1 Plants dioecious; plants strongly rhizomatous-clonal; [plants of saline situations, coastal or more rarely inland]; [tribe *Cynodonteae*; subtribe *Monanthochloinae*] ..... ***Distichlis***
1 Plants bisexual; plants cespitose or weakly short- rhizomatous; [plants of various habitats, including saline].
2 Lemmas 1-3-nerved, the nerves strong and obvious; spikelets 1-27 mm long.
3 Lemma nerves hairy; lemmas slightly to strongly 2-lobed, the midnerve shortly excurrent between the 2 lobes; [tribe *Cynodonteae*; subtribe *Tridentinae*].
4 Palea glabrous or with hairs < 0.5 mm long; plants perennial; inflorescences exserted, conspicuous ..... ***Tridens***
4 Palea long-ciliate on the upper half, the hairs 0.5-2 mm long; plants annual; inflorescences often largely hidden in the upper sheath ..... ***Triplasis***
3 Lemma nerves glabrous; lemmas not at all lobed.
5 Mature spikelets stiff; grains protruding, with a bottle-neck-like beak; [tribe *Diarrheneae*] ..... ***Diarrhena***
5 Mature spikelets not stiff; grains neither protruding, nor shaped with a bottleneck-like beak.
6 Florets 3-34 per spikelet; lemmas unawned; [tribe *Eragrostideae*; subtribe *Eragrostidinae*] ..... ***Eragrostis***
6 Florets 2-3 per spikelet; lemmas awned or unawned; [tribe *Poeae*] ..... ***Sphenopholis***
2 Lemmas 5-many-nerved, the nerves often obscure; spikelets 2-70 mm long.
7 Sheaths united for at least ½ their length.
8 Spikelets in dense one-sided clusters on a few stiff branches; spikelets strongly flattened; [tribe *Poeae*] ..... ***Dactylis***
8 Spikelets in open or somewhat congested panicles, not as above; spikelets slightly to not at all flattened.
9 Lemmas awned.
10 Callus of the lemma glabrous; [collectively widespread]; [tribe *Bromeae*] ..... ***Bromus***
10 Callus of the lemma pubescent; [of VA, WV, KY, and northward]; [tribe *Meliceae*] ..... ***Schizachne***
9 Lemmas unawned.
11 Lower glumes 1-veined; [plants of wetlands] ..... ***Glyceria***
11 Lower glumes 3-7-veined; [plants of mesic to dry habitats] ..... ***Melica***
7 Sheaths completely free or united at most up to ½ their length.
12 Basal 1-8 florets of the spikelet sterile.
13 Ligule membranous (the membrane apex ciliate); lower 1-4 florets sterile; disarticulation above the glumes and between the florets; [of various, usually moist, habitats, collectively widespread]; [tribe *Centotheceae*] ..... ***Chasmanthium***
13 Ligule of hairs; lower 2-8 florets sterile; disarticulation below the glumes (the spikelet falling whole); [of coastal dunes, from se. VA southward and westward]; [tribe *Eragrostideae*; subtribe *Uniolinae*] ..... ***Uniola***
12 Lowermost florets of the spikelet fertile; [tribe *Poeae*].
14 Lemmas about as broad as long, spreading at a ca. 90° angle to the rachilla ..... ***Briza***
14 Lemmas longer than broad, ascending at an acute angle to the rachilla.
15 Lemmas rounded at the apex, not awned.
16 Lemmas obscurely (3-) 5 (-7) nerved; spikelets 2.5-13 mm long ..... ***Puccinellia***
16 Lemmas prominently 5-9-nerved; spikelets 3.6-6.5 mm long ..... ***Torreyochloa***
15 Lemmas acute at the apex, or awned.
17 Callus of the lemmas hairy ..... ***Poa***
17 Callus of the lemma glabrous.
18 Lemmas awned.
19 Plant annual; stamen 1 ..... ***Vulpia***
19 Plant perennial; stamens 3.
20 Leaf blades often involute, 0.2-3 mm wide, not auriculate at the base ..... ***Festuca***
20 Leaf blades flat, 3-12 mm wide, auriculate at the base ..... ***Schedonorus***
18 Lemmas unawned.
21 Leaf tips blunt, cupped like the prow of a row-boat ..... ***Poa***
21 Leaf tips acuminate, planar or keeled (but not as above).
22 Leaf blades often involute, 0.2-3 mm wide, not auriculate at the base ..... ***Festuca***
22 Leaf blades flat, 3-12 mm wide, auriculate at the base ..... ***Schedonorus***

Aegilops Linnaeus 1753 (Goatgrass)

A genus of about 23 species, annuals, of w. Asia east to the Mediterranean region. References: Saufferer in FNA (2007a); Tucker (1996)=Z.

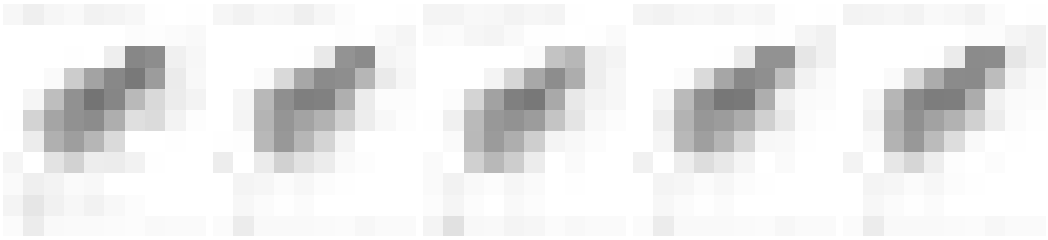
1 Glumes unawned (with a tooth to ca. 3 mm long); spikes moniliform.....***A. ventricosa***
1 Glumes awned; spikes narrowly cylindrical to ovoid (not moniliform).
2 Spikes narrowly cylindrical, about 3 mm in diameter .....***A. cylindrica***
2 Spikes ovoid or lanceoloid, broadest at the base, 4-13 mm in diameter at the broadest point.
3 Upper spikelets 4-5 mm long.....***A. neglecta***
3 Upper spikelets 7-9 mm long.....***A. triuncalis*** *var.* ***triuncalis***

* ***Aegilops cylindrica*** Host, Jointed Goat Grass. Disturbed areas; native of Mediterranean Europe and w. Asia. [= C, F, FNA, G, HC, K, Pa, Z]
* ***Aegilops neglecta*** Requien ex Bertoloni, Small Goat Grass, Three-awned Goatgrass. Disturbed areas; native of Mediterranean Europe and w. Asia. Reported from Arlington County, VA. [= FNA, Z; = *A. ovata* Linnaeus – C, G, HC, apparently misapplied; = *A. geniculata* Roth – K, apparently misapplied]
* ***Aegilops triuncialis*** Linnaeus *var.* ***triuncialis***, Barbed Goatgrass. Disturbed areas; native of Mediterranean Europe east to w. and c. Asia. Known from MD. [= FNA; < *A. triuncialis* – HC, K]
* ***Aegilops ventricosa*** Tausch, Swollen Goatgrass. Disturbed areas; native of Mediterranean Europe. Known from DE. [= FNA]

Agropyron Gaertner 1770 (Crested Wheatgrass)

A genus of about 15 species, perennials, of Eurasia. References: Barkworth in FNA (2007a).

* ***Agropyron cristatum*** (Linnaeus) Gaertner, Crested Wheatgrass. Disturbed areas; native of Eurasia. [= C, F, FNA, G; > *A. cristatum* – HC; > *A. desertorum* – HC]



Agrostis Linnaeus 1753 (Bentgrass)

A genus of about 220 species, primarily temperate. References: Harvey in FNA (2007a); Tucker (1996)=Z. [also see *Lachnagrostis* and *Polypogon*]

1 Palea 1/2-3/4 as long as the lemma, 0.6-1.2 mm long; plants introduced, often (though not always) in disturbed habitats; plants flowering June-October; [subgenus *Agrostis*].
2 Ligule mostly 0.5-2 mm long, truncate; panicle branches naked toward the base, diffuse when in fruit, the spikelets well-separated.....
.....***A. capillaris***
2 Ligule mostly 2.5-6 mm long, acute, rounded, or truncate; panicle branches (some of them) with spikelets to near the base, the spikelets usually agglomerated.
3 Leaves 3-8 mm wide; inflorescence triangular-ovoid, the branches widely spreading at maturity, usually reddish; plant with rhizomes, without stolons.....***A. gigantea***
3 Leaves mostly 1-3 mm wide; inflorescence narrowly ovoid, the branches ascending at maturity, usually tan; plant without rhizomes, with or without stolons .....***A. stolonifera***
1 Palea < 2/5 as long as the lemma, 0-0.5 mm long; plants native, typically in more or less natural habitats; plants flowering March-November; [subgenus *Vilfa*].
4 Lemma usually awned (sometimes unawned), the awn inserted near the tip, 4-10 mm long, straight, very delicate and flexuous; annual, flowering April-June .....***A. elliottiana***
4 Lemma awned or not, the awn (when present) inserted either near the middle of the lemma or near the apex, 0-6 mm long, straight or bent, neither delicate nor flexuous; perennial, flowering March-November.
5 Lemma with a (2-) 3-5 mm long, geniculate awn.
6 Anthers 1.0-1.5 mm long; spikelets 1.7-3.0 mm long; plant loosely cespitose, with stolons to 25 cm long.....***A. canina***
6 Anthers 0.5-0.8 mm long; spikelets 2.0-4.o mm long; plant densely cespitose.....***A. mertensii***
5 Lemma awnless or with a 0-3 mm long awn, this often straight (rarely geniculate in *A. scabra*).
7 Spikelets 1.2-2 mm long; anthers 0.3-0.6 mm long; lemma never awned; plants flowering March-July.....***A. hyemalis***
7 Spikelets 1.8-3.5 (-3.7) mm long; anthers 0.3-1.5 mm long; lemma awnless or awned; plants flowering June-November.
8 Leaves (at least the basal) mostly involute, 1-2 (-3) mm wide; panicle branches mostly forking well beyond the middle; anthers 0.4-0.8 mm long.....***A. scabra***

8 Leaves flat, 2-6 mm wide; panicle branches mostly forking at or below the middle; anthers 0.3-1.2 mm long.
9 Lemma 1.8-3 mm long, minutely but copiously scabrous (at 20× or more); anthers 0.7-1.2 mm long; spikelets (2.3-) 2.7-3.5 (-3.7) mm long, usually clustered near the tips of the branchlets; panicle branches scabrous; culms to 15 dm tall; [of wet savannas and other wet habitats of the Coastal Plain] ..... ***A. altissima***
9 Lemma 1.4-2 mm long, glabrous; anthers 0.3-0.6 mm long; spikelets (1.8-) 2.2-2.7 (-3.2) mm long, usually not clustered near the tips of the branchlets; panicle branches glabrous to scabrous; culms to 10 dm tall; [of various habitats, nearly throughout our area] ..... ***A. perennans***

Agrostis altissima (Walter) Tuckerman, Coastal Bog Bentgrass. Wet savannas, sinkhole ponds, edges of swamp forests. October-November. MA (?) and NJ south to se. LA, primarily on the Coastal Plain. [= F, HC, Pa, Z; < *A. perennans* – RAB, FNA GW, K, WH; = *A. perennans* var. *elata* (Pursh) A. Hitchcock – C, G, S]

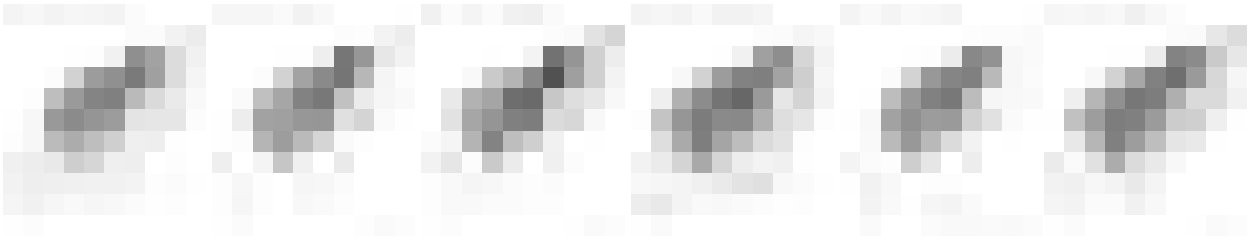
* ***Agrostis canina*** Linnaeus, Brown Bentgrass, Velvet Bentgrass. Roadsides, open areas, lawns; native of Eurasia. May-July. Naturalized in North America to DE, se. PA (Rhoads & Block 2007), WV, and TN (Kartesz 1999). [= C, F, FNA, G, HC, K, Pa, WV]

* ***Agrostis capillaris*** Linnaeus, Rhode Island Bentgrass, Colonial Bentgrass, Browntop. Meadows, roadsides, disturbed areas; native of Europe (and possibly n. North America). June-August. [= C, FNA, K, Pa, Z; = *A. tenuis* Sibthorp – RAB, G, HC, S, W, WV; > *A. tenuis* var. *tenuis* – F]

Agrostis elliottiana J.A. Schultes, Elliott's Bentgrass, Southern Bentgrass. Dry soils of barrens, fields, and rock outcrops. April-June. MD west to s. OH, and e. KS, south to Panhandle FL (Gadsden County) and c. TX. [= RAB, C, F, FNA, G, HC, K, Pa, S, W, WH, Z]

Agrostis exarata Trinius, Spike Bentgrass. Disturbed areas; native of w. North America, a waif in e. North America. Reported for very widely scattered sites in e. North America, including Leslie County, KY (Kartesz 2010). [= FNA] {not keyed or mapped}

* ***Agrostis gigantea*** Roth, Redtop, Black Bentgrass. Fields, roadsides, disturbed areas; native of Eurasia. June-October. [= C, F, FNA, K, Pa, W, Z; < *A. stolonifera* – RAB, GW; = *A. stolonifera* Linnaeus var. *major* (Gaudin) Farwell – G; = *A. alba* – HC, WV, misapplied; >< *A. alba* – S, misapplied]



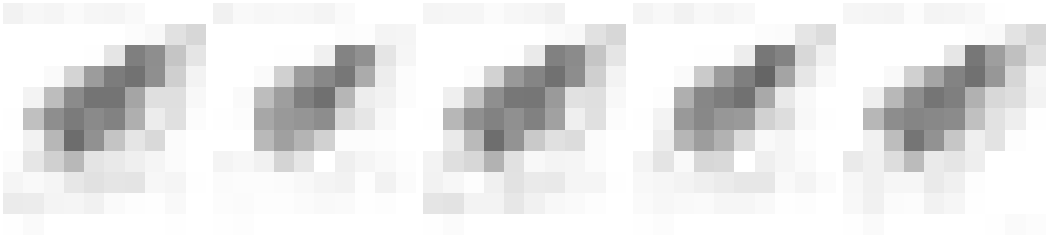
Agrostis hyemalis (Walter) Britton, Sterns, & Poggenburg, Ticklegrass, Small Bentgrass, Hairgrass. Roadsides, other disturbed habitats. March-July. ME west to WI, south to FL and TX. [= F, FNA, K, Pa, WH, WV, Z; < *A. hyemalis* – RAB (also see *A. scabra*); = *A. hyemalis* var. *hyemalis* – C, G; = *A. hiemalis* – GW, HC, orthographic variant; < *A. hiemalis* – S, W, orthographic variant (also see *A. scabra* var. *scabra*] {FL}

Agrostis mertensii Trinius, Arctic Bentgrass. In thin soil of high elevation rocky summits. July-August. Circumboreal, in North America south to ME (Mt. Katahdin), NH (White Mountains), VT, NY (Adirondack Mountains), WV (Spruce Knob), TN (Roan Mountain, Abrams Creek), NC (Roan Mountain, Big Yellow Mountain, Black Mountains), QC, BC, CO, UT (?), and AK. [= C, FNA, K, W, Z; > *A. borealis* Hartman – RAB, HC, S, WV; > *A. borealis* Hartman var. *americana* (Scribner) Fernald – F, G]

Agrostis perennans (Walter) Tuckerman, Upland Bent, Autumn Bentgrass. Woodlands, forests, roadsides. August-October. NL (Newfoundland) west to MN, south to n. FL and TX; c. Mexico south to c. South America. [= HC, WV, Z; < *A. perennans* – RAB, FNA, GW, K, Pa, W, WH (also see *A. altissima*); = *A. perennans* var. *perennans* – C, G, S; > *A. perennans* var. *perennans* – F; > *A. perennans* var. *aestivalis* Vasey – F]

Agrostis scabra Willdenow, Fly-away Grass, Rough Bentgrass. {habitats}. June-November. Throughout North America, though mainly in cooler climates; ne. Asia. [= FNA, GW, K, Pa, WH, Z; < *A. hyemalis* – RAB, W; = *A. hyemalis* (Walter) Britton, Sterns, & Poggenburg var. *scabra* (Willdenow) Blomquist – C; > *A. scabra* var. *scabra* – F; = *A. hyemalis* (Walter) Britton, Sterns, & Poggenburg var. *tenuis* (Tuckerman) Gleason – G; = *A. scabra* var. *scabra* – HC]

* ***Agrostis stolonifera*** Linnaeus, Creeping Bentgrass. Disturbed areas, wet, moist, or dry; native of Europe. June-October. [= K, Pa; > *A. stolonifera* var. *stolonifera* – C, G; > *A. stolonifera* var. *palustris* (Hudson) Farwell – C; < *A. stolonifera* – FNA, GW, RAB, W, WH (also see *A. gigantea*); > *A. alba* Linnaeus var. *alba* – F, misapplied; > *A. alba* Linnaeus var. *palustris* (Hudson) Persoon – F, misapplied; > *A. stolonifera* – HC, Z; = *A. alba* – S, misapplied; > *A. stolonifera* var. *compacta* Hartman – G; > *A. palustris* Hudson – HC, WV, Z]



Aira Linnaeus 1753 (Hair Grass)

A genus of 8-9 species, annuals, native of Europe, n. Africa, and w. Asia. References: Wipff in FNA (2007a); Tucker (1996)=Z.

1 Panicle dense and spike-like, 0.5-4.1 cm long, 0.3-0.7 cm wide, the branches short and appressed to ascending.....***A. praecox***
1 Panicle open, 1.2-13.5 cm long, 1.5-10 cm wide, the branches elongate, diffusely spreading or ascending.
2 Pedicels usually 1-2× as long as the spikelets; lemma of both the lower floret and the upper floret with an awn 2-4 mm long .....***A. caryophyllea***
2 Pedicels usually 2-8× as long as the spikelets; lemma of upper floret with an awn 1.5-2.5 mm long, lemma of the lower floret awnless or with a minute awn < 1 mm long.....***A. elegans***

* ***Aira caryophyllea*** Linnaeus, Silver Hair Grass. Fields, roadsides, disturbed areas; native of Europe. May. [= RAB, C, G, HC, K, WH, Z; = *Aira caryophyllea* var. *caryophyllea* – FNA; = *Aspris caryophyllea* (Linnaeus) Nash – S]
* ***Aira elegans*** Willdenow ex Roemer & Schultes, Elegant Hair Grass. Fields, roadsides, disturbed areas; native of Europe. May-June. [= RAB, G, HC, K; = *Aira elegantissima* Schur – C, Z; = *Aira elegantissima* Schur – C, Z; = *Aira caryophyllea* Linnaeus var. *capillaris* (Mertens & W.D.J. Koch) Mutel – FNA; = *Aspris capillaris* (Host) A.S. Hitchcock – S]
* ***Aira praecox*** Linnaeus, Early Hair Grass, Spike Hairgrass. Fields, roadsides, disturbed areas; native of Europe. Reported for NC by Burk (1961), and recently collected in the NC Sandhills (B.Sorrie, pers.comm. 2004). [= C, G, HC, K, Z]

Alloteropsis J. Presl 1828

A genus of 5-8 species, annuals and perennials, native of tropical Asia and Australia. References: Hall in FNA (2003a).

* ***Alloteropsis cimicina*** (Linnaeus) Stapf, Bugseed Grass. Disturbed areas; native of se. Asia. Naturalized in FL Panhandle and ne. FL. [= FNA, WH]

Alopecurus Linnaeus 1753 (Foxtail Grass)

A genus of about 36 species, north temperate and temperate South America. References: Tucker (1996)=Z.

1 Glumes 4-6 mm long, acute or acuminate.
2 Glumes with hairs < 1.0 mm long on the keel, merely scabrous toward the tip.....***A. myosuroides***
2 Glumes with hairs 1.0-1.5 mm long on the keel, including toward the tip.....***A. pratensis***
1 Glumes 2-3.2 mm long, obtuse or truncate.
3 Awn about as long as the glumes (at most exceeding the glumes by 1 mm) .....***A. aequalis*** *var*. ***aequalis***
3 Awn longer than the glumes, exceeding the glumes by 1.5-3.5 mm.
4 Anthers 0.4-0.7 mm long; annual.....***A. carolinianus***
4 Anthers 1.3-2 mm long; perennial.....***A. geniculatus***

Alopecurus aequalis Sobolewski *var*. ***aequalis***, Short-awn Foxtail Grass. Wet swales, wet meadows, distches, shores. Circumboreal, south in North America to NJ, w. VA, IN, MO, and CA. [= F, FNA, K; < *A. aequalis* – C, G, HC, Pa]
Alopecurus arundinaceus Poiret, Creeping Meadow Foxtail. Pastures, disturbed areas. Native of Eurasia. Reported for Bell County, KY (Kartesz 2010). [= FNA] {not keyed or mapped}
Alopecurus carolinianus Walter, Carolina Foxtail Grass. Moist fields, ditches, forests. April-May. MA west to BC, south to n. FL and CA. [= RAB, C, F, FNA, G, GW, HC, K, WH, WV, Z; = *A. ramosus* Poiret – S]

* ***Alopecurus geniculatus*** Linnaeus, Water Foxtail Grass. Disturbed areas; native of Eurasia. [= C, F, FNA, G, HC; > *A. geniculatus* var. *geniculatus* – K]
* ***Alopecurus myosuroides*** Hudson, Slender Foxtail Grass. Moist fields; native of Europe. April-May. [= RAB, C, F, FNA, G, HC, K, S, WV, Z]
* ***Alopecurus pratensis*** Linnaeus, Meadow Foxtail. Roadsides, fields; native of Eurasia. May-July. Reported for Piedmont of nc. GA (Jones & Coile 1988), for scattered locations in PA (Rhoads & Block 2007), and for VA, KY, WV, MD, and DE (Kartesz 1999). Reported for Ashe County, NC (Poindexter & Murrell 2008). [= C, F, FNA, G, HC, K, WV]

Ammophila Host 1809 (Beach-grass)

A genus of 2-3 species, rhizomatous perennials, north temperate. References: Barkworth in FNA (2007a); Tucker (1996)=Z.

1 Ligule 10-35 mm long ..... ***A. arenaria***
1 Ligule 1-4.6 mm long ..... ***A. breviligulata***

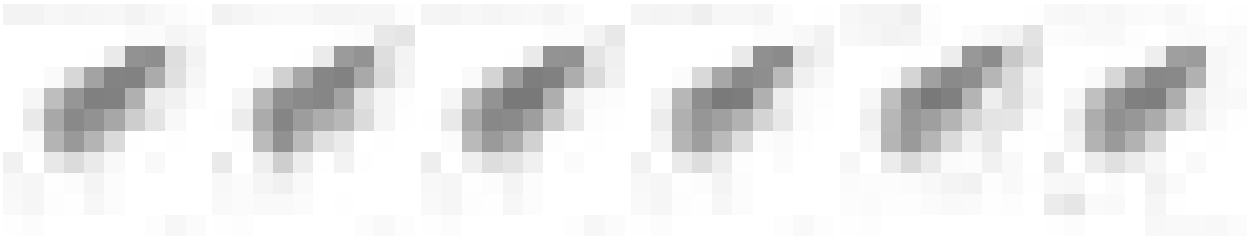
* ***Ammophila arenaria*** (Linnaeus) Link, European Beach-grass. Dunes, disturbed areas; native of Europe. Introduced in MD and PA (Kartesz 1999). [= C, F, FNA, HC, K]

Ammophila breviligulata Fernald, American Beach-grass. Dunes. August-September. NL (Newfoundland) south to about Cape Hatteras, Dare County, NC, and on shores around the Great Lakes; planted farther south. As a native grass, *Ammophila* ranged south only to NC, where it was rare; it is now commonly planted ("sprigged") in the Carolinas as a sand-binder and is now common south into SC. [= K; < *A. breviligulata* – RAB, F, G, HC, S; = *A. breviligulata* ssp. *breviligulata* – FNA; ? *A. breviligulata* – C, Pa, Z]

Amphibromus Nees 1843

A genus of about 12 species, annuals and perennials, native of Australia, New Zealand, and South America. References: Jacobs in FNA (2007a).

* ***Amphibromus scabrivalvis*** (Trinius) Swallen *var*. ***scabrivalvis***, Rough Amphibrome. Disturbed areas; native of South America. Established in Tangipahoa Parish, LA. [= FNA; < *Amphibromus scabrivalvis* – K; < *Helictotrichon scabrivalve* (Trinius) G. Tucker]



Amphicarpum Kunth 1829 (Peanut-grass)

The genus consists only of the two species treated here, remarkable for their dimorphic spikelets, some of them cleistogamous and subterranean, others aerial and chasmogamous. A series of publications over the past century make *Amphicarpum* one of the best studied "useless" grasses anywhere (Holm 1896; Weatherwax 1934; Gray & Fairbrothers 1971; McNamara & Quinn 1977; Cheplick & Quinn 1982, 1983, 1986, 1987, 1988a, 1988b; Cheplick 1989). References: Wipff in FNA (2003a).

1 Leaf blades hirsute with pustular-based hairs on both surfaces, the margins ciliate (and also slightly cartilaginous-thickened); [of moist to wet, peaty or sandy-peaty soils] ..... ***A. amphicarpon***
1 Leaf blades glabrous, the margins cartilaginous-thickened; [of seasonally flooded natural ponds] ..... ***A. muhlenbergianum***

Amphicarpum amphicarpon (Pursh) Nash, Pinebarrens Peanut-grass. Wet, peaty, open soils, especially peat-burns in pocosin edges, primarily in the outer Coastal Plain, responding strongly to fire. August-October. An Atlantic Coastal Plain endemic, scattered and rather rare, from e. MA to GA. If one carefully excavates young plants in spring or summer, they will generally be found to be connected to the remnants of the previous year's subterranean spikelet. [= FNA; = *Amphicarpum purshii* Kunth – RAB, C, F, G, GW, HC, K; = *Amphicarpon amphicarpon* (Pursh) Nash – S]

Amphicarpum muhlenbergianum (J.A. Schultes) Hitchcock, Florida Peanut-grass, Blue Maiden-cane. Natural depression ponds, flatwoods ponds, clay-based Carolina bays. August-October. A Southeastern Coastal Plain endemic: FL and s. AL north to se. NC, rare north of s. GA. First found in NC in the late 1980s by M. Boyer. [= RAB, FNA, GW, HC; = *A. muehlenbergianum* – K, orthographic variant; = *Amphicarpon floridanum* Chapman – S]

Andropogon Linnaeus 1753 (Broomsedge, Bluestem)

A genus of about 100-110 species, mainly tropical. Campbell's work (1983, et seq.) has greatly clarified the taxonomy of *Andropogon* in e. North America. Great confusion and disagreement were previously the rule in dealing with the *A. virginicus-A. glomeratus* complex. Campbell's careful morphologic work has provided workable technical characters which distinguish the taxa he recognizes. I have generally followed Campbell (1983, et seq.) in his circumscriptions of taxa, but have differed in decisions of rank; see Weakley et al. (2011) for discussion. Taxa differing in numerous morphologic characters, with different (though overlapping) geographic ranges, with different ecological preferences (often rather narrowly segregated by hydrology), and (when they do occur in proximity to one another) showing little or no sign of introgression or hybridization are probably

better treated as biological species. Thus, I have treated a number of Campbell's varieties as species. Several of his "variants" also warrant taxonomic recognition, at varietal or specific rank (Campbell 1986; Weakley et al. 2011). References: Campbell (1983)=Z; Campbell in FNA (2003a); Weakley et al. (2011)=Y. Key adapted in part from Z.

Identification notes: A thorough understanding of the architecture of the inflorescences of *Andropogon* is necessary in order to identify them successfully. The parts will be described, beginning from the apex of a branch of the inflorescence. Spikelets occur in pairs, the sessile spikelet (usually just referred to as the **spikelet**) and the **pedicelled spikelet**, which is usually vestigial or absent (except in *A. gerardii*) and sterile (except in *A. gerardii*, where it is staminate). The first or **lower glume** of the sessile spikelet has two **keels**, and the presence and location of antrorse prickle hairs (scabrousness) is an important character in the *A. glomeratus* complex. The length of the sessile spikelet is an important character; it should be measured exclusive of the **awn**, borne at the apex of the lemma. Awn length is also a useful taxonomic character. The pedicelled spikelet is borne on the **pedicel**, which is attached at the base of the sessile spikelet and typically angles away from it at about a 45 degree angle. The **rachis internode** extends from the base of one sessile spikelet to the next sessile spikelet above, breaking apart (upon dehiscence) just below the next spikelet and remaining attached to the sessile spikelet below. The **dispersal unit** consists of a sessile spikelet sitting in the V shape formed by (on one side) the pedicel and pedicelled spikelet and (on the other side) the rachis internode. Both the pedicel and the rachis internode are usually pubescent with long hairs, and the color of those hairs and their distribution are useful characters.

While the dispersal units are still attached to one another, the rachis internodes form a continuous and more-or-less straight **rachis**. The dispersal units attached together in an unbranched sequence are termed a **raceme**, whose length is a useful character. Two or more racemes are attached digitately at the summit of the **peduncle** (in *Schizachyrium* only a single raceme is found). The number of racemes attached is an important character. A **raceme sheath** subtends the peduncle, often more or less surrounding the peduncle and the racemes. The length of the peduncle (distance between the points of attachment of the raceme sheath and the racemes) is an important character. The length and width (at its widest point) of the raceme sheath are very useful characters, used throughout the key. The racemes, peduncle and subtending raceme sheath make up an **inflorescence unit**. The overall inflorescence is more-or-less complexly branched; its overall size and shape are very useful in recognizing the various taxa, but variation in such a subjective (and environmentally plastic) character has added to the taxonomic confusion in *Andropogon*. The use of inflorescence shape in the key has been minimized, but is often mentioned in the discussion of each species. The number of inflorescence units per plant varies from species to species, in some species rarely exceeding 10, in others ranging upward to 500 or 600. The absence or presence of hairs immediately below the raceme sheath is useful in some groups.

There are several important characters of the foliage. *A. capillipes* and *A. glaucopsis* have culm sheaths and leaf blades that are strongly glaucous; this is usually very obvious, but can be tested for by running the finger along the surface of the leaf (a white coating of wax will come off on the finger). The key often calls for the ligule length; measure the longest portion of the undivided portion of the ligule. The ligule often has an erose or ciliate upper margin; measure the length of the cilia. The length of leaf blade is measured from the ligule to the leaf apex; do not include the leaf sheath, which is often long and (especially late in the year) only loosely sheathing the culm or even divergent it. Whether the culm is antrorsely scabrous or smooth is better determined by touch than by sight. Choose several mid-culm sheaths, run one's finger downward and upward along the sheath surface (near the collar is best). If the sheath is antrorsely scabrous one will feel a somewhat greater resistance to moving the finger downward than upward.

1 Pedicellate spikelet staminate, as large as the sessile, fertile spikelet; sessile spikelets > 7 mm long; [section *Andropogon*].....***A. gerardii***
1 Pedicellate spikelet sterile, vestigial or absent; sessile spikelets < 7 mm long; [section *Leptopogon*].
2 Leaves strongly glaucous (often nearly white with a powdery wax that can be rubbed off on the fingers), glabrous.
3 Ligules (0.9-) 1.5 (-2.0) mm long, with cilia 0-0.2 mm long; leaf blades usually (33-) avg. 40 (-75) cm long; pubescence beneath raceme sheaths moderate to dense; raceme sheaths (2.0-) 2.4-3.6 (-4.4) cm long, (1.3-) 2.0-2.5 (-3.0) mm wide.....***A. glaucopsis***
3 Ligules (0.2-) 0.4 (-0.5) mm long, with cilia 0.3-1.2 mm long; leaf blades (12-) avg. 19 (-38) cm long; pubescence beneath raceme sheaths absent to dense; raceme sheaths (2.1-) 2.9-4.3 (-6.0) cm long, (2.7-) 3.1-3.8 (-5.5) mm wide.
4 Summit of branchlet below attachment of raceme sheath glabrous; raceme sheaths (2.1-) 2.6-3.8 (-4.9) cm long; spikelets (2.6-) 3.2-3.5 (-3.9) mm long; racemes (1.4-) 1.7-2.4 (-3.2) cm long; leaves 2-5 mm wide, averaging 3.5 mm; upper floret lemma awn 0.6-1.5 mm long, averaging 1.1 mm.....***A. capillipes***
4 Summit of branchlet below attachment of raceme sheath pubescent with hairs 2-4 mm long; raceme sheaths (2.4-) 3.2-4.8 (-6.0) cm long; spikelets (3.0-) 3.5-3.9 (-4.4) mm long; racemes (1.5-) 2.0-3.0 (-4.0) cm long; leaves 2.5-6.5 mm wide, averaging 5 mm; upper floret lemma awn 0.9-2.1 mm long, averaging 1.4 mm.....***A. dealbatus***
2 Leaves green (to somewhat glaucous, but never powdery white), pubescent or glabrous.
5 Upper culm sheaths distinctly broadened and strongly overlapping, often largely hiding the raceme sheaths before senescence (but in some forms with the raceme sheaths strongly exserted); culms mostly < 1 m tall (to 1.4 m tall).....***A. elliottii***
5 Upper culm sheaths reduced, not strongly overlapping, not hiding the raceme sheaths after anthesis; culms mostly > 1 m tall (except *A. perangustatus*, *A. tracyi*, and small forms of *A. virginicus*).
6 Many or all peduncles longer than the subtending raceme sheaths at maturity, racemes then fully exserted above the apex of the raceme sheath.
7 Inflorescence branches arching outward in pronounced curves; racemes (1.2-) 1.5-2.1 (-2.6) cm long; awn (0.2-) avg. 0.7 (-1.1) cm long; spikelets (4.1-) 4.4-4.6 (-5.0) mm long.....***A. brachystachyus***
7 Inflorescence branches erect; racemes (2.2-) 2.6-6 cm long; awn 0.5-2.0 cm long; spikelets (4.3-) 4.9-6.5 (-7.5) mm long.
8 Lower glumes more or less folded; stamen 1; racemes (2.2-) 2.6-4.3 (-5.3) cm long; awn (0.5-) avg. 0.8 (-1.6) cm long; spikelets (4.3-) 4.9-5.4 (-6.1) mm long.....***A. arctatus***
8 Lower glumes flat; stamens 3; racemes 3-6 cm long; awn 1-2 cm long; spikelets (4.5-) 5-6.5 (-7.5) mm long.....***A. ternarius*** *var.* ***ternarius***
6 Peduncles all shorter than the subtending raceme sheaths at maturity, at least the bases of the racemes not exserted above the apex of the raceme sheath.
9 Inflorescence units with (2-) 4-7 (-13) racemes; raceme sheaths (4.1-) 5.3-8.0 (-10-1) mm wide; hairs of the rachis internode and pedicel yellow-tawny when dry .....***A. mohrii***
9 Inflorescence units with 2-5 (-7) racemes; raceme sheaths (1.5-) 2.0-4.8 (-6.3) mm wide; hairs of the rachis internode and pedicel gray to whitish when dry.
10 Postflowering peduncles < 10 mm long.
11 Culm sheaths antrorsely scabrous (often hirsute as well); leaf blades usually > 35 cm long.

12 Ligules (0.6-) 0.8 (-1.3) mm long (usually < 1 mm long), with cilia 0.2-0.9 mm long; raceme sheaths (1.5-) 2.0-2.5 (-3.0) mm wide (usually < 2.5 mm wide); keels of first glume often scabrous below the middle ..... ***A. tenuispatheus***
12 Ligules (0.7-) 1.2 (-2.2) mm long (usually > 1 mm long), with cilia 0.0-0.3 mm long; raceme sheaths (2.0-) 2.4-3.4 (-4.7) mm wide (usually > 2.5 mm wide); keels of first glume scabrous only above the middle, smooth below.
13 Inflorescences oblong to obpyramidal; spikelets (3.8-) 4.1-4.4 (-5.0) mm long; anthers usually not marcescent within spikelet; mature peduncles (4 -) 11-35 (-60) mm long (usually some of them > 10 mm long) ..... ***A. glomeratus***
13 Inflorescences (linear to) oblong; spikelets (3.4-) 3.6-3.8 (-4.6) mm log; anthers usually marcescent within spikelets; mature peduncles (2-) 3-5 (-8) mm long..... ***A. hirsutior***
11 Culm sheaths not scabrous (often hirsute); leaf blades < 35 cm long (except in *A. glomeratus* var. *pumilus*).
14 Leaves glabrous.
15 Ligules (0.8-) 1.1 (-1.5) mm long, with cilia 0-0.1 mm long; basal leaves often filiform, < 1.5 mm wide, strongly erect. ..... ***A. perangustatus***
15 Ligules (0.2-) 0.5 (-0.8) mm long, with cilia 0.2-1.3 mm long; basal leaves usually > 2 mm wide, soon arching.
16 Culm internodes green (or glaucous just below the node only); raceme sheaths (2.2-) 2.5-3.8) (-4.5) cm long, (1.7-) 2.4-3.1) (-4.0) mm wide; peduncles (1-) 4-9 (-30) mm long; racemes 2 (-3) per inflorescence unit..... ..... ***A. virginicus*** *var.* ***decipiens***
16 Culm internodes glaucous; raceme sheaths (2.8-) 3.3-4.7 (-6.7) cm long, (3.0-) 3.2-3.8 (-5.2) mm wide; peduncles (2-) 3-4 (-6) mm long; racemes 2-4 (-7) per inflorescence unit, at least some inflorescence units (especially at culm and branch apices) with 3 or more racemes ..... ***A. virginicus*** *var.* ***virginicus*** *['smooth variant']*
14 Leaves pubescent, at least on the margin near the collar.
17 Keels of first glume often scabrous below the middle; leaves usually > 44 cm long ..... ***A. tenuispatheus***
17 Keels of first glume scabrous only above middle; leaves usually < 31 cm long.
18 Pubescence of young culm sheaths appressed; spikelets usually > 4 mm long; hairs on rachis internode and sterile pedicel dense, long; callus hairs 1.5-5 mm long..... ***A. longiberbis***
18 Pubescence of young culm sheaths spreading; spikelets mostly < 4 mm long; hairs on rachis internode and sterile pedicel rather sparse and short; callus hairs 1-2.5 mm long.
19 Raceme sheaths (2.2-) 2.5-3.8 (-4.5) cm long, (1.7-) 2.4-3.1 (-4.0) mm wide; racemes 2 (3) per inflorescence unit; spikelets (3.0-) 3.3-3.6 (-4.0) mm long ..... ***A. virginicus*** *var.* ***decipiens***
19 Raceme sheaths (2.3-) 3.4-5.2 (-6.7) cm long, (2.7-) 3.3-4.0 (-5.5) mm wide; racemes 2-5 (-7) per inflorescence unit; spikelets (2.9-) 3.7-3.9 (-4.7) mm long..... ***A. virginicus*** *var.* ***virginicus***
10 Postflowering peduncles > 15 mm long.
20 Culm sheaths antrorsely scabrous (often hirsute as well).
21 Ligules (1.0-) 1.2 (-2.0) mm long, with cilia 0-0.3 mm long; keels of first glume scabrous only above middle .... ***A. glomeratus***
21 Ligules (0.6-) 0.8 (-1.3) mm long, with cilia 0.2-0.9 mm long; keels of first glume often scabrous below middle..... ..... ***A. tenuispatheus***
20 Culm sheaths not scabrous (often hirsute).
22 Culms < 1.2 m tall; leaf blades < 30 cm long and < 3 mm wide; inflorescence units rarely > 20/culm.
23 Raceme sheaths (2.2-) 2.5-3.8 (-4.5) cm long; spikelets (3.0-) 3.3-3.6 (-4.0) mm long; leaf blades (2.5-) 3.6 (-5.5) mm wide..... ***A. virginicus*** *var.* ***decipiens***
23 Raceme sheaths (2.6-) 4.1-6.6 (-8.5) cm long; spikelets (3.0-) 3.4-5.1 (-5.5) mm long; leaf blades (0.8-) 1.8 (-3.0) mm wide.
24 Ligules (0.8-) 1.1 (-1.5) mm long, with cilia 0-0.1 mm long..... ***A. perangustatus***
24 Ligules (0.2-) 0.4 (-0.5) mm long, with cilia (0.1-) 0.2-0.8 mm long ..... ***A. tracyi***
22 Culms usually > 1.2 m tall; leaf blades often > 30 cm long and > 3 mm wide; inflorescence units usually > 20/culm.
25 Inflorescence branches arching outward in pronounced curves; awn mostly < 1 cm long; spikelets (4.1-) 4.4-4.6 (-5.0) mm long; anther > 1.7 mm long ..... ***A. brachystachyus***
25 Inflorescence branches erect; awn mostly >1 cm long; spikelets (3.0-) 3.3-3.8 (-4.5) mm long; anther < 1.5 mm long.
26 Raceme sheaths (1.5-) 2.0-2.5 (-3.0) mm wide; keels of first glume often scabrous below middle; culms to 2.5 m tall; leaves to 109 cm long and 9.5 mm wide ..... ***A. tenuispatheus***
26 Raceme sheaths (1.7-) 2.4-3.1 (-4.0) mm wide; keels of first glume scabrous only above middle; culms < 1.7 m tall; leaves < 35 cm long and 5.5 mm wide..... ***A. virginicus*** *var.* ***decipiens***

Andropogon arctatus Chapman, Florida Bluestem. Pinelands, rarely moist disturbed ground. The species is native to pinelands from n. FL west to w. Panhandle of FL and adjacent s. AL, south to s. FL. The curious record from Pamlico County, NC (the specimen at GH, collected by Randolph and Randolph in 1922, annotated as *A. arctatus* by Campbell) is likely a waif. [= FNA, HC, K, S, Z]

Andropogon brachystachyus Chapman, Shortspike Bluestem. Moist to wet pinelands, natural pond margins, bogs, disturbed roadsides. Se. SC (McMillan et al. 2002) south to FL, south to s. FL, west to e. FL Panhandle. *A. brachystachyus* is considered by some to range north to NC. [= FNA, K, Z; = *A. brachystachys* – GW, HC, S, orthographic variant]

Andropogon capillipes Nash, Dryland White Bluestem. Dry to mesic pine flatwoods, sandhills, adjacent roadbanks. September-October. Se. NC south to s. FL and west to s. AL. See *A. dealbatus* for discussion of these two taxa. The type of *A. capillipes* (collected by A.H. Curtiss in FL) is of this taxon; Nash (1900) states that it occurs "in dry soil, North Carolina to Florida" and emphasizes that it is "abundantly distinct from *A. virginicus*, to which it is related." [= Y; < *A. virginicus* – RAB; < *A. virginicus* var. *glaucus* Hackel – F, FNA; < *A. capillipes* – GW, HC, K, S; = *A. virginicus* var. *glaucus* "drylands variant" – Z]

Andropogon dealbatus (C. Mohr) Weakley & LeBlond, Wetland White Bluestem. Wet savannas, ditches adjacent to savannas, depressional wetlands. September-October. S. NJ south to s. FL and west to e. TX; also in the Bahamas (Sorrie & LeBlond 1997). Campbell (1983) informally described two "variants" of *A. virginicus* var. *glaucus*. *A. capillipes* is clearly a species distinct from *A. virginicus*; moreover, the substantial morphological and ecological differences between Campbell's two "variants" (which he describes as nearly always sharply distinct, even when growing in close proximity) warrant recognition as good species. [= Y; < *A. virginicus* – RAB; < *A. virginicus* var. *glaucus* Hackel – F, FNA; < *A. capillipes* – GW, HC, K, S; = *A. virginicus* var. *glaucus* "wetlands variant" – Z; = *A. virginicus* var. *dealbatus* Mohr]

Andropogon floridanus Scribner, Florida Bluestem. Longleaf pine sandhills. September-October. S. GA west to FL Panhandle, south to s. FL. Reported for e. and s. GA (FNA, Jones & Coile 1988). [= FNA, HC, K, S] {not yet keyed}

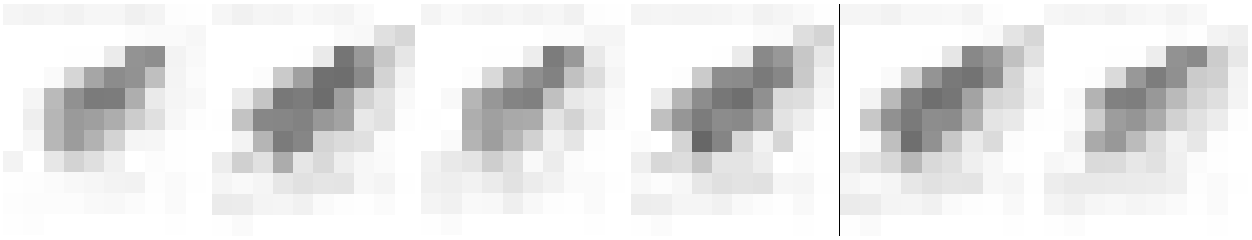
Andropogon gerardii Vitman, Big Bluestem, Turkeyfoot. In a wide variety of habitats, usually rather dry, such as sandhills, glades, cliffs, and rock outcrops, in the Piedmont in woodlands, former prairie-like sites, woodlands, open forests, and river-scour grasslands, in the Mountains in glades, riverside scour areas, and rarely in grassy balds, ascending to at least 1600 m over mafic rocks (on Old Field Bald, Watauga and Ashe counties, NC). July-October. QC west to SK, south to FL and AZ. Some favor treating *A. hallii* Hackel as a subspecies of *A. gerardii* (Wipff 1996c). I do not agree, but if that course is followed, then our eastern taxon becomes *A. gerardii* ssp. *gerardii*. [= RAB, C, FNA, G, GW, HC, K, Pa, W; > *A. gerardii* var. *gerardii* – F; = *A. provincialis* Lamarck – S; = *A. gerardi* – WV, orthographic variant]

Andropogon glaucopsis Elliott, Chalky Bluestem. Wet savannas, pine flatwoods, ditches, wet disturbed sites. September-October. Se. VA south to c. peninsular FL and west to e. TX (Singhurst, Sorrie, & Holmes 2012). Although sometimes included in the past in either *A. glomeratus* or *A. virginicus*, this species is distinctive and easily recognized in the field (even from a car at 60 m.p.h.) by the combination of blue color, height of well over 1 m (taller than the other glaucous bluestems), and semi-bushy inflorescence. [= GW, K, Y; < *A. virginicus* – RAB; = *A. virginicus* var. *glaucopsis* (Elliott) A.S. Hitchcock – F, HC; = *A. glomeratus* var. *glaucopsis* (Elliott) A.S. Hitchcock – FNA, Z; < *A. glomeratus* – S]

Andropogon glomeratus (Walter) Britton, Sterns, & Poggenburg. Swamps, wet savannas, pine flatwoods, wet disturbed sites. September-October. S. MA south to c. peninsular FL and west to s. MS, primarily on the Coastal Plain, but scattered inland to w. PA, WV, c. KY, c. TN and AR. [= Y; = *A. glomeratus* (Walter) Britton, Sterns, & Poggenburg var. *glomeratus* – FNA, K, Z; < *A. virginicus* – RAB; = *A. virginicus* var. *abbreviatus* (Hackel) Fernald & Griscom – C, F, G, GW, WV; < *A. glomeratus* – HC, Pa, S, W]

Andropogon gyrans W.W. Ashe. Dry to moist forests, woodlands, fields, and disturbed areas. September-October. S. NJ west to s. IN, s. IL, s. MO, south to s. FL and TX. Campbell (1983) argued that the name *A. elliottii* should be replaced by *A. gyrans*; Ward (2004c) argues for retention of the traditional *A. elliottii*. We here follow Campbell. [= C, Pa, W; = *A. elliottii* Chapman – HC, WV; > *A. elliottii* – RAB, S; > *A. campyloracheus* Nash – RAB, S; = *A. gyrans* Ashe – C, W; = *A. gyrans* var. *gyrans* – FNA, K, Z; > *A. elliottii* var. *elliottii* – F, G; > *A. elliottii* var. *gracilior* Hackel – F, G; > *A. elliottii* var. *projectus* Fernald & Griscom – G]

Andropogon hirsutior (Hackel) Weakley & LeBlond. Wet savannas, pine flatwoods, adjacent ditches, other wet disturbed sites. September-October. E. MD south to c. peninsular FL west to se. LA. See discussion in Weakley et al. (2011) for reasons for recognition of this taxon at specific rank. [= Y; = *Andropogon glomeratus* (Walter) Britton, Sterns, & Poggenburg var. *hirsutior* (Hackel) C. Mohr – FNA, K, Z; < *A. virginicus* – RAB; ? *A. virginicus* var. *glaucopsis* (Elliott) A.S. Hitchcock – G, misapplied; = *A. virginicus* var. *hirsutior* (Hackel) A.S. Hitchcock; < *A. glomeratus* – HC, S]



Andropogon longiberbis Hackel, Longbeard Bluestem. Dry sandy soils of sandhills and dunes. September-October. Se. NC south to s. and w. FL, and in the Bahamas. [= FNA, HC, K, S, Z]

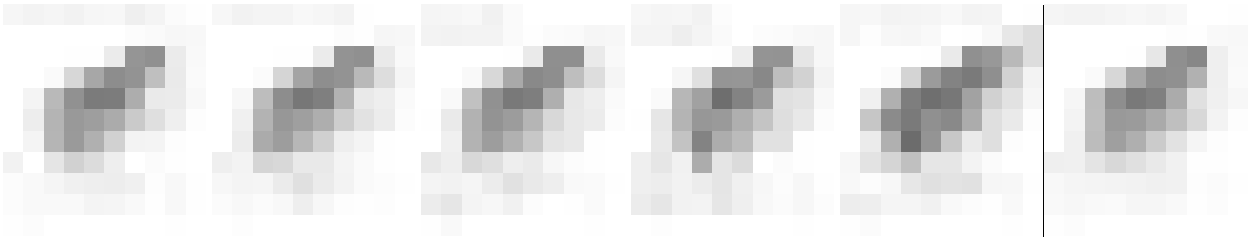
Andropogon mohrii (Hackel) Hackel, Tawny Bluestem, Bog Bluestem. Wet savannas, sphagnous bogs. September-October. Se. VA south to n. FL, west to LA. [= RAB, C, F, G, GW, HC, K, S; = *A. liebmannii* Hackel var. *pungensis* (Ashe) C.S. Campbell – FNA, Z]

Andropogon perangustatus Nash, Narrow-leaved Bluestem. Clay-based Carolina bays and boggy wetlands. August-October. E. VA south to c. peninsular FL, east to e. TX. Growth form, general appearance, and habitat (dense bluish tussocks with very narrow leaves and long ligules, growing in wet areas such as clay-based Carolina bays) make *A. perangustatus* readily recognizable. [= HC, S; = *A. gyrans* Ashe var. *stenophyllus* (Hackel) C.S. Campbell – FNA, K, Z; = *A. elliottii* Chapman var. *stenophyllus* (Hackel) D.B. Ward]

Andropogon tenuispatheus (Nash) Nash. Maritime wet grasslands, brackish marsh edges, moist disturbed sites. September-October. Se. VA and c. OK south to s. FL and w. TX, also south into Central America and the Caribbean. [< *A. virginicus* – RAB; = *A. glomeratus* (Walter) Britton, Sterns, & Poggenburg var. *pumilus* Vasey ex Dewey – FNA, K, Z ("robust variant"); < *A. glomeratus* – HC, S]

Andropogon ternarius Michaux *var.* ***ternarius***, Splitbeard Bluestem. Dry to moist soils. September-October. Var. *ternarius* ranges from DE west to KY and s. MO, south to FL and TX. Var. *cabanisii* (Hackel) Fernald & Griscom is endemic in s. and c. peninsular FL. [= FNA, K, Z; < *A. ternarius* – RAB, C, G, W; > *A. ternarius* var. *ternarius* – F; > *A. ternarius* var. *glaucescens* (Scribner) Fernald & Griscom – F; = *A. ternarius* – HC, S]

Andropogon tracyi Nash, Tracy's Bluestem. Dry sandy or clayey soils of sandhills, disturbed sites. September-October. E. NC south to s. FL and west to MS. [= FNA, HC, K, S, Z]



Andropogon virginicus Linnaeus *var*. ***decipiens*** C.S. Campbell, Deceptive Bluestem. Savannas, flatwoods, maritime wet grasslands, disturbed pinelands. September-October. Se. VA south to s. FL and west to w. FL; also in the Bahamas (Sorrie & LeBlond (1997). [= FNA, K, Z (1986); < *A. virginicus* – RAB, S; < *A. virginicus* var. *virginicus* – F, G, HC; = *A. virginicus* var. *virginicus* – Z (1983 – "deceptive variant")]

Andropogon virginicus Linnaeus *var*. ***virginicus***, Old-field Broomstraw, Broomsedge, "Sedge Grass", "Sage Grass". Old fields, roadbanks, disturbed sites. September-October. MA west to MI and e. KA, south to FL and e. TX, and in the Caribbean and Central America. Campbell (1983) recognized 3 "variants" within *A. virginicus* var. *virginicus*; the "deceptive variant" he later (1986) described formally as var. *decipiens* (see above). The "old-field variant" is the common "variant" in our area, occurring abundantly throughout the state. It has green stem internodes and the leaves usually pubescent, at least on the margins near the collar. The "smooth variant" is known only from the Coastal Plain and is apparently rare in our area, known from NC and SC (Berkeley and Marion counties; P. McMillan, pers. comm.) southward and westward. It has glaucous stem internodes and glabrous leaves. The "smooth variant" probably warrants formal taxonomic recognition. [= FNA, K, Z ("oldfield variant" and "smooth variant"); < *A. virginicus* – RAB, Pa, S, W; < *A. virginicus* var. *virginicus* – C, WV; < *A. virginicus* var. *virginicus* – G, HC (also see var. *decipiens*); >< *A. virginicus* var. *virginicus* – F; > *A. virginicus* var. *tetrastachyus* (Elliott) Hackel – F]

Anthenantia Palisot de Beauvois 1812 (Silkyscale)

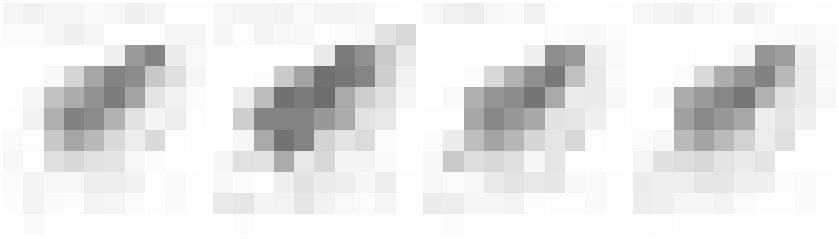
A genus of 3 species, of se. North America (or 4-5 species of se. North America and tropical America, if *Leptocoryphium* is included in *Anthenantia*). Clayton & Renvoize (1986) state that "*Anthenantia* is the etymologically correct version of three alternative spellings given by Beauvois." References: Wipff in FNA (2003a); Crins (1991)=Z; Kral (2004)=Y; Clayton & Renvoize (1986).

1 Leaves weakly if at all geniculate and auriculate at junction of blade and sheath, ascending to erect (lacking a sharp bend outward at the summit of the sheath), medium green; blade (3-) 4-8 (-10) mm wide, the proximal margins glabrous or sometimes ascending pilose-ciliate; pigmentation of leaves, spikelets and their trichomes variously reddish or purplish; fertile lemma red-brown to nearly black, leaf tip with a very short taper to a blunt or rounded apex; lower sheaths crowded and keeled (therefore distichous) ..... ***A. rufa***

1 Leaves strongly geniculate and auriculate at junction of blade and sheath, spreading, usually squarrose (with a sharp bend outward at the summit of the sheath), yellowish green,; blade 4-10 (-15) mm wide, the proximal margins ciliate at least basally with ascending strumose-hirsute cilia; pigment of leaves, spikelets and their trichomes usually with little or any red; fertile lemma brown; leaf tip with a long taper to a sharp apex; lower sheaths not crowded, keeled, or distichous ..... ***A. villosa***

Anthenantia rufa (Nuttall) J.A. Schultes, Purple Silkyscale. Wet savannas in the outer Coastal Plain, seepage bogs and moist sandhill-pocosin ecotones in the fall-line sandhills. September-October. Se. NC south to n. FL and west to w. LA. *A. rufa* inhabits much wetter habitats than the similar *A. villosa*, and is more typical of the outer Coastal Plain. Plants without culms are reminiscent of the Liliaceae. [= FNA, Y; = *Anthaenantia rufa* – RAB, GW, HC, K, S, Z, orthographic variant]

Anthenantia villosa (Michaux) Palisot de Beauvois, Green Silkyscale. Sandhills, especially in submesic swales. September-October. Se. NC south to s. FL and west to e. TX. *A. villosa* is found in drier habitats than *A. rufa*, most typically in upland swales in the sandhills. Kral (2004) has segregated a new species, *A. texana* Kral, of the w. Gulf Coastal plain, previously confused with *A. villosa*. [= Y; < *Anthaenantia villosa* – RAB, HC, K, S, Z, orthographic variant; < *Anthenantia villosa* – FNA]



Anthoxanthum Linnaeus 1753 (Vernal Grass)

A genus of about 50 species (as here circumscribed to include *Hierochloe*), perennials and annuals, of temperate, boreal, and arctic regions. Tucker (1996), Soreng et al. (2003), and Allred & Barkworth in FNA (2007a) all include *Hierochloe* into a more

broadly circumscribed *Anthoxanthum*. References: Allred & Barkworth in FNA (2007a); Tucker (1996)=Z; Soreng et al. (2003)=Y.

1 Glumes subequal; lowest 2 florets staminate.
  2 Hairs on the apex of the bisexual florets< 0.5 mm long, or sometimes with some longer hairs and then theses distributed only near the midrib.....***A. hirtum***
  2 Hairs on the apex of the bisexual florest 0.5-1 mm long, evenly distributed.....***A. nitens*** *ssp.* ***nitens***
1 Glumes unequal, the lower shorter than the upper; lowest 2 florets sterile.
  3 Annual, geniculate; ligules 0.5-2 mm long; glumes glabrous; leaves 1-2 mm wide.....***A. aristatum***
  3 Perennial, erect; ligules (1-) 2-3 mm long; glumes villous throughout or at least on the keel; leaves 2-5 mm wide.....***A. odoratum***

* ***Anthoxanthum aristatum*** Boissier, Annual Vernal Grass. Roadsides, disturbed areas; native of Europe. April-June. [= RAB, C, FNA, G, HC, K, Pa, S, WH, Z; = *A. puelii* Lecoq & Lamotte – F, WV]

Anthoxanthum hirtum (Schrank) Y. Schouten & Veldkamp, Hairy Holygrass, Sweetgrass, Vanilla Grass. Fens, wet calcareous meadows, high elevation pastures and openings, saltmarsh edges (DE). April-August. A circumboreal species and subspecies, widespread in n. Eurasia and n. North America, ranging south in North America to NJ, MD, PA, OH, IN, IL, IA, SD, CO, UT, NM, and CA, with several disjunct occurrences in North Carolina, in Long Hope Valley, Ashe County, the Nantahala River Bogs, Macon County, and Pond Mountain, Ashe County. The report by S ("recorded by Chapman from Statesville, N.C.") can be discounted; the record reflects a collection made in the mountains by Mordecai E. Hyams, a botanist and herb trader based in Statesville. Belden et al. (2004) document the first occurrence in Virginia. The sweet, vanilla-like odor of this grass is responsible for various folk uses – by Native Americans for making fragrant baskets, in Scandinavia strewn on church floors on festival days. [= FNA; < *Hierochloe odorata* (Linnaeus) Palisot de Beauvois – C, F, G, HC, Pa, WV; > *H. hirta* (Schrank) Borbás ssp. *arctica* (J. Presl) G. Weimarck – K; < *Torresia odorata* (Linnaeus) A.S. Hitchcock – S; < *Anthoxanthum nitens* (Weber) Y. Schouten & Veldkamp – Z; *?* *Anthoxanthum nitens* (Weber) Y. Schouten & Veldkamp spp. *nitens* – Y; > *H. odorata* var. *fragrans* (Willdenow) Richter (the North American plants)] {revise Y and Z synonymy}

Anthoxanthum nitens (Weber) Y. Schouten & Veldkamp *ssp.* ***nitens***, Vanilla Sweetgrass. Wet meadows, marshes, roadsides; sometimes interpreted as native in ne. North America and sometimes as an introduction from Europe. NL (Labrador) south to DE; n. Europe. [= FNA; < *Hierochloe odorata* (Linnaeus) Palisot de Beauvois – C, F, G, HC, Pa] {add Y and Z synonymy}

* ***Anthoxanthum odoratum*** Linnaeus, Sweet Vernal Grass Lawns, roadsides, disturbed areas; native of Europe. April-June. *A. odoratum* is a familiar grass of suburban areas and roadsides, and its pollen is known as a major cause of spring hay fever. From a letter from Charles Darwin to J.D. Hooker, in June 1855: "Have just made out my first grass, hurrah! hurrah! I must confess that fortune favours the bold, for, as good luck would have it, it was the easy *Anthoxanthum odoratum*: nevertheless it is a great discovery; I never expected to make out a grass in all my life, so hurrah! It has done my stomach surprising good..." [= RAB, C, F, FNA, G, HC, Pa, S, W, WV, Z; = *A. odoratum* ssp. *odoratum* – K]

Apera Adanson 1763 (Windgrass)

A genus of 3 species, of temperate Europe and w. Asia. References: Allred in FNA (2007a).

* ***Apera spica-venti*** (Linnaeus) Palisot de Beauvois, Common Windgrass. Disturbed areas; native of Europe. Reported for se. PA (Rhoads & Klein 1993), MD, and KY (Kartesz 1999). [= FNA, C, HC, K; = *Agrostis spica-venti* Linnaeus – F, G]

Aristida Linnaeus 1753 (Three-awn Grass)

A genus of about 250-300 species, widespread in the tropics, subtropics, and warm temperate zones. Cerros-Tlatilpa, Columbus, & Barker (2011) disuss the phylogeny of the genus. References: Allred in FNA (2003a); Allred (1986)=Z; Allred (1984, 1985); Peet (1993)=Y; Ward (2001)=X; Henrard (1929)=Q; Kesler, Anderson, & Hermann (2003)=V. Key adapted, in part, from Z.

Identification notes: The awns must be dry and relatively mature to assume their characteristic positions (immature awns and moist mature awns are erect and parallel). It is sometimes useful to dry a collection unpressed. Beware, however, that drying followed by dispersal can take place very quickly under the right conditions (such as the dashboard of a hot car)!

1 Plant a perennial, forming dense tussocks, the leaves primarily basal, usually very numerous, mostly > 3 dm long, **either** 0.5-1.5 mm wide and almost always tightly involute, **or** 1-3 mm wide and flat or folded; flowering only in the growing season following fire.
  2 Leaves 1-3 mm wide, flat or folded; [of wet pinelands of FL].....***A. rhizomorpha***
  2 Leaves 0.5-1.5 mm wide and almost always tightly involute; [collectively more widespread in our area, though almost strictly Coastal Plain, from NC south to s. FL, west to s. MS].

3 Base of blade and collar (and often the upper sheath) with conspicuous tuft or bearding of woolly to villous pubescence (sometimes deciduous on foliage more than a year old); leaves usually glabrous above the basal 2 cm of the blade; [of s. SC south and west to s. FL and s. MS]..... ***A. beyrichiana***

3 Base of blade, collar, and upper sheath lacking a conspicuous tuft of woolly to villous pubescence; leaves with 2 lines of villous pubescence on either side of the midrib on the lower surface extending nearly or entirely the length of the blade (sometimes deciduous on foliage more than a year old); [of n. SC and NC]..... ***A. stricta***

1 Plant an annual or perennial, forming small tufts (or solitary), the leaves primarily cauline, usually few, mostly < 3 dm long (if as long as 3 dm then > 2 mm wide), flat to slightly folded, but not wiry; flowering not strongly triggered by fire.

4 First glume 3-7 nerved.

5 Central awn of the lemma (8-) 12-65 (-70) mm long, the lateral awns as long or nearly so..... ***A. oligantha***

5 Central awn of the lemma (9-) 12-25 (-30) mm long, the lateral awns 1-4 mm long (or even lacking)..... ***A. ramosissima***

4 First glume 1-2-nerved.

6 Central awns spirally coiled at the base (above the awn column), like a corkscrew, ½ to 3 full turns (when dry).

7 Lateral awns 5-13 mm long, spreading..... ***A. basiramea***

7 Lateral awns 1-4 mm long, erect

8 First glume 1/2 to 2/3 as long as the second glume; lemma 6-11 mm long, glabrous to scaberulous..... ***A. curtissii***

8 First glume as long as or nearly as long as the second glume; lemma 3-8 mm long, sparsely appressed-pubescent..... ***A. dichotoma***

6 Central awns straight to curved (or contorted at the base).

9 Lateral awns < ½ as long as the central awn.

10 Inflorescences 15-25 cm wide; loosely cespitose perennial, unbranched upward..... ***A. patula***

10 Inflorescences 1-6 cm wide; annuals, much branched above the base.

11 Awns flattened at the base..... ***A. adscensionis***

11 Awns terete at the base.

12 Lemmas 8-22 mm long; central awn curved ca. 180 degrees at the base..... ***A. ramosissima***

12 Lemmas 2.5-10 mm long; central awn curved ca. 90 degrees at the base.

13 Central awn (8-) 12-27 mm long; lateral awns (1-) 6-18 mm long..... ***A. geniculata***

13 Central awn mostly 1-10 (-14) mm long; lateral awns 0-5 (-8) mm long..... ***A. longespica***

9 Lateral awns > ½ as long as the central awn.

14 Sheaths lanose or floccose (the hairs kinked and intertwined); nodes of the panicle axis with tufts of lanose or floccose hairs..... ***A. lanosa***

14 Sheaths glabrous to pilose (the hairs straight and usually appressed, not intertwined); nodes of the panicle axis glabrous or pilose.

15 Awn column (the connivent awns twisted together) or lemma beak (slender, narrowed, and twisted portion of lemma body below the awns) 7-30 mm long; lemma body (including the beak, if present) separated from the awns (or awn column) by an articulation zone, the awns (or awn column) disarticulating at maturity from the lemma.

16 Panicle spiciform, broadest near the middle, dense, the spikelets overlapping strongly; awns (10-) 20-30 mm long, borne at the summit of a twisted lemma beak 7-30 mm long; culms simple or with very few branches; plants perennial..... ***A. spiciformis***

16 Panicle almost corymbiform, broadest above the middle, open, the spikelets overlapping only slightly; awns 30-40 mm long, not including the 8-15 mm long column formed by the twisting together of the 3 awn bases; culms often much-branched; plants annual..... ***A. tuberculosa***

15 Awn column or lemma beak absent or < 7 mm long; lemma body not separated from the awns by an articulation zone.

17 Main lower branches of the panicle divergent from the culm and with pulvini..... ***A. purpurea*** *var.* ***longiseta***

17 Main lower branches of the panicle (or pedicels in racemose species) ascending to appressed and lacking pulvini.

18 Spikelets borne singly at each node of the main axis, the inflorescence thus a spike or raceme..... ***A. mohrii***

18 Spikelets 2 or more per node of the main axis at most nodes (a few nodes may have single spikelets), often with side branches present as well, the inflorescence thus a panicle (less commonly a raceme).

19 First glume 1/3-¾ the length of the second glume..... ***A. gyrans***

19 First glume > ¾ the length of the second glume.

20 Central awn 15-40 mm long; first glume prominently 2-keeled, (8-) 9-14 mm long when mature..... ***A. palustris***

20 Central awn 8-25 mm long; first glume either 1-keeled and 6-14 mm long, **or** weakly 2-keeled and 5.5-9 (-10) mm long when mature.

21 Central awn about 2× as thick as the lateral awns, divergent to reflexed; first glume 1-keeled or weakly 2-keeled; [moist to wet habitats].

22 Basal internode of the culm 0.3-0.6 mm wide; most nodes of the inflorescence with 1-2 spikelets; all awns spreading, the central spirally twisted basally and often contorted by as much as 180 degrees (best seen in fresh material); central awn 15-20 mm long, lateral awns 11-16 mm long, the ratio of the lateral:central awn length 0.69-0.80; lemma callus beard 0.6-1.0 mm long..... ***A. simpliciflora***

22 Basal internode of the culm 0.7-1.2 mm wide; most nodes of the inflorescence with 3 or more spikelets; central awn spreading to slightly deflexed, not spirally twisted basally, the lateral awns ascending to erect (best seen in fresh material); central awn 13-22 mm long, lateral awns 8-15 mm long, the ratio of the lateral:central awn length 0.55-0.69; lemma callus beard 0.2-0.6 mm long..... ***A. virgata***

21 Central awn < 1.5× as thick as the lateral awns, erect to divergent; first glume 1-keeled (rarely weakly 2-keeled); [dry habitats].

23 Culms mostly > 10 dm tall and 3-6 mm in diameter near the base; awns 8-15 mm long; panicle branches > 4 cm long; callus ca. 1.0 mm long..... ***A. condensata***

23 Culms 5-8 (-10) dm tall and 1-4 mm in diameter near the base; awns 12-25 mm long; panicle branches 1-4 cm long; callus 0.4-0.8 mm long.

24 First glume 1-4 mm longer than the second glume (rarely about equal to it); awns 15-25 mm long, straight or slightly contorted at the base; leaf blades 1-3 mm wide, usually curling..... ***A. purpurascens***

24 First glume shorter than or about equal to the second glume; awns 12-18 mm long, spirally contorted at the base; leaf blades about 1 mm wide, usually not curling..... ***A. tenuispica***

* ***Aristida adscensionis*** Linnaeus, Sixweeks Three-awn. {habitat in our area unknown}; native of w. United States. Reported for SC (FNA). {further investigate} [= F, FNA, G, HC, K]

* ***Aristida basiramea*** Engelmann ex Vasey, Forktip Three-awn. Sandy soils; probably introduced, native of mw. United States. ME and ON south to SC (FNA), FL (Wunderlin & Hansen 2003), AL, TX, and CO (FNA). [= F, FNA, G, HC, K; = *A. basiramea* var. *basiramea* – C] {FL}

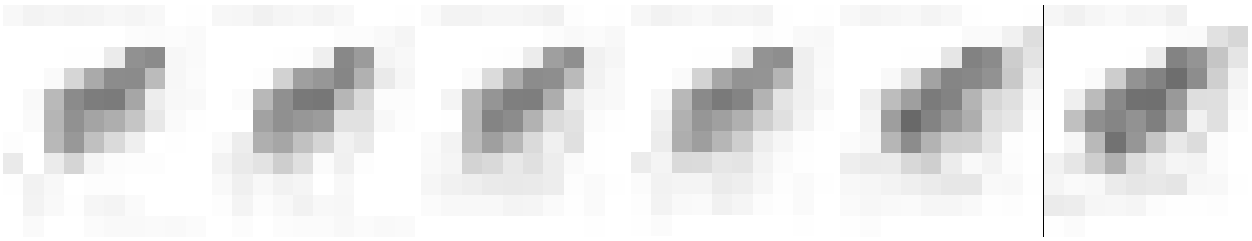
Aristida beyrichiana Trinius & Ruprecht, Southern Wiregrass. Sandhills, savannas, from very dry to seasonally saturated soils. September-November. S. SC south to s. FL, west to s. MS. See Peet (1993) for discussion of the taxonomy and ecology of this species; also see comments under *A. stricta*, which also apply here. Ward (2001) proposes varietal status for *A. stricta* and *A. beyrichiana*. [= K, Y; < *A. stricta* – RAB, FNA, GW, HC, S, V, Z; = *A. stricta* Michaux var. *beyrichiana* (Trinius & Ruprecht) D.B. Ward – X]

Aristida condensata Chapman, Big Three-awn. Dry sandy soils of sandhills. August-October. Sc. NC south to s. FL, west to s. MS (Sorrie & Leonard 1999). [= RAB, FNA, HC, K, S, Z]

Aristida curtissii (A. Gray ex S. Watson & Coulter) Nash, Curtiss's Three-awn. Roadsides, disturbed areas, bare eroding soil. August-October. ME west to WY, south to n. FL, AR, OK, and CO, perhaps largely or entirely adventive in our area. See Z for a discussion of the rationale for reducing *A. curtissii* to a variety of *A. dichotoma*. C reduces it to a variety of the more western *A. basiramea* Engelmann ex Vasey. For now, and for simplicity, I prefer to retain the two as species. [= RAB, G, HC, S; = *A. basiramea* Engelmann ex Vasey var. *curtissii* (A. Gray ex S. Watson & Coulter) Shinners – C; = *A. dichotoma* Michaux var. *curtissii* A. Gray – F, FNA, K, Pa, W, WV, Z]

Aristida dichotoma Michaux, Fork-tip Three-awn. Roadsides, fields, disturbed areas, bare eroding soil. August-October. ME west to WI, south to n. FL and TX. See *A. curtissii* for comments. [= RAB, C, G, HC, S; = *A. dichotoma* var. *dichotoma* – F, FNA, K, Pa, W, WV, Z]

* *Aristida divaricata* Willdenow. Allred (1986) reports the collection of this sw. North American species from a Soil Conservation Service test nursery in Chapel Hill, NC. [= FNA, HC, K1, K2] {rejected; not a component of our flora; not keyed; not mapped}



Aristida geniculata Rafinesque, Northeastern Slim-spike Three-awn. Disturbed areas. August-October. The distribution and habitats of *A. geniculata* and *A. longespica* in our area are poorly known, pending further field and herbarium investigation. The phylogenetic study of Cerros-Tlatilpa, Columbus, & Barker (2011) suggests that this taxon is not closely related to *A. longespica*, and should be given species rank. [= *A. longespica* var. *geniculata* (Rafinesque) Fernald – C, FNA, HC, K, Pa, Z; < *A. longespica* – RAB, W, WV; > *A. longespica* var. *geniculata* – F; > *A. intermedia* Scribner & Ball – F, G, S; > *A. longespica* – G]

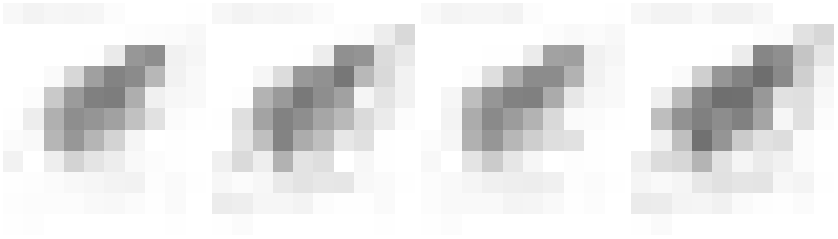
Aristida gyrans Chapman, Corkscrew Three-awn. Dry pinelands. E. GA and w. Panhandle FL, south to s. FL. In Bryan, Long, and Montgomery counties in e. GA (Sorrie 1998b), and in wc. GA (J. Allison, pers. comm.). [= FNA, HC, K, S]

Aristida lanosa Muhlenberg ex Elliott, Woollysheath Three-awn. Dry sandy soils of sandhills and fields. August-October. NJ south to FL, west to TX, north in the interior to MO and OK. Var. *macera*, usually dismissed as yet another Fernaldian "variety" known only from se. VA, needs further evaluation. [= RAB, C, FNA, K, S, WV, Z; > *A. lanosa* var. *lanosa* – F, G, HC; > *A. lanosa* var. *macera* Fernald & Griscom – F, G, HC]

Aristida longespica Poiret, Southeastern Slim-spike Three-awn. Cp (DE, FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (NC, SC, VA), {WV}: disturbed areas; common. August-October. The distribution and habitats of *A. geniculata* and *A. longespica* in our area are poorly known, pending further field and herbarium investigation. [= *A. longespica* var. *longespica* – C, F, FNA, HC, K, Pa, Z; < *A. longespica* – RAB, G, W, WV; = *A. longespica* – S]

Aristida mohrii Nash, Mohr's Three-awn. Sandhills. August-October. Panhandle FL and sw. GA west to s. AL; apparently disjunct in SC (Chesterfield and Richland counties). [= FNA, HC, K, S, Z]

Aristida oligantha Michaux, Prairie Three-awn. Roadsides, fields, disturbed areas. August-October. VT west to SD, south to FL and TX, scattered elsewhere as a weed. [= RAB, C, F, FNA, G, HC, K, Pa, S, W, WV, Z]



Aristida palustris (Chapman) Vasey, Longleaf Three-awn. Wet pine savannas, limesink depressions. August-October. Se. NC south to FL, west to TX; apparently disjunct on the Cumberland Plateau of KY. [= C, FNA, K, S, Z; = *A. affinis* (Schultes) Kunth – RAB, F, G, GW, HC, misapplied]

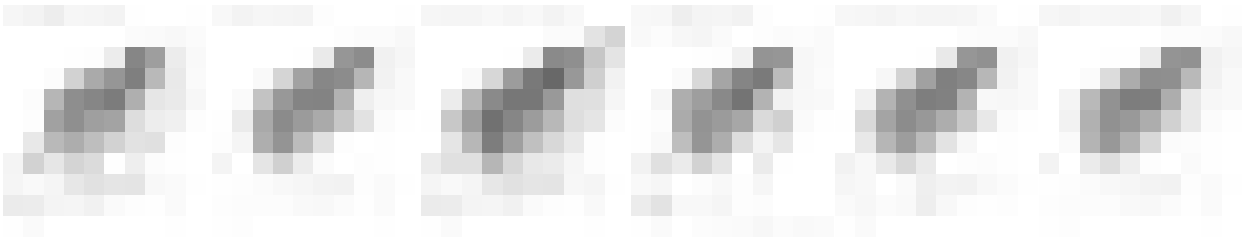
Aristida patula Chapman ex Nash, Tall Three-awn. Dry to moist sandy soils of pond margins, pinelands, dunes. Endemic to FL Panhandle (Dixie, Franklin, Gadsden, Leon, Taylor, and Wakulla counties) (Wunderlin & Hansen 2006) and peninsula. [= FNA, GW, HC, K, S]

Aristida purpurascens Poiret, Arrowfeather. Dry habitats, especially in dry sandy soils. August-October. MA west to WI and KS, south to FL and TX. In the Sandhills occurring in two forms, one green, the other strongly glaucous-blue. [= RAB, C, G, HC, Pa, S, W, WV; > *A. purpurascens* var. *purpurascens* – F; > *A. purpurascens* var. *minor* Vasey – F; = *A. purpurascens* var. *purpurascens* – FNA, K, Z]

* ***Aristida purpurea*** Nuttall *var*. ***longiseta*** (Steudel) Vasey, Red Three-awn. Disturbed areas; adventive from farther west. August-October. Also reported from NC, but the collection is from a Soil Conservation Service test nursery, and there is no evidence of naturalization. [= C, FNA, K, Z; > *A. longiseta* var. *robusta* Merrill – F; = *A. longiseta* Steudel – G, HC]

Aristida ramosissima Engelmann ex A. Gray. Pine flatwoods. East to Panhandle FL (Bay County) (Wunderlin & Hansen 2004), c. TN, and e. KY (FNA). [= C, F, FNA, G, HC, K, S]

Aristida rhizomorpha Swallen, Florida Three-awn. Wet pine flatwoods. FL endemic, north to Baker, Duval, and Nassau counties. [= FNA, HC, K]



Aristida simpliciflora Chapman, Southern Three-awn, Chapman's Three-awn. Wet pine savannas. Sw. GA west through the FL Panhandle and c. AL to s. MS (Sorrie & Leonard 1999), and south into c. peninsular FL; northward apparently as a rarity in se. SC (Berkeley County) and se. NC. *A. simpliciflora* was believed to be a Gulf Coastal Plain endemic until found by R. LeBlond in 1999 in wet savannas in se. NC (Green Swamp savannas, Brunswick County; Old Dock Savanna, Columbus County; and The Neck Savanna, Pender County). It is reported for sw. GA (Jones & Coile 1988, Kartesz 1999). Harper also reports it for c. GA. [= FNA, HC, K, S, Z]

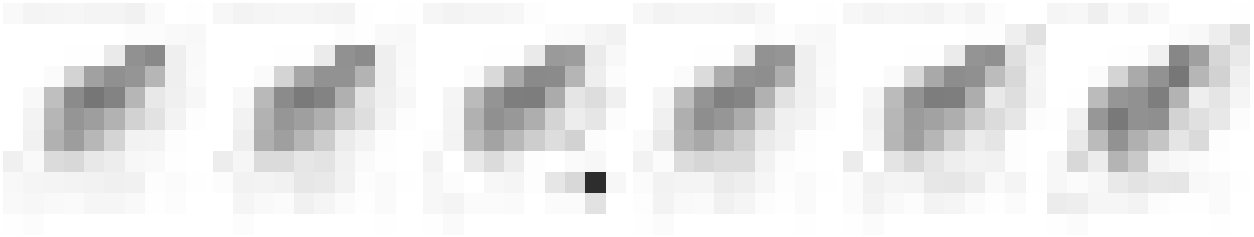
Aristida spiciformis Elliott, Bottlebrush Three-awn, Spike Three-awn. Wet pine savannas and seepage areas. August-October. E. SC (McMillan et al. 2002) south to FL, west to MS. Allred (1986) also reports this species from NC, but the documentation is unknown to me. [= RAB, FNA, GW, HC, K, S, Z]

Aristida stricta Michaux, Carolina Wiregrass, Pineland Three-awn. Coastal Plain pinelands of nearly all sorts, ranging from the driest white-sand sandhills to seasonally saturated pine savannas dominated by a mixture of longleaf pine and pond pine, largely or entirely replaced in the wettest savannas by *Sporobolus teretifolius*, *Sporobolus pinetorum*, *Muhlenbergia expansa*, *Ctenium aromaticum*, and *Calamovilfa brevipilis*; also in Piedmont areas adjacent to the Coastal Plain and formerly supporting fire-maintained longleaf pine woodlands. September-November. Ne. NC (south of Albemarle Sound and the Roanoke River), south to ne. SC (Lee and Kershaw counties). *A. stricta* was the keystone species of much of the upland Coastal Plain of the Carolinas. Its flammable foliage facilitated the spread of lightning-set fires that maintained the biologically rich pine savanna, sandhill, and pine flatwood ecosystems once widespread in our area. Though still locally common in parts of the Sandhill region and in portions of Brunswick, Pender, Onslow, and Carteret counties, NC, *A. stricta* is much rarer than formerly. The conversion of vast acreages of former pinelands to agriculture, pine tree farms, and developed areas has taken its toll over the years. In the twentieth century, suppression of fire has also led to the destruction of *A. stricta*. More recently, pine-straw raking is leading to the serious decline of A. *stricta* in its few remaining strongholds on public lands. *A. stricta* has little tolerance for ground disturbance. See Peet (1993) for discussion of the taxonomy and ecology of this species. Ward (2001) proposes varietal status for *A. stricta* and *A. beyrichiana*. [= K, Y; < *A. stricta* – RAB, FNA, GW, HC, S, V, Z (also see *A. beyrichiana*); = *A. stricta* var. *stricta* – X]

Aristida tenuispica A.S. Hitchcock, Southern Arrowfeather. Sandy habitats. August-October. NC south to FL and west to MS. [= HC, S; = *A. purpurascens* Poiret var. *tenuispica* (A.S. Hitchcock) Allred – FNA, K, Z]

Aristida tuberculosa Nuttall, Seabeach Needlegrass. Sandhills, coastal dunes (in VA), other dry, sandy habitats such as sandy roadsides. August-October. Se. NH south to NJ and disjunct in e. VA in the outer Coastal Plain; from sc. NC south to Panhandle FL and west to s. MS (Sorrie & Leonard 1999), mostly in the inner Coastal Plain; and also near the Great Lakes in sw. MI, n. IN, n. IL, s. WI, se. MN, and e. IA. The curious trimodal distribution is unexplained. [= RAB, C, F, FNA, G, HC, K, S, Z]

Aristida virgata Trinius. Moist to wet savannas, mountain bogs (Henderson Co., NC), other moist habitats. August-October. S. NJ south to FL, west to TX, primarily on the Coastal Plain. The phylogenetic study of Cerros-Tlatilpa, Columbus, & Barker (2011) appears to confirm that this taxon is not closely related to *A. purpurascens*, and should therefore be accorded species rank. [= RAB, C, F, G, GW, HC, S; = *A. purpurascens* Poiret var. *virgata* (Trinius) Allred – FNA, K, Z]



Arrhenatherum Palisot de Beauvois 1812 (False Oatgrass)

A genus of about 6 species, perennials, of the Mediterranean region and e. Asia. References: Hatch in FNA (2007a); Tucker (1996)=Z.

1 Base of culm consisting of a series of adjacent (moniliform) corms 5-10 mm in diameter.....***A. elatius*** *var.* ***bulbosum***
1 Base of culm not swollen or cormose, 2-4 mm thick.....***A. elatius*** *var.* ***elatius***

* ***Arrhenatherum elatius*** (Linnaeus) J. & K. Presl *var.* ***bulbosum*** (Willdenow) Spenner, Tuber Oatgrass, Onion Couch. Habitat in our area not known; native of Europe. This variety was apparently cultivated for the edible tubers in Bronze Age Europe (Tucker 1996). Cited for VA in HC. [= C, F, G, HC, K, WV, Z; = *A. elatius* ssp. *bulbosum* (Willdenow) Schübl. & G. Martens – FNA; < *A. elatius* – GW, W; = *A. elatius* var. *tuberosum* Thiel. – S]

* ***Arrhenatherum elatius*** (Linnaeus) J. & K. Presl *var.* ***elatius***, Tall Oatgrass. Meadows, fields, roadsides; native of Europe. May-June. [= C, F, G, HC, K, S, WV, Z; < *A. elatius* – RAB, GW, W; = *A. elatius* ssp. *elatius* – FNA; > *A. elatius* var. *elatius* – Pa; > *A. elatius* var. *biaristatum* (Peterm.) Peterm. – Pa]

Arthraxon Palisot de Beauvois 1812 (Basket Grass)

References: van Welzen (1981)=Y; Thieret in FNA (2003a); Kiger (1971)=Z.

Identification notes: Sometimes confused (especially before flowering) with *Microstegium*, but *Arthraxon* has distinctly cordate-clasping leaves, which *Microstegium* lacks. Also vegetatively similar to *Oplismenus*.

* ***Arthraxon hispidus*** (Thunberg) Makino *var.* ***hispidus***, Basket Grass. Moist ditches, bottomlands, disturbed areas; native of se. Asia. September-October. Like *Microstegium*, *Arthraxon* appears to be steadily increasing its abundance in our area. [= FNA, Y; < *A. hispidus* – C, GW, K, Pa, Z; > *A. hispidus* var. *cryptatherus* (Hackel) Honda – RAB, F, G, HC, W]

Arundinaria Michaux 1803 (Cane)

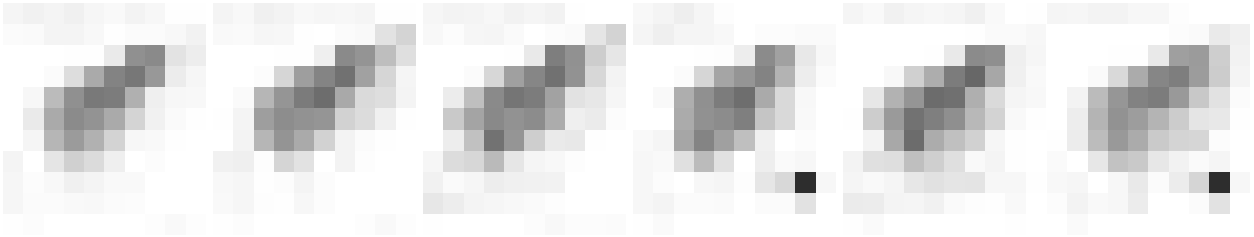
A genus of 3 species, woody grasses (bamboos), native of se. United States. *Arundinaria* was much reduced by the foraging of free-range livestock in the eighteenth and early nineteenth centuries and by fire suppression in the late nineteenth century and throughout the twentieth century. "Canebrakes," large areas dominated by cane, were described in many historical accounts and apparently occupied large parts of the landscape of the Coastal Plain, also occurring in the Piedmont and low Mountains. References: Ward (2009c)=V; Clark & Triplett in FNA (2007a); Tucker (1988)=Y; McClure (1973)=Z; McClure (1963); Judziewicz et al. (2000)=X; Triplett, Weakley, & Clark (2006)=Q. The key is adapted from Q.

1 Primary branches with 0-1 compressed basal internodes (in the basalmost 1 cm or so); culm internodes usually sulcate (with a groove extending upward from the node, sometimes partly obscured by the branch); culm leaves deciduous; culms to 10 m tall; rhizomes lacking air canals; foliage leaf blades 0.8-1.3 cm wide .....***A. gigantea***
1 Primary branches with 2-5 compressed basal internodes (in the basalmost 1 cm or so); culm internodes usually terete; culm leaves persistent to tardily deciduous; culms to 4 m tall; rhizomes with or without longitudinal air canals (visible in cross-section as a cylinder of hollow canals 1 mm or less from the outer surface); foliage leaf blades 0.8-2 cm wide.
  2 Foliage blades chartaceous, deciduous, abaxial surfaces pilose or glabrous, weakly tessellate; primary branches usually < 35 cm long, basal nodes of primary branches not developing secondary branches; top knot blades 12-22.5 cm long; rhizomes with or without air canals .....***A. appalachiana***
  2 Foliage blades coriaceous, persistent, abaxial surfaces densely pubescent or glabrous, strongly tessellate; primary branches usually > 50 cm long, basal nodes of primary branches developing secondary branches; top knot blades 20-30 cm long; rhizomes with air canals ....***A. tecta***

Arundinaria appalachiana Triplett, Weakley, & L.G. Clark, Hill Cane. Dry to moist forests on slopes. Noted as distinctive as long ago as 1900 by R.M. Harper, W.C. Coker, W.W. Ashe, and C.D. Beadle, this distinctive plant of the Appalachians has only recently been described as a species (Triplett, Weakley & Clark 2006). The short plants (often only knee-high, though sometimes head-high) on mountain slopes south of Asheville are autumn-deciduous, whereas both our other species are evergreen. [= FNA, Q, V; < *A. gigantea* (Walter) Walter – RAB, GW; < *A. gigantea* ssp. *tecta* (Walter) McClure – K, X, Z; < *A. tecta* – HC, S, Y; = *A. tecta* var. *decidua* Beadle in L.H. Bailey]

Arundinaria gigantea (Walter) Muhlenberg, Giant Cane, River Cane. Swamps, floodplain. April-July. S. OH south to FL and e. TX. There has been much disagreement over the recognition of one, two, or several taxa of cane in the Southeastern United States. This species reaches heights of 6-7 (-10) m and is supposed to flower only once every 40-50 years. *A. macrosperma* Michaux is controversial, sometimes considered to be a synonym of *A. gigantea* or to represent hybridization or introgression between *A. gigantea* and *A. tecta*. [= F, FNA, HC, Q, S, WV, Y; < *A. gigantea* – RAB, C, GW (also see *A. tecta*); = *A. gigantea* ssp. *gigantea* – K, Z; > *A. gigantea* ssp. *gigantea* – X; > *A. gigantea* (Walter) Muhlenberg ssp. *macrosperma* (Michaux) McClure – X; = *A. macrosperma* Michaux – V]

Arundinaria tecta (Walter) Muhlenberg, Switch Cane, Small Cane. Savannas, pocosins, canebrakes, generally (but not solely) in wetlands. April-July. Primarily a Southeastern Coastal Plain endemic: e. MD to FL and s. AL. *A. tecta* is a smaller plant than *A. gigantea* (normally 1-2 m tall, but reaching heights of up to 4 m where fire-suppressed), and flowers more frequently, supposedly every 3-4 years (Tucker 1988), probably actually in response to fire. [= FNA, Q; < *A. gigantea* (Walter) Muhlenberg – RAB, C, GW; < *A. tecta* – F, HC, S, Y; < *A. gigantea* ssp. *tecta* (Walter) McClure – K, X, Z; = *A. gigantea* (Walter) Muhlenberg –V]



Arundo Linnaeus 1753 (Giant Reed)

A genus of 3 species, widespread in the tropics, subtropics and warm-temperate areas. References: Allred in FNA (2003a).

* ***Arundo donax*** Linnaeus, Giant Reed. Disturbed areas; native of the Old World. September-October. Horticultural forms with leaves transversely striped white and green have been treated as var. *versicolor*, but are are better considered as only a form or cultivar. [= RAB, F, FNA, K, S; > *A. donax* var. *donax* – HC; > *A. donax* var. *versicolor* (P. Miller) Stokes – HC]

Avena Linnaeus 1753 (Oats)

A genus of about 29 species, native of temperate and boreal Eurasia and n. Africa. References: Baum in FNA (2007a); Tucker (1996)=Z.

1 Florets disarticulating from the glumes at maturity (the glumes remaining attached to the plant); lemmas pubescent with brown hairs; lemmas with long bent awns; callus bearded with hairs up to ¼ as long as the lemmas ..... ***A. fatua***
1 Florets not disarticulating from the glumes at maturity; lemmas glabrous or scabrous (rarely sparsely strigose); lemmas unawned or with relatively straight awns; callus glabrous ..... ***A. sativa***

* ***Avena fatua*** Linnaeus, Wild Oats. Disturbed areas; native of Europe and c. Asia. {needs herbarium checks; no records shown on VA Atlas}. [= C, F, FNA, G, HC, K, Pa]

* ***Avena sativa*** Linnaeus, Oats. Fields and disturbed areas, commonly cultivated; native of Middle East. May-June. An important crop, but apparently only a weed until transported from the Middle East to the moister central Europe, where cultivated beginning about 3000 BP (Hancock 2004). [= RAB, FNA, G, HC, K, Pa, S, W, Z; > *A. sativa* var. *orientalis* (Schreber) Alefeld – F; > *A. sativa* var. *sativa* – F]

Avenella Koch ex Steudel 1840 (Hairgrass)

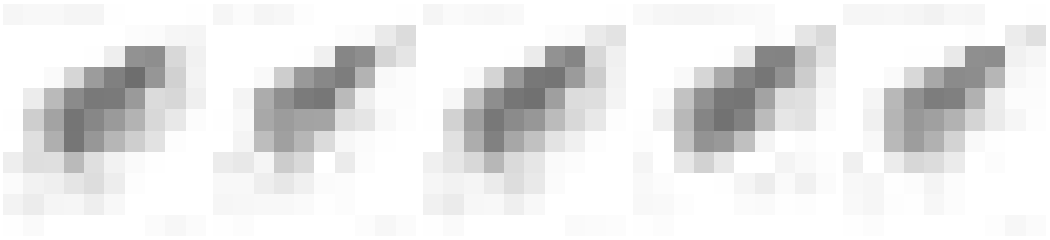
A monotypic genus, perennial, circumboreal, formerly often included in *Deschampsia*. References: Chiapella (2007); Barkworth in FNA (2007a).

Avenella flexuosa (Linnaeus) Drejer, Common Hairgrass, Wavy Hairgrass. Grassy balds, high elevation rocky summits, rocky or sandy woodlands. April-August. Circumboreal, ranging south in North America to n. GA, OH, WI, and MN; disjunct in AR and OK, and in Mexico. [= *Deschampsia flexuosa* – RAB, C, FNA, G, HC, Pa, W, WV, Z; > *D. flexuosa* (Linnaeus) Trinius var. *flexuosa* – F, K; = *Aira flexuosa* Linnaeus – S]

Avenula (Dumortier) Dumortier 1868

A genus of about 30 species, perennials, mainly European. References: Tucker in FNA (2007a).

* ***Avenula pubescens*** (Hudson) Dumortier, Downy Oatgrass. Disturbed areas; native of Eurasia. [> *Avenula pubescens* ssp. *pubescens* – FNA; > *Avenula pubescens* ssp. *laevigata* (Schur) Holub – FNA; = *Helictotrichon pubescens* (Hudson) Bess. ex Pilger – C, HC, K; = *Avena pubescens* Hudson – F, G]



Axonopus Palisot de Beauvois 1812 (Carpet Grass)

A genus of ca. 100 species, primarily tropical and subtropical. Phylogenetic studies suggest that *Axonopus* may be included in *Paspalum*. References: Barkworth in FNA (2003a).

1 Spikelets 4-6 mm long ..... ***A. furcatus***
1 Spikelets 1.5-2.8 mm long.
  2 Spikelets 1.5-2.2 mm long; leaf blades mostly 8-10 mm wide ..... ***A. compressus***
  2 Spikelets 2.2-2.8 mm long; leaf blades mostly 2-4 (-6) mm wide ..... ***A. fissifolius***

Axonopus compressus (Swartz) Palisot de Beauvois, Southern Carpet Grass. Moist disturbed areas, Lawns; probably introduced. Reported for VA by HC. Sometimes used as a lawn grass in the deep South. [= FNA, GW, HC, K, S, WH3; ***Paspalum compressum*** (Swartz) Raspail]

Axonopus fissifolius (Raddi) Kuhlmann, Common Carpet Grass. Pine flatwoods, sandy forests, roadsides, lawns. June-October. VA south to FL, west to TX and OK, and extending into tropical America. [= FNA, K, WH3; ? *A. affinis* Chase – RAB, GW, HC, W; = ***Paspalum fissifolium*** Raddi]

Axonopus furcatus (Flügge) A.S. Hitchcock, Big Carpetgrass. Sandy forests, bottomlands, roadsides, lawns. July-October. Se. VA south to FL, west to TX and AR; apparently adventive in e. MD (Knapp et al. 2011). [= RAB, C, F, FNA, G, GW, HC, K, S, WH3; = ***Paspalum furcatum*** Flügge]

Bambusa Schreber 1789 (Bamboo)

A genus of ca. 100 species, trees and shrubs, native to tropical and subtropical Asia. References: Stapleton in FNA (2007a).

1 Culm leaves with auricles absent or very small and rounded; basal internodes not swollen, not much longer than those above ..... ***B. multiplex***
1 Culm leaves with auricles well-developed, to 5 cm long and 1.5 cm wide; basal internodes swollen, much shorter than the internodes above ..... ***B. vulgaris***

* ***Bambusa multiplex*** (Loureiro) Raeuschel ex Schultes & Schultes f, Hedge Bamboo, Dwarf Bamboo. Disturbed areas; native of se. Asia. Reported as naturalized or persistent in portions of the southeastern United States, including GA, FL Panhandle, and FL peninsula. [= FNA, HC]

* ***Bambusa vulgaris*** Schrader ex J.C. Wendland, Common Bamboo. Disturbed areas; native of tropical Asia. Reported for SC (Kartesz 1999). {investigate} [= FNA, HC, K]

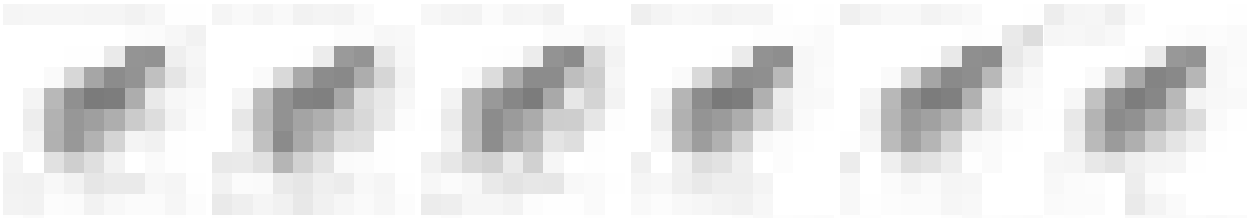
Bothriochloa Kuntze 1891 (Beardgrass, Cane Bluestem)

A genus of ca. 35 species, widespread in tropical and subtropical regions of the Old and New World. References: Allred in FNA (2003a); Vega (2000)=Z; Allred & Gould (1983)=Y. Key adapted from Allred in FNA (2003a).

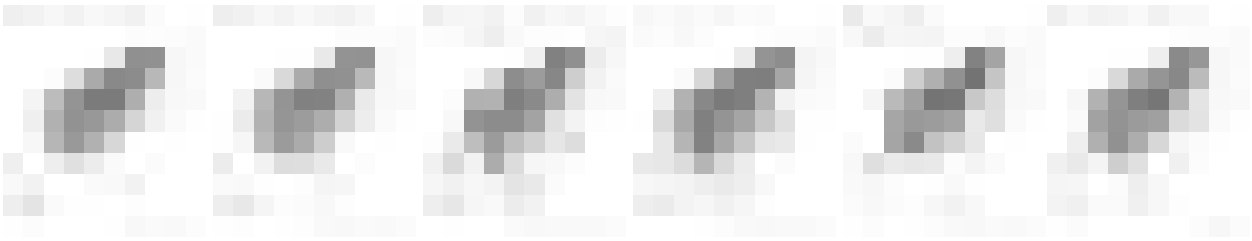
1 Sessile spikelets 4.5-8.5 mm long
  2 Rachises 5-10 cm long, with many branches ..... ***B. barbinodis***
  2 Rachises usually < 5 cm long, with 3-8 branches ..... ***B. hybrida***
1 Sessile spikelets 3-4.5 mm long.
  3 Pedicellate spikelets much shorter than the sessile spikelets.
    4 Panicles reddish when mature; hairs below the sessile spikelets sparse and ca. ¼ as long as the spikelets, not obscuring the spikelets ..... ***B. bladhii***
    4 Panicles silvery-white or tannish when mature, hairs below the sessile spikelets dense and > ½ as long as the spikelets, somewhat obscuring the spikelets
      5 Panicles 9-20 cm long; sessile spikelets 3-4× as long as thick; leaves basally disposed; culm usually < 2 mm in diameter ..... ***B. laguroides*** *ssp.* ***torreyana***
      5 Panicles 4-12 (-14) cm long; sessile speikelets 4-6× as long as thick; leaves evenly distributed on the culm; culm usually 2-4 mm in diameter ..... ***B. longipaniculata***
  3 Pedicellate spikelets about as long as the sessile spikelets.

6 Rachises longer than the branches ..... ***B. bladhii***
6 Rachises shorter than the branches.
7 Lower glumes of the sessile spikelets with a dorsal pit..... ***B. pertusa***
7 Lower glumes of the sessile spikelets without a dorsal pit ..... ***B. ischaemum*** *var*. ***songarica***

* ***Bothriochloa barbinodis*** (Lagasca y Segura) Herter, Cane Bluestem, Pinhole Bluestem. Disturbed areas; native of w. United States. [= FNA, K; > *Bothriochloa perforata* (Trinius ex E. Fournier) Herter – Z; = *Andropogon barbinodis* Lagasca y Segura – HC; > *Bothriochloa barbinodis* (Lagasca y Segura) Herter var. *perforata* (Trinius ex E. Fournier) Gould; > *Andropogon perforatus* Trinius ex E. Fournier]



* ***Bothriochloa bladhii*** (Retzius) S.T. Blake, Australian Bluestem. Disturbed areas; native of subtropical Asia and Africa. Reported from e. TN (according to specimen cited by FNA and Z) and Alachua County, FL (immediately south of our area). [= FNA, K, WH, Z] {synonymy incomplete}
* ***Bothriochloa hybrida*** (Gould) Gould. Roadsides; native of TX south into Mexico. Described as "widespread and well-established along roadsides in Georgia" (Carter, Baker, & Morris 2009). [= *Andropogon hybrida* Gould] {synonymy incomplete}
* ***Bothriochloa ischaemum*** (Linnaeus) Keng *var*. ***songarica*** (Ruprecht ex Fischer & C.A. Meyer) Celarier & Harlan, King Ranch Bluestem. Disturbed places; native of western North America. Reported for SC (Kartesz 1999) and GA (Carter, Baker, & Morris 2009). [= K, Z; < *B. ischaemum* – FNA]
* ***Bothriochloa laguroides*** (A.P. de Candolle) Herter *ssp*. ***torreyana*** (Steudel) Allred & Gould, Silver Bluestem. Disturbed areas; native of c. and sw. United States and Mexico. Reported for SC (Kartesz 1999), ne. GA (Jones & Coile 1988; Allred & Gould 1983), e. TN, and c. TN (Chester et al. 1993), in some cases as *B. saccharoides* var. *torreyana*. [= FNA, K, Y, Z; = *B. saccharoides* (Sw.) Rydberg var. *torreyana* (Steudel) Gould]
* ***Bothriochloa longipaniculata*** (Gould) Allred & Gould, Longspike Silver Bluestem. Disturbed areas; native of LA to TX, south to Mexico and Panama. [= FNA, K]
* ***Bothriochloa pertusa*** (Linnaeus) A. Camus, Pitted Bluestem. Disturbed areas; native of Eurasia. Introduced at scattered sites in e. North America, including FL, LA, MD, and MS (FNA, Kartesz 1999). [= FNA, K, Z; = *Andropogon pertusus* (Linnaeus) Willdenow – HC] {FL} {synonymy incomplete}



Bouteloua Lagasca y Segura 1805 (Grama)

A genus of about 40 species, of the Western Hemisphere. References: Herrera Arrieta, Peterson, & de la Cerda Lemus (2004)=X; Columbus (1999)=Z; Gould (1979)=Y; Wipff in FNA (2003a); Snow in FNA (2003a). Key based in part on Wipff in FNA (2003a)

1 All spikelets unisexual, plants usually dioecious; [introduced species] ..... ***B. dactyloides***
1 Lowest floret in each spikelet bisexual, the upper staminate or sterile; [introduced or native species].
2 Panicle branches deciduous; disarticulation occurring at the base of the branch (the branch therefore falling whole); spikelets 2-3 per branch, appressed to the branch; [native species of limestone habitats, also with introduced populations]; [subgenus *Bouteloua*]..... ..... ***B. curtipendula*** *var*. ***curtipendula***
2 Panicle branches persistent; disarticulation occurring above the glumes (the individual florets therefore falling); spikelets >6 per branch, pectinately disposed; [rare introductions]; [subgenus *Chondrosum*].
3 Panicle branches terminating in a spikelet ..... ***B. gracilis***
3 Panicle branches extending beyond the base of the terminal spikelets..... ***B. hirsuta*** *var*. ***hirsuta***

Bouteloua curtipendula (Michaux) Torrey *var*. ***curtipendula***, Side-oats Grama. Dry rocky slopes and bluffs over calcareous rocks (such as limestone) or ultramafic rocks (such as serpentine), limestone glades. July-September. S. CT west to MT, south to VA, e. TN, nw. GA, AL, Panhandle FL (Gadsden County), TX, AZ, and CA; also in Central and South America. The older literature refers to *B. curtipendula* as introduced in SC, but the single specimen documenting its occurrence there appears to be from experimental plantings at Clemson University; there is apparently no evidence of its establishment. *B.*

curtipendula occurs on serpentine in the Piedmont of GA (Allison, pers. comm.). Var. *caespitosa* Gould & Kapadia is cespitose rather than rhizomatous and occurs in sw. United States. [= C, FNA, K, Y; < *B. curtipendula* – RAB, F, G, HC, Pa, S, W, WV]

* ***Bouteloua dactyloides*** (Nuttall) J.T. Columbus, Buffalo Grass. Lawns, disturbed areas; native of w. North America. [= Z; = *Buchloe dactyloides* (Nuttall) Engelmann – C, F, FNA, G, HC, K]

* ***Bouteloua gracilis*** (Willdenow ex Kunth) Lagasca y Segura ex Griffiths, Blue Grama. Disturbed areas; native of w. North America. Reported for SC (Gould 1979). [= F, FNA, K, Y; > *Bouteloua gracilis* var. *gracilis* – HC]

Bouteloua hirsuta Lagasca y Segura *var*. ***hirsuta***, Hairy Grama. Disturbed areas; native of w. North America. Present in the FL peninsula (Wunderlin & Hansen 2003), where native in maritime grasslands; reported for SC and GA (Kartesz 1999). [= K, Y; < *Bouteloua hirsuta* – F, HC; = *Bouteloua hirsuta* ssp. *hirsuta* – FNA]

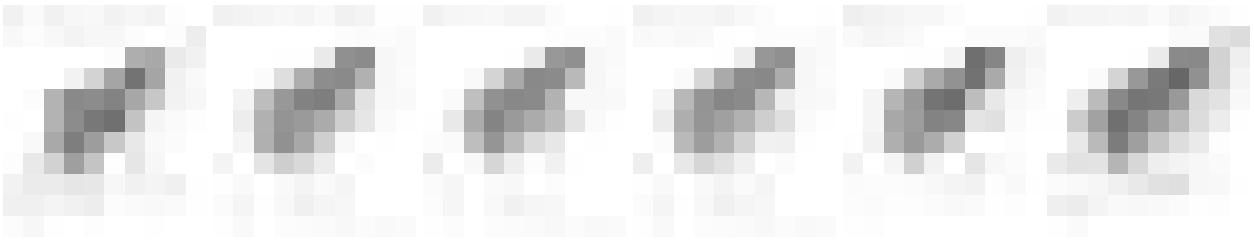
Brachyelytrum Palisot de Beauvois 1812 (Shorthusk)

The only other species of the genus is *B. japonicum* Hackel, of s. Japan, Korea, and ec. China (Saarela et al. 2003, Tucker 1988). References: Stephenson & Saarela in FNA (2007a); Saarela et al. (2003)=Z; Tucker (1988)=Y; Stephenson (1971); Voss (1972); Campbell, Garwood, & Specht (1986). Key based in part on Saarela et al. (2003).

1 Lemmas hirsutulous or minutely scabrous, the longest hairs (0.06-) 0.08-0.14 (-0.2) mm long (not evident at 10×); lemma (0.7-) 0.8-1.2 (-1.4) mm wide; widest leaf blade (8-) 10-14 (-16) mm wide; second glume (0.6-) avg. 1.2 (-3.0) mm long; [Mountains] ..... ***B. aristosum***
1 Lemmas hirsute with hairs (0.2-) 0.4-0.8 (0.9) mm long (easily seen at 10×); lemma (0.8-) 1.1-1.5 (-1.8) mm wide; widest leaf blade (9-) 11-17 (-20) mm wide; second glume (0.2-) avg. 2.2 (7.0) mm long; [widely distributed in our area]..... ***B. erectum***

Brachyelytrum aristosum (Michaux) Trelease in Branner & Coville, Northern Shorthusk. Moist forests, mostly at moderate to high elevations, such as northern hardwoods and spruce-fir. July-August. NL (Newfoundland), QC, ON, and MN south to n. NJ, PA, n. OH, n. IN, and s. WI, and in the mountains to sw. NC, e. TN, nw. SC, and ne. GA. In MI, *B. aristosum* flowers about 10 days before co-occurring *B. erectum*, with strongly synchronized anthesis of each species occurring on a single day (Stephenson 1971)). Reputed intermediates and hybrids between the two taxa are apparently based on the use of ambiguous characters. [= FNA, Pa, Z; = *Brachyelytrum septentrionale* (Babel) G. Tucker – K, Y; < *B. erectum* – RAB, G, HC, S, W; = *B. erectum* var. *septentrionale* Babel – F; = *B. erectum* var. *glabratum* (Vasey ex Millspaugh) Koyama & Kawano – C; > *B. aristosum* var. *glabratum* Vasey – WV]

Brachyelytrum erectum (Schreber ex Sprengel) Palisot de Beauvois, Common Shorthusk. Mesic forests, in the Mountains at lower elevations than *B. septentrionale*). June-August. MA, NY, OH, MI, and s. WI south to Panhandle FL and e. TX. [= FNA, K, Pa, WV, Y, Z; < *B. erectum* – RAB, G, HC, S, W (also see *B. aristosum*); = *B. erectum* var. *erectum* – C, F]



Brachypodium Palisot de Beauvois 1812

A genus of about 18 species, mainly Mediterranean Europe and n. Africa. References: Piep in FNA (2007a).

* ***Brachypodium sylvaticum*** (Hudson) Palisot de Beauvois *ssp*. ***sylvaticum***, Slender False Brome. Roadsides and yards; native of Europe. [= FNA; < *B. sylvaticum* – HC, K]

Briza Linnaeus 1753 (Quaking Grass)

A genus of about 20 species, annuals and perennials, native of Eurasia and South America. References: Snow in FNA (2007a); Tucker (1996)=Z.

1 Plant perennial; ligules ca. 0.5 mm long ..... ***B. media***
1 Plant annual; ligules 3-13 mm long.
  2 Spikelets 10-20 mm long..... ***B. maxima***
  2 Spikelets 2-7 mm long..... ***B. minor***

* ***Briza maxima*** Linnaeus, Greater Quaking Grass. Disturbed areas; native of the Mediterranean region. Reported in e. GA (Jones & Coile 1988). [= FNA, K] {synonymy incomplete}

* ***Briza media*** Linnaeus, Perennial Quaking Grass. Disturbed areas; native of Europe. May-August. Reported for scattered locations in PA (Rhoads & Block 2007), MD, DE, and AL (Kartesz 1999). [= C, F, FNA, G, HC, K, Pa]

* ***Briza minor*** Linnaeus, Lesser Quaking Grass. Fields, disturbed areas; native of Europe. April-June. [= RAB, C, F, FNA, G, GW, HC, K, S, Z]

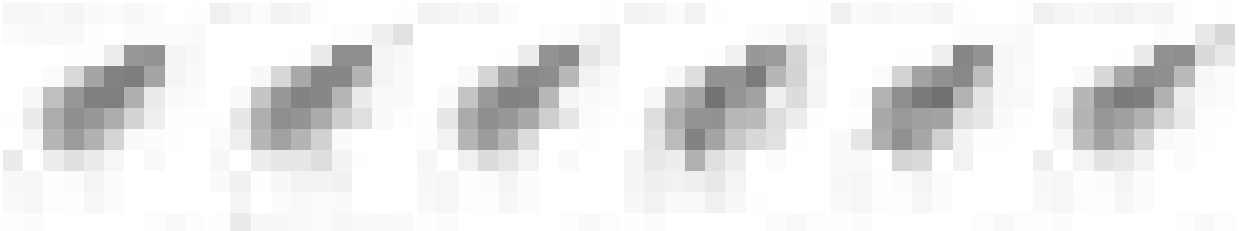
Bromus Linnaeus 1753 (Brome-grass)

A genus of about 150 species, north temperate and South American. References: McNeill (1976); Sales (1993, 1994)=Z; Tucker (1996)=Y; Pavlick (1995)=X; McKenzie & Ladd (1995); Pavlick & Anderton in FNA (2007a).

1 Lemmas compressed and strongly keeled (the whole spikelet thus strongly laterally flattened); first glume 3-9-nerved; [section *Ceratochloa*]. ..... ***B. catharticus*** *var.* ***catharticus***
1 Lemmas rounded or weakly keeled (the whole spikelet therefore terete to somewhat laterally flattened); first glume either 3-5-nerved or 1-3-nerved.
2 First glume 3-5 nerved (at least 3 nerves well-developed).
3 Lemma awn 2-3 mm long; plant perennial; [native species of dry woodlands]; [section *Bromopsis*] ..... ***B. kalmii***
3 Lemma awn 3-12 mm long (or 0-6 mm long in *B. secalinus*); plant annual; [introduced species of disturbed habitats]; [section *Bromus*].
4 Panicle compact, the lateral branches erect or ascending, the pedicels < 10 mm long (shorter than the spikelets)
5 Lemmas 3-5 mm wide; inflorescence ovoid in outline ..... ***B. hordeaceus*** *ssp.* ***hordeaceus***
5 Lemmas 1.5-2 mm wide; inflorescence obovoid in outline ..... ***B. scoparius***
4 Panicle relatively open, the lateral branches erect, ascending, or spreading, the pedicels > 15 mm long (longer than the spikelets).
6 Margins of the lemmas involute in fruit, wrapping around the grain, exposing the rachilla ..... ***B. secalinus***
6 Margins of the lemmas gaping, overlapping in fruit.
7 Panicle branches erect or ascending, relatively stiff and straight ..... ***B. racemosus***
7 Panicle branches spreading (at least the lower), either relatively stiff and straight, or flexuous and lax.
8 Panicle branches stiff; lemma awns 5-12 mm long, straight ..... ***B. commutatus***
8 Panicle branches flexuous and lax; lemma awns 7-15 mm long, flexuous ..... ***B. japonicus***
2 First glume 1 (-3) nerved (only 1 nerve well-developed).
9 Longer lemma awns 10-60 mm long; plants annual; [introduced species of disturbed habitats]; [section *Genea*].
10 Panicle dense, spikelike ..... ***B. rubens***
10 Panicle open, not spikelike.
11 First glume 13-20 mm long; second glume 20-30 mm long; lemma awns 35-60 mm long ..... ***B. rigidus***
11 First glume 5-14 mm long; second glume 8-17 mm long; lemma awns 10-30 mm long.
12 First glume 7-14 mm long; second glume 9-17 mm long; lemma awns 18-30 mm long ..... ***B. sterilis***
12 First glume 5-7 mm long; second glume 8-11 mm long; lemma awn (7-) 10-17 mm long ..... ***B. tectorum***
9 Longer lemma awns 1-6 (-8) mm long; plants perennial; [native and introduced species, collectively of disturbed and natural habitats]; [section *Bromopsis*].
13 Plants with creeping rhizomes, forming clonal colonies; both surfaces of leaves glabrous or glabrescent ..... ***B. inermis***
13 Plants not strongly rhizomatous, the stems solitary or tufted; surfaces of leaf blades usually pubescent (sometimes sparsely so).
14 Pedicels erect or ascending, mostly shorter than the spikelet; leaves 2-3 mm wide; [introduced, of disturbed habitats] ..... ***B. erectus***
14 Pedicels ascending at first, later arching-drooping, mostly longer than the spikelet; leaves 4-15 mm wide; [native, mostly of forests].
15 Lemmas glabrous (or very minutely pubescent) on the back, hairy along the lower margins with long hairs ..... ***B. ciliatus***
15 Lemmas uniformly hairy over the entire back-surface (or rarely entirely glabrous).
16 Culms with 10-20 leaves, often weak and leaning or reclining; junction of sheaths and base of leaf blades with 2 well-developed flanges prolonged into auricles or divergent spurs; second glume primarily 5-nerved; flowering late, with anthesis August-October ..... ***B. latiglumis***
16 Culms with 6-10 leaves, erect; junction of sheaths and base of leaf blades lacking flanges or auricles; second glume primarily 3-nerved; flowering earlier, anthesis from May-August.
17 Underleaf surfaces with a conspicuous satiny sheen (when fresh); summit of sheath opposite the ligule with a conspicuous tuft of hairs ..... ***B. nottowayanus***
17 Underleaf surfaces lacking a conspicuous satiny sheen; summit of sheath opposite the ligule lacking a conspicuous tuft of hairs ..... ***B. pubescens***

* ***Bromus arvensis*** Linnaeus. Disturbed areas; native of Europe. Reported as introduced for nc. GA (Jones & Coile 1988), for VA, MD, PA, and NJ (Kartesz 1999), and for KY (Campbell 2007). [= C, F, FNA, HC, K, Pa] {not yet keyed}

* ***Bromus briziformis*** Fischer & C.A. Meyer, Rattlesnake Brome. Disturbed areas; native of Europe. Late May-July. Reported as an introduction in ne. North America, south to MD, NJ, PA, DE (Kartesz 1999). [= FNA, K; = *Bromus brizaeformis* – C, F, G, HC, orthographic variant] {not yet keyed}



* ***Bromus carinatus*** Hooker & Arnott *var.* ***marginatus*** (Nees) Barkworth & Anderton, Mountain Brome. Reported by Jones & Coile (1988) for nc. GA and by FNA for MS. [= FNA; < *Bromus catharticus* – C; = *Bromus marginatus* Nees – K] {not yet keyed}

* ***Bromus catharticus*** Vahl *var.* ***catharticus***, Rescue Grass. Disturbed areas; native of South America. April-June. [= FNA; ? *B. catharticus* – RAB, F, G, HC, K, W, X, Y; ? *Bromus willdenowii* Kunth – C; ? *Bromus unioloides* Kunth – S]

Bromus ciliatus Linnaeus, Fringed Brome. Seepage areas, edges of fens, moist areas near high elevation creeks, grassy balds, high elevation woodlands, mostly over mafic or calcareous rocks. July-August. Widespread in n. North America: NL

(Labrador) to AK, south in the east to PA, and in the mountains to NC. Known in NC only from Bluff Mountain and Long Hope Valley, Ashe and Watauga counties, and Roan Mountain, Mitchell County. [= RAB, C, FNA, G, HC, Pa, S, W, WV, X, Y; > *Bromus ciliatus* var. *ciliatus* – F, K; = *Bromopsis ciliata* (Linnaeus) Holub]

* ***Bromus commutatus*** Schrader, Hairy Chess, Meadow Brome. Disturbed areas; native of Europe. May-June. The relationship and relative distribution of this species and *Bromus racemosus* is poorly known for our area. See *Bromus racemosus* for further comments. [= C, F, FNA, HC, K, Pa, S, WV, X, Y; < *Bromus commutatus* – RAB (also see *Bromus racemosus*); < *Bromus racemosus* – G, W]

* ***Bromus erectus*** Hudson, Short-branched Brome. Disturbed areas; native of Europe. [= C, F, FNA, G, HC, K, S, WV, X; = *Bromopsis erecta* (Hudson) Fourrier]

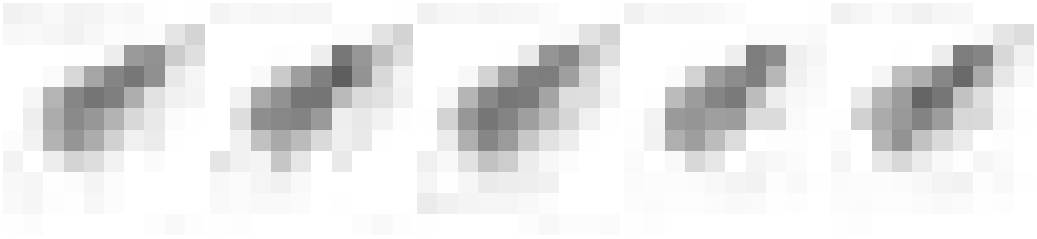
* ***Bromus hordeaceus*** Linnaeus *ssp.* ***hordeaceus***, Soft Chess, Lopgrass. Disturbed areas; native of Europe. July. [= FNA, K, X; ? *Bromus mollis* Linnaeus – RAB, F, G, HC, misapplied; < *Bromus hordeaceus* – C, Pa, Y]

* ***Bromus inermis*** Leysser, Smooth Brome, Hungarian Brome. Disturbed areas; native of Europe. June-July. [= RAB, C, FNA, G, HC, Pa, S, W, WV, X, Y; > *Bromus inermis* var. *inermis* – F; > *Bromus inermis* ssp. *inermis* var. *inermis* – K; = *Bromopsis inermis* (Leysser) Holub]

* ***Bromus japonicus*** Thunberg, Japanese Chess. Disturbed areas; native of Asia. May-June. [= RAB, C, FNA, G, K, Pa, S, W, WV, X, Y; > *Bromus japonicus* var. *japonicus* – F, HC; > *Bromus japonicus* var. *porrectus* Hackel – F, HC]

Bromus kalmii A. Gray, Kalm Brome, Canada Brome. Forests and woodlands, shale woodlands and barrens, grassy ridgetop oak forests. ME west to SD, south to MD, w. VA, and IA. Distinctive for its few leaves (usually 3-4) clustered near the base, the spikelets large and approximate to one another in a narrow, nodding panicle. [= C, F, FNA, G, HC, K, Pa, X]

Bromus latiglumis (Shear) A.S. Hitchcock, Riverbank Brome, Auricled Brome, Hairy Woodbrome, Flanged Brome. Alluvial soils along rivers. August-October. Widespread in ne. North America, from ME to MT, south to NC and OK. Flowering many weeks later than co-occurring *B. pubescens*. In NC apparently only along large rivers flowing west through the Appalachians into the Mississippi River drainage, notably the New and the French Broad. [= F, FNA, G, HC, K, WV, X; < *Bromus purgans* Linnaeus – RAB; = *Bromus altissimus* Pursh – C, Pa; < *Bromus latiglumis* – Y (also see *Bromus nottowayanus*)]



Bromus nottowayanus Fernald, Satin Brome, Nottoway River Brome, Virginia Brome. Moist forests, especially along small stream bottoms. June-August. The range of this species is poorly known, owing to confusion between it, *B. pubescens* and *B. latiglumis*. It is apparently known from MD, VA, and NC, west to TN, IL, IN, MO, and AR. McKenzie & Ladd (1995) report on the biology and taxonomy of this species. [= C, F, FNA, HC, K, X; < *Bromus purgans* Linnaeus – RAB; < *Bromus latiglumis* – Y; = *Bromopsis nottowayana* (Fernald) Holub]

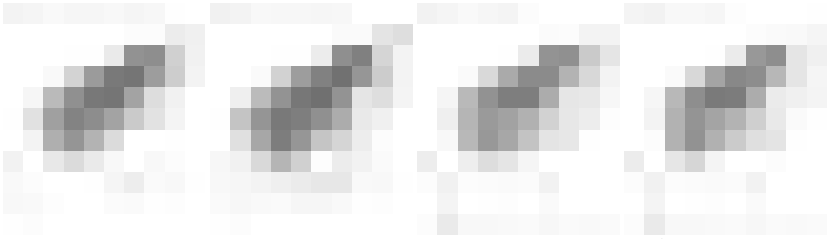
Bromus pubescens Muhlenberg ex Willdenow, Common Eastern Brome, Canada Brome. Mesic forests, generally on rocky slopes. May-August. Widespread in e. North America: s. ON west to AB, south to FL and AZ. [= C, FNA, K, Pa, W, X, Y; < *Bromus purgans* Linnaeus – RAB, S, misapplied (also see *Bromus latiglumis* and *Bromus nottowayanus*); = *Bromus purgans* Linnaeus – F, G, WV, misapplied; > *Bromus purgans* var. *purgans* – HC; > *Bromus purgans* var. *laeviglumis* (Scribner ex Shear) Swallen – HC; = *Bromus laeviglumis* – S, misapplied (?); = *Bromopsis pubescens* (Muhlenberg ex Willdenow) Holub]

* ***Bromus racemosus*** Linnaeus, Smooth Brome. Disturbed areas; native of Europe. May-June. The relative distribution, abundance, and habitats in our area of this species and *B. commutatus* poorly understood. Additional characters are as follows (from Stace 2010): lemmas 7-9 mm long (vs. 7.5-11 mm long in *B. commutatus*), anthers 1.5-3.5 mm long (vs. 1.3-2.5 mm long), spikelets 10-18 mm long (vs. 15-30 mm long), all panicle branches <4 cm long (vs. some panicle branches > 4 cm long). [= C, F, FNA, HC, K, Pa, X; < *Bromus commutatus* – RAB; < *Bromus racemosus* – G, W (also see *Bromus commutatus*)] {not yet mapped}

* *Bromus ramosus* Hudson. Introduced. Reported for DC and MS (Kartesz 1999). [= FNA, K] {not yet keyed or mapped}

* ***Bromus rigidus*** Roth, Ripgut Brome, Ripgut Grass. Disturbed areas; native of Mediterranean Europe. April. [= RAB, C, F, G, HC, K; < *Bromus diandrus* Roth – FNA, Y; ? *Bromus diandrus* var. ?? – Z]

* ***Bromus rubens*** Linnaeus, Foxtail Chess, Red Brome. Waste areas near wool-combing plants, other disturbed areas; native of Mediterranean Europe. The SC occurrences come from areas around wool-combing plants, and were likely introduced on wool from w. United States, where this European species is well-established. Reported introduced in VA and MD (Kartesz 1999) as *B. madritensis*. [= C, FNA, G, X; ? *Bromus madritensis* Linnaeus – F, misapplied; < *Bromus rubens* – K; < *Bromus madritensis* Linnaeus – K; = *Bromus madritensis* ssp. *rubens* (Linnaeus) Husnot]



* ***Bromus scoparius*** Linnaeus, Broom Brome. Disturbed areas; native of s. Europe. [= FNA, K] {add to synonymy}
* ***Bromus secalinus*** Linnaeus, Cheat, Common Chess, Ryebrome. Disturbed areas; native of Europe. May-June. [= RAB, C, F, FNA, G, HC, K, Pa, S, W, WV, X, Y]
* *Bromus squarrosus* Linnaeus, Squarrose Brome. Reported for KY and NJ (Kartesz 1999). Native of Eurasia. [= FNA, K] {not yet keyed}
* ***Bromus sterilis*** Linnaeus, Barren Brome, Poverty Brome, Cheatgrass. Disturbed areas; native of southern Europe. May-June. [= RAB, C, F, FNA, G, HC, K, Pa, S, W, WV, X, Y, Z]
* ***Bromus tectorum*** Linnaeus, Downy Brome, Downy Chess, Downy Cheat, Junegrass, Cheatgrass. Disturbed areas; native of Europe. April-June. [= RAB, C, F, FNA, G, HC, K, Pa, S, W, WV, X, Y; ? *Bromus tectorum* ssp. *tectorum* – Z]

Calamagrostis Adanson 1763 (Reed-grass)

A genus of about 230 species, north and south temperate. References: Marr, Hebda, & Greene in FNA (2007a); Tucker (1996)=Z; Greene (1980). Key based on FNA.

1 Callus hairs > 1.3× as long as the lemma; rachilla prolonged beyond the palea; [rare introduction from s. NJ northward] ..... ***C. epigejos***
1 Callus hairs < 1.2× as long as the lemma; rachilla not prolonged beyond the palea; [natives, sometimes weedy, widespread].
2 Awns attached on the upper 2/5 of the lemmas, 0.5-2 mm long, straight ..... ***C. coarctata***
2 Awns attached on the lower ½ of the lemmas, 0.9-6 mm long, straight or bent.
3 Awns usually exserted, (2.8-) 3-6 mm long; callus hairs 0.3-0.7× as long as the lemma.
4 Leaves (1-) 2-3 (-4) mm wide; plant densely tufted, delicate, culms 10-55 (-60) cm tall, with 2-3 nodes; [high elevation rock outcrops and glades] ..... ***C. cainii***
4 Leaves (2-) 3-8 (-12) mm wide; plant rhizomatous or loosely tufted, coarse, culms (60-) 75-120 cm tall, with 3-5 nodes; [low to moderate elevation forests and woodlands].
5 Leaves glaucous above and below; leaf collars glabrous..... ***C. porteri*** *ssp.* ***insperata***
5 Leaves glaucous above, dark green below; leaf collars with prominent tufts of hairs ..... ***C. porteri*** *ssp.* ***porteri***
3 Awns usually not exserted, 0.9-3.1 (-4) mm long; callus hairs (0.5-) 0.7-1.2 (-1.5)× as long as the lemma.
6 Callus hairs < 1 mm long, 0.2-0.3× as long as the lemma ..... ***C. pickeringii***
6 Callus hairs > 1 mm long, (0.5-) 0.7-1.2 (-1.5)× as long as the lemma
7 Glumes smooth (or scabrous on the keel only); awns stout, readily distinguished from the callus hairs..... ..... ***C. stricta*** *ssp.* ***inexpansa***
7 Glumes scabrous on the keel and often also the surface; awns delicate, difficult to distinguish from the callus hairs.
8 Spikelets 2.5-4 mm long; lemmas usually shorter than the glumes; glumes rounded to broadly keeled, with raised midveins; glume apices usually acute, rarely acuminate ..... ***C. canadensis*** *var.* ***canadensis***
8 Spikelets 2-3 mm long; lemmas usually about as long as the glumes; glumes rounded, midveins not raised; glume apices acute ..... ***C. canadensis*** *var.* ***macouniana***

Calamagrostis cainii A.S. Hitchcock, Cain's Reed-grass. High elevation rocky summits. July-September. Endemic to a few mountain-tops in the Southern Appalachians, *C. cainii*, once thought to be endemic to Mount LeConte, TN, was discovered at two sites in NC in 1989 and 1990 – Mount Craig, Yancey County, and Craggy Pinnacle, Buncombe County (Wiser 1991). This species is more likely to be mistaken (especially superficially) for an *Agrostis* than for any of the other *Calamagrostis* in our area, but is distinguishable by its larger spikelets (5-6 mm long, rather than 1.3-2 mm) and the presence of a callus beard. [= FNA, HC, K, W, Z]

Calamagrostis canadensis (Michaux) Palisot de Beauvois *var*. ***canadensis***, Bluejoint, Canada Reed-grass. Wet meadows along streams, high elevation openings, such as grassy balds and cliff bases. August. Widespread and common across n. North America, reaching its southern limit in the east in w. NC, e. TN (Chester et al. 1993), and ne. GA (Rabun Bald, Rabun County). [= FNA, G, HC, K, Pa; < *C. canadensis* – RAB, C, S, W, WV, Z; > *C. canadensis* var. *canadensis* – F; > *C. canadensis* var. *robusta* Vasey – F]

Calamagrostis canadensis (Michaux) Palisot de Beauvois *var*. ***macouniana*** (Vasey) Stebbins. Bottomlands. NL (Newfoundland) and AB south to NJ, PA, VA?, OH, w. KY, IL, MO, NE, WY, OR. Reported for VA (FNA), the documentation unknown. Reported south to NJ and KY only (Kartesz 1999). {investigate} [= F, FNA, G, HC, K, Pa; < *C. canadensis* – C, Z; = *C. macouniana* (Vasey) Vasey]

Calamagrostis coarctata Eaton, Nuttall's Reed-grass. Savannas, bogs, and other wet sites. July-October. ME and NY south to n. GA (Jones & Coile 1988), AL, and LA, primarily on the Coastal Plain. The replacement of the familiar name *C. cinnoides* is necessary for nomenclatural reasons (Kartesz 1999); a proposal may be made to conserve the name *C. cinnoides* (Barkworth, pers. comm., 2009). [= K; = *C. cinnoides* (Muhlenberg) W.P.C. Barton – RAB, C, F, FNA, G, GW, HC, Pa, S, W, WV, Z; = *C. coarctata* Eaton – K]

* ***Calamagrostis epigejos*** (Linnaeus) Roth, Bushgrass, Feathertop. Disturbed areas; native of Eurasia. July-early October. [= C, G, FNA, Pa; = *C. epigeios* – HC; > *C. epigeios* var. *epigeios* – F, K2; > *C. epigeios* var. *georgica* (K. Koch) Grisebach – F, K2]

Calamagrostis pickeringii A. Gray, Pickering's Reedgrass. Bogs. NL west to ON, south to NY and s. NJ. [= C, F, FNA, G, HC]

Calamagrostis porteri A. Gray *ssp.* ***porteri***, Porter's Reed-grass. Dry to dry-mesic forests, forest edges, cliff bases. July-early September. NY to AL, in the Appalachians; it was first reported from NC by Ware (1973). This species is typically sterile unless disturbed by fire or mechanically; it is therefore probably more common than collections indicate. In addition to the key characters above, it can be distinguished from *C. canadensis* by its having leaf sheaths pubescent at the summit (Matthews & Radford 1985). [= FNA, K; = *C. porteri* – C, HC, Pa, W, WV; ? *C. porteri* – G, Z]

Calamagrostis porteri A. Gray *ssp.* ***insperata*** (Swallen) C.W. Greene. Rock outcrops; rocky woodlands. OH and MO south to TN and AR. [= FNA, K; = *C. insperata* Swallen – C, HC]

Calamagrostis stricta (Timm) Koeler *ssp.* ***inexpansa*** (A. Gray) C.W. Greene. Mt (WV): {habitat}. NL (Newfoundland) and NL (Labrador) west to AK, south to NY, OH, n. WV (Preston and Randolph counties), IA, AZ, and CA; ne. Asia. [= FNA, K; < *C. stricta* – C; ? *C. neglecta* (Ehrhart) Gaertner, Mey., & Scherb. var. *neglecta* – F; = *C. inexpansa* A. Gray – G, HC]

Calamovilfa (A. Gray) Hackel ex Scribner & Southworth 1890 (Sandreed)

A genus of 5 species, of e. and c. North America. Reeder & Ellington (1960) studied various anatomic features of *Calamovilfa*, and determined that its closest relative was *Sporobolus*. Various molecular phylogenetic studies of *Sporobolus* and closely related genera suggest that *Calamovilfa* should be included in *Sporobolus* (Ortiz-Diaz & Culham 2000; Peterson, Romaschenko, & Johnson 2010). References: Thieret in FNA (2003a); Thieret (1966)=Z. Key based in part on Thieret in FNA (2003a).

Identification notes: Superficially somewhat similar to *Sporobolus pinetorum*, *S. floridanus*, and *S. curtissii* (herbarium specimens of the two genera have been regularly confused), *Calamovilfa brevipilis* and *C. curtissii* are distinguished by leaves tapered to either end and long-acuminate (vs. parallel-margined and abruptly acute in *Sporobolus*) and tendency to form larger, clonal patches (*Sporobolus* forms wiregrass-like bunches or clumps). In flower or fruit, *Calamovilfa* can be distinguished by characters of the spikelet, by vegetative characters, or by its coarser, generally taller culms, with the panicle branches usually spreading (rather than always ascending in *Sporobolus*). These five species have very similar bases, unlike any other grasses in our area – the lower leaf sheaths are indurated and shiny, forming a hard, polished, knotty, and fire-proof covering over the short-creeping rhizome. *Aristida stricta* has a somewhat similar base, but less indurated, less creeping, and with an unpolished appearance. *Calamovilfa brevipilis* also has a cartilaginous, pale yellow annulum surrounding the outer (abaxial) surface of the juncture of the sheath and leaf, a structure not visible in the other species. Positive identification in sterile condition is not difficult.

1 Panicles narrow, the branches appressed-ascending; [Coastal Plain of FL]; [section *Calamovilfa*].....***C. curtissii***
1 Panicles broad, the bracnches ascending-spreading; [either of the Coastal Plain of SC northward, or of the interior].
  2 Spikelets 6.0-7.4 mm long; glumes acute to acuminate, usually arcuate; lemmas 5.5-7.0 mm long, usually arcuate; [river scour areas in the rocky inland parts of the South]; [section *Interior*] .....***C. arcuata***
  2 Spikelets 4.0-5.8 mm long; glumes acute, straight; lemmas 4.0-5.4 mm long, straight; [pineland habitats of the Coastal Plain of SC northward]; [section *Calamovilfa*].....***C. brevipilis***

Calamovilfa arcuata K.E. Rogers, Cumberland Sandreed. Riverside scours. Ouachita Mountains of w. AR and e. OK; Cumberland Plateau of TN (Morgan and Cumberland counties), KY (McCreary County), and AL (Blount County). [= FNA, K]

Calamovilfa brevipilis (Torrey) Scribner, Pinebarren Sandreed. Savanna-pocosin ecotones, sandhill seepage bogs, pocosins, boggy powerline rights-of-way. June-October. A "bimodal endemic", with two areas of distribution: Pine Barrens of NJ and the Coastal Plain (very rarely lower Piedmont) of e. NC, n. SC, and s. VA. The recognition of three geographic varieties by Fernald was judged by Thieret (1966) to be "untenable:" var. *brevipilis* of NJ, var. *calvipes* Fernald of VA, and var. *heterolepis* Fernald of NC-SC. Like *Aristida stricta*, this grass is essentially dependent on fire for flowering (it will also sometimes flower in response to mowing or other disturbance). Suppression of the natural fire regime has led to its substantial decline and the severe contraction of its range in the Southeast, since fire exclusion in its seepage or ecotone habitat leads to rapid invasion by shrubs and competitive elimination of *Calamovilfa* and many other herbs. [= RAB, C, FNA, G, GW, K, S, Z; > *C. brevipilis* var. *brevipilis* – F, HC; > *C. brevipilis* var. *heterolepis* Fernald – HC; > *C. brevipilis* var. *calvipes* Fernald – F, HC]

Calamovilfa curtissii (Vasey) Scribner, Curtiss's Sandreed. Moist pinelands and edges of natural ponds. FL Panhandle and e. peninsular FL. *C. curtissii* is a closely related sibling species of *C. brevipilis*. [= FNA, GW, HC, K, S, Z]

Cenchrus Linnaeus 1753 (Burgrass, Sandspur)

A genus of about 16 species, primarily tropical and subtropical. References: Stieber & Wipff in FNA (2003a); Ward (2010b)=Y; Crins (1991)=Z. Key based in part on FNA.

Identifications note: Spikelets of *Cenchrus* are subtended by an involucre of spines and/or bristles which are (in most of our species) fused into a **bur**. Bristles are narrow-based and terete. Spines are broad-based, and somewhat flattened (not terete) in cross-section, at least basally.

1 Involucre of bristles only, these not fused into a bur; perennial, to 2 m tall ..... ***C. myosuroides***
1 Involucre of spines fused into a coherent bur, sometimes also with bristles; annual or perennials, to 1 m tall.
  2 Spines in a single whorl, subtended by numerous smaller, narrower, free outer bristles.
    3 Spines fused at the base only, the lower surfaces with 1-3 grooves ..... ***C. biflorus***
    3 Spines fused for >1/3 their length, the lower surfaces not grooved.
      4 Rachis internodes 0.8-1.7 mm long; most of the outer bristles equal to or slightly longer than the flattened inner bristles (spines)..... ..... ***C. brownii***
      4 Rachis internodes 2-4 mm long; most of the outer bristles much shorter than the flattened inner bristles (spines) ..... ***C. echinatus***
  2 Spines in multiple whorls or irregular in their disposition (if few and in a single whorl, then not subtended by smaller, narrower bristles).
    5 Plants perennial, long-lived, clump-forming; burs not imbricate, usually glabrous; leaf blades 1-3.5 mm wide..... ***C. gracillimus***
    5 Plants annual or perennial, short-lived and not clump-forming; burs imbricate, usually pubescent, leaf blades (1-) 3-14.2 mm wide.
      6 Burs (excluding the spines) 9-16 mm long, 4-6 mm wide, the spines 4-8 mm long; spikelets 1 (-2) per bur, concealed; leaf blades 3-14 mm wide..... ***C. tribuloides***
      6 Burs (excluding the spines) 5.5-12 mm long, 2.5-6 mm wide, the spines 2-7 mm long; spikelets 2-4 per bur, exserted at the tip; leaf blades 1-5 (-7) mm wide.
        7 Spines stout, 6-10 (-40), 2-5 mm long; spikelets 3.5-6 mm long..... ***C. incertus***
        7 Spines slender, 45-75, 3.5-7 mm long; spikelets 6-8 mm long..... ***C. longispinus***

* ***Cenchrus biflorus*** Roxburgh, Indian Sandbur. Disturbed areas, ballast; native of Africa and s. Asia. Reported from ballast in Mobile, AL; perhaps only a waif. [= FNA, HC]

*? ***Cenchrus brownii*** Roemer & J.A. Schultes. Disturbed areas, maritime grasslands. Se. United States (NC, GA, AL, and FL); West Indies, Central America, n. South America. The sole known NC specimen was collected in 1885 by Gerald McCarthy in NC "in locis navalibus et vastis." [= FNA, K, WH, Y; ? *C. viridis* Sprengel – HC, S, misapplied]

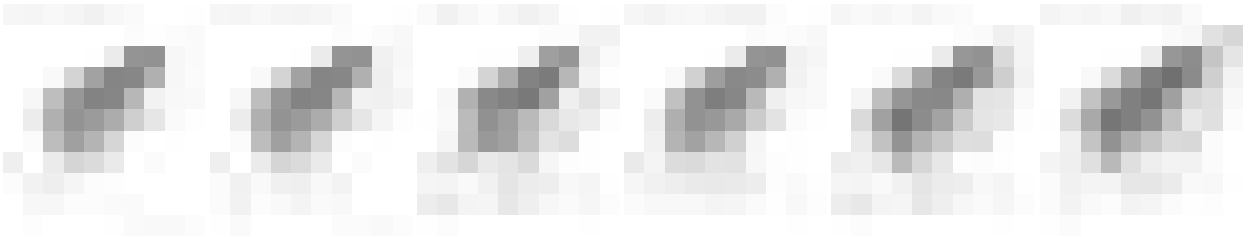
Cenchrus echinatus Linnaeus, Southern Sandspur, Bristly Sandspur, Hedgehog Grass. Fields, roadsides, disturbed areas. June-October. NC (and DC?) south to FL, west to CA, south into the tropical America. The basis for the record for w. VA in FNA is not clear. [= RAB, C, FNA, HC, K, S, WH, Y, Z]

Cenchrus gracillimus Nash, Sandhill Sandspur. Longleaf pinelands, other sandy habitats. N. FL, s. and e. GA, s. AL, and s. MS; West Indies (Cuba, Jamaica). [= FNA, HC, K, S, WH, Y]

Cenchrus incertus M.A. Curtis, Coastal Sandspur. Fields, roadsides, disturbed areas. July-October. VA south to FL, west to AR and KS, south into tropical America. Ward (2010b) argues convincingly that the name *C. spinifex* is very uncertainly applied to our species and should not be taken up. [= RAB, C, F, G, HC, S, Y, Z; = *C. spinifex* Cavanilles – FNA, K]

Cenchrus longispinus (Hackel) Fernald, Northern Sandspur, Common Sandspur. Fields, roadsides, disturbed areas, lawns. June-October. ME west to OR, south to FL, TX, and CA. [= RAB, C, F, FNA, K, Pa, W, Z; = *C. pauciflorus* Bentham – G, HC, S, WV, misapplied]

* ***Cenchrus myosuroides*** Kunth. Roadsides, disturbed areas; native of farther south. December. SC south to FL, west to TX, south into the West Indies and other parts of tropical America. [= RAB, FNA, HC, K, S, Y, Z]



Cenchrus tribuloides Linnaeus, Dune Sandspur. Dunes, sandy fields, sandy woodlands in the outer Coastal Plain. August-October. NY (Long Island) south to FL, west to TX, south into tropical America. This is the sandspur so familiar to (and disliked by) beach-goers in our area. [= RAB, C, F, FNA, HC, K, Pa, S, W, WH, Y, Z]

Chasmanthium Link 1827 (Spanglegrass, Spikegrass)

A genus of 5 species endemic to se. North America. References: Sánchez-Ken & Clark in FNA (2003a); Yates (1966a, 1966c)=Z.

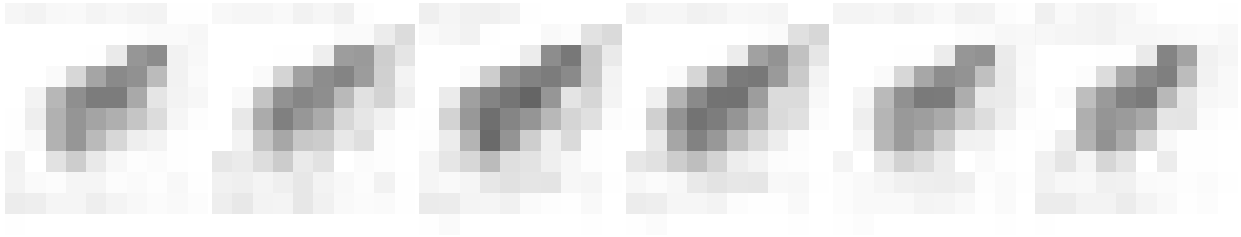
1 Panicle branches elongate, pendulous; spikelets (15-) 20-40 mm long, with 6-20 flowers ..... ***C. latifolium***
1 Panicle branches short, erect or ascending; spikelets 5-18 mm long, with 2-8 (-11) flowers.
2 Fully-developed spikelets 12-18 mm long, 8-12 mm wide.
3 Axils of the spikelets and panicle branches glabrous; empty lemmas 9 (-12); [se. NC south to c. peninsular FL and e. FL Panhandle]..... ..... ***C. nitidum***
3 Axils of the spikelets and panicle branches with a tuft of long hairs; empty lemmas 2-4; [w. FL Panhandle west to e. LA (Florida parishes)] ..... ***C. ornithorhynchum***
2 Fully-developed spikelets 4-9 mm long, 3-7 mm wide.
4 Collar (junction of leaf and sheath) glabrous or nearly so; leaves 3-7 mm wide ..... ***C. laxum***
4 Collar (junction of leaf and sheath) pilose; leaves 6-12 mm wide.
5 Inflorescence with divergent branches; [outer Coastal Plain calcareous sites from SC southward]..... ***C. sessiliflorum*** *var.* ***1***
5 Inflorescence with appressed branches; [more widespread in our area]..... ***C. sessiliflorum*** *var.* ***sessiliflorum***

Chasmanthium latifolium (Michaux) Yates, River Oats, Fish-on-a-pole. Riverbanks, streambanks, bottomland forests, seepages and glades over mafic or calcareous rock, usually in nutrient-rich soils. June-October. NJ, OH, IL, and KS south to FL and TX. [= C, FNA, GW, K, Pa, W, Z; = *Uniola latifolia* Michaux – RAB, F, G, HC, S, WV]

Chasmanthium laxum (Linnaeus) Yates, Slender Spikegrass. Savanna-pocosin ecotones, sandhill-pocosin ecotones, moist hardwood swamps, other moist habitats. June-October. Widespread in se. North America, north to s. NY, KY, and OK. See *C. sessiliflorum* for comments on the suggestion that these two taxa are only varietally distinct. [= C, FNA, GW, K, Pa, W, Z; = *Uniola laxa* (Linnaeus) Britton, Sterns, & Poggenburg – RAB, F, G, HC, S; = *Chasmanthium laxum* var. *laxum*]

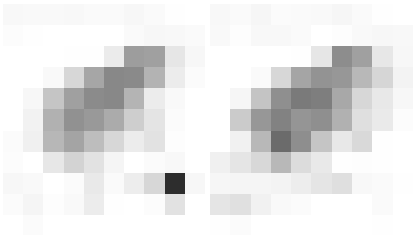
Chasmanthium nitidum (Baldwin) Yates, Shiny Spanglegrass. Blackwater swamp forests. September-November. A Southeastern Coastal Plain endemic: se. NC south to c. FL and west to se. AL. [= FNA, GW, K, Z; = *Uniola nitida* Baldwin – RAB, HC, S]

Chasmanthium ornithorhynchum (Steudel) Yates, Birdbill Spikegrass. Blackwater swamp forests. S. AL and w. FL Panhandle west to e. LA (Florida Parishes). Also reported for NC and SC (FNA 2003a). {investigate} [= FNA, GW, K, Z; = *Uniola ornithorhyncha* Steudel – S]



Chasmanthium sessiliflorum (Poiret) Yates *var.* ***1***, Coastal Hammock Longleaf Spikegrass. Calcareous hammocks. August-October. An additional taxon warrants recognition: it is characterized by divergent panicle branches and occurs in outer Coastal Plain calcareous sites (J. Allison, pers. comm.). [< *Chasmanthium sessiliflorum* (Poiret) Yates – C, FNA, GW, K, Z; < *Uniola sessiliflora* Poiret – RAB, F, G, HC; < *Uniola longifolia* Scribner – S; < *Chasmanthium laxum* (Linnaeus) Yates var. *sessiliflorum* (Poiret) L. Clark]

Chasmanthium sessiliflorum (Poiret) Yates *var.* ***sessiliflorum***, Longleaf Spikegrass. Moist hardwood forests, swamps, other moist habitats. August-October. Widespread in se. North America, north to se. VA, TN, AR, and OK. This species and *C. laxum* are morphologically somewhat similar, but their treatment as varieties of a single species is completely unwarranted. They frequently co-occur (especially on the Gulf Coastal Plain), growing side by side, and show no sign of intergradation. [< *Chasmanthium sessiliflorum* – C, FNA, GW, K, W, Z; < *Uniola sessiliflora* Poiret – RAB, F, G, HC; < *Uniola longifolia* Scribner – S; < *Chasmanthium laxum* (Linnaeus) Yates var. *sessiliflorum* (Poiret) L. Clark]



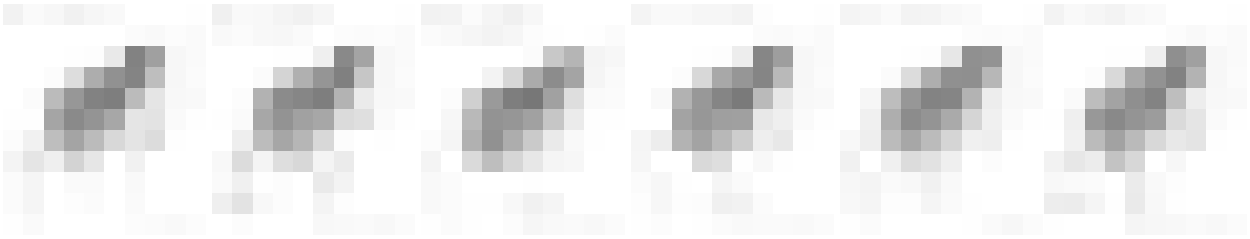
Chloris Swartz 1788 (Finger-grass, Chloris)

A genus 0f 55-60 species, annuals or perennials, mainly tropical and Southern Hemisphere. References: Barkworth in FNA (2003a). [also see *Eustachys*]. Key based partly on C.

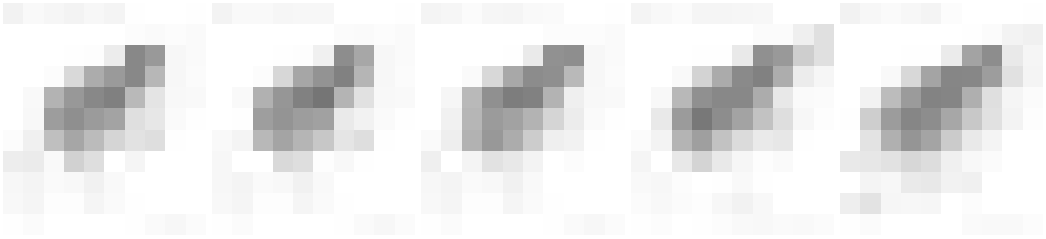
1 Inflorescence verticillate, typically the panicle branches in 2-5 verticils; perennial; fertile lemma inconspicuously appressed-pilose; spikelets not imbricate..... ***C. verticillata***

1 Inflorescence digitate, the panicle branches in a single verticil at the apex of the culm; annual; lemma conspicuously long-ciliate; spikelets imbricate..... ***C. virgata***

* ***Chloris barbata*** Swartz, Swollen Windmill-grass. Disturbed areas, waste areas near wool-combing mills; native of West Indies, e. Mexico, Central America, and South America. [= FNA, K1, K2] {FL} {not yet keyed}
* ***Chloris canterae*** Arechavaleta *var*. ***canterae***, Paraguayan Windmill-grass. Disturbed ground; native of Paraguay. The epithet was originally spelled "*canterai*," but should be corrected to the genitive "*canterae*" by the provisions of the ICBN. [= K2; = *C. canterei* Arechavaleta var. *canterei* – K1; < *C. cantérai* – HC, orthographic variant] {not yet keyed}
* ***Chloris canterae*** Arechavaleta *var*. ***grandiflora*** (Rosengurtt & Izaguirre deArtucio) D.E. Anderson, Paraguayan Windmill-grass. Waste areas near wool-combing mills, perhaps only a waif; native of Paraguay. [= K2; = *C. canterei* Arechavaleta var. *grandiflora* (Rosengurtt & Izaguirre deArtucio) D.E. Anderson – K1; < *C. cantérai* – HC, orthographic variant] {not yet keyed}
* ***Chloris cucullata*** Bisch. Waste areas near wool-combing mills, other disturbed areas, perhaps only a waif; native of sc. United States and Mexico. [= K1] {not keyed}
* ***Chloris divaricata*** R. Brown. Waste areas near wool-combing mills, perhaps only a waif; native of Australia. [= K1] {not keyed}
* ***Chloris gayana*** Kunth, Rhodes Grass. Waste areas near wool-combing mills, other disturbed areas, perhaps only a waif; native of Africa. [= F, HC, K1, S] {not keyed}



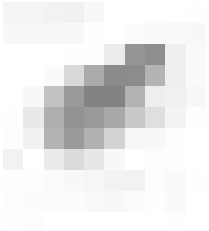
* ***Chloris pectinata*** Bentham. Waste areas near wool-combing mills, perhaps only a waif; native of Australia. [= K1] {not keyed}
* ***Chloris truncata*** R. Brown, Stargrass. Waste areas near wool-combing mills, perhaps only a waif; native of Australia. [= HC, K1] {not keyed}
* ***Chloris ventricosa*** R. Brown. Waste areas near wool-combing mills, perhaps only a waif; native of Australia. Also reported for VA (Hitchcock & Chase 1951; Kartesz 1999). [= HC, K1] {not keyed}
* ***Chloris verticillata*** Nuttall, Windmill-grass. Disturbed areas, bottomland fields; native of farther west. [= C, F, G, HC, K, Pa]
* ***Chloris virgata*** Swartz, Feather Finger-grass, Showy Chloris. Disturbed areas; native of tropical America. [= RAB, C, F, G, HC, K]



Chrysopogon Trinius 1820 (Goldbeard)

A genus of about 26 species, tropical and subtropical, all species except *C. pauciflorus* native to the Old World. References: Hall & Thieret in FNA (2003a); Veldkamp (1999).

Chrysopogon pauciflorus (Chapman) Bentham ex Vasey, Florida Goldbeard, Florida Rhaphis. Sandhill. FL and Cuba; its occurrence in se. NC (at Carolina Beach State Park) is plausible either as a native, disjunct occurrence or as an introduction. [= FNA, HC, K; = *Rhaphis pauciflora* (Chapman) Nash – S]



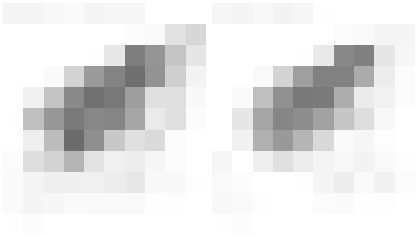
Cinna Linnaeus 1753 (Woodreed)

A genus of about 4 species, of temperate Eurasia, North America, and South America. References: Brandenburg in FNA (2007a); Brandenburg, Blackwell, & Thieret (1991); Tucker (1996)=Z; Brandenburg & Thieret (2000). [also see *Limnodea*]

1 Spikelets (3.5-) 4-6 (-7.5) mm long; glumes firm, subherbaceous, rather dull, hyaline only narrowly and marginally, the upper glume prominently 3-nerved ..... ***C. arundinacea***
1 Spikelets (2-) 2.5-4 (-5) mm long; glumes (at least the first and sometimes the second as well) glistening, hyaline except the midrib, the upper glume 1-nerved (very rarely 3-nerved) ..... ***C. latifolia***

Cinna arundinacea Linnaeus, Common Woodreed, Sweet Woodreed. Bottomland forests, rocky bars in rivers, tidal freshwater marshes, other low, wet habitats. August-October. NB and MN south to s. GA (Carter, Baker, & Morris 2009) and TX. [= RAB, C, FNA, G, GW, K, Pa, S, W, WV, Z; > *C. arundinacea* var. *arundinacea* – F, HC; > *C. arundinacea* var. *inexpansa* Fernald & Griscom – F, HC]

Cinna latifolia Grisebach, Drooping Woodreed, Slender Woodreed. Moist forests at high elevations. June-August. Circumboreal, occurring in n. Eurasia and n. North America, south in North America to NC, TN, n. IL, MN, UT, NM, and CA. [= RAB, C, F, FNA, G, HC, K, Pa, W, WV, Z]



Coelorachis Brongniart 1831 (Jointgrass)

A genus of about 20 species, widespread in the Old World and New World tropics and subtropics. Generic circumscription has been controversial and uncertain. References: Allen in FNA (2003a); Veldkamp, Koning, & Sosef (1986)=Z.

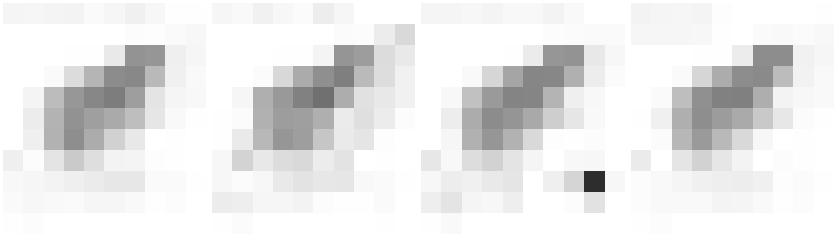
1 Culms round in cross-section ..... ***C. cylindrica***
1 Culms compressed-keeled in cross-section.
2 Lower glume with rectangular pits ..... ***C. tesselata***
2 Lower glume smooth or with transverse ridges.
3 Lower glume with transverse ridges ..... ***C. rugosa***
3 Lower glume smooth ..... ***C. tuberculosa***

Coelorachis cylindrica (Michaux) Nash, Carolina Jointgrass. Open woodlands and roadsides, probably in areas formerly prairie-like and fire-maintained, perhaps now extirpated in portions of our area (including NC). June-August. Fairly widespread in se. North America, north to NC and SC (at least formerly), MS, MO, and TX. [= C, FNA, K; = *Manisuris cylindrica* (Michaux) Kuntze – RAB, F, G, GW, HC; = *Manisuris campestris* (Nuttall) A.S. Hitchcock – S; = *Mnesithea cylindrica* (Michaux) Koning & Sosef – Z]

Coelorachis rugosa (Nuttall) Nash, Wrinkled Jointgrass. Limesink ponds (dolines), depression meadows, clay-based Carolina bays, wet savannas, disturbed areas (such as seeps in powerline rights-of-way), always in places with a seasonally high water-table. June-October. A Southeastern Coastal Plain endemic: s. NJ south to FL and west to TX. [= C, FNA, K; = *Manisuris rugosa* (Nuttall) Kuntze – RAB, F, G, GW, HC, S; = *Mnesithea rugosa* (Nuttall) Koning & Sosef – Z]

Coelorachis tesselata (Steudel) Nash, Pitted Jointgrass. Wet savannas and bogs. Southeasatern Coastal Plain endemic: sw. GA and FL west to e. LA. [= FNA, K; = *Manisuris tesselata* (Steudel) Scribner – GW, HC, S; = *Mnesithea tesselata* (Steudel) Koning & Sosef – Z]

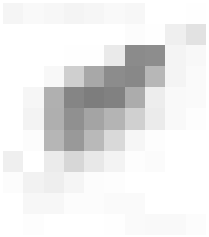
Coelorachis tuberculosa (Nash) Nash, Smooth Jointgrass. Pond margins. Southeastern Coastal Plain endemic: sw. GA (Mitchell County) (Sorrie 1998b) west to s. AL, and in the FL peninsula. [= FNA, K; = *Manisuris tuberculosa* Nash – GW, HC, S; = *Mnesithea tuberculosa* (Nash) Koning & Sosef – Z]



Coix Linnaeus 1753 (Job's-tears)

A genus of about 5 species, native to tropical Asia. References: Thieret in FNA (2003a).

* ***Coix lacryma-jobi*** Linnaeus, Job's-tears. Disturbed areas, perhaps merely a waif; native of tropical Asia. July-September. Reported for se. PA (Rhoads & Block 2007), TN (Thieret in FNA 2003a), c. KY (Kartesz 2010), and s. NJ (Kartesz 1999; Kartesz 2010). [= FNA, K, Pa]



Coleataenia Grisebach 1879

A genus of 8 species, perennials, of s. North America and the West Indies to South America. Named as *Sorengia* by Zuloaga, Scataglini, & Morrone (2010), but this name proved to be illegitimate, and was replaced by *Coleataenia* (Soreng 2010).
References: Zuloaga, Scataglini, & Morrone (2010)=X; Lelong (1986)=Z; Zuloaga & Morrone (1996)=Y; Soreng (2010)=V; Freckmann & Lelong in FNA (2003a); Weakley et al. (2011)=U.

1 Glumes and sterile lemmas not keeled along midvein; apices of fertile lemmas glabrous; panicle < 1 cm wide, 3-12 cm long; leaf blades 4-19 cm long, 1-4 mm wide, involute at maturity; culms wiry ..... ***C. tenera***
1 Glumes and sterile lemmas keeled along midvein; apices of fertile lemmas with a minute tuft of stiff hairs; panicles < 1 to > 20 cm wide, 9-40 cm long; leaf blades 8-50 cm long, 2-12 mm wide, flat (sometimes drying involute); culms wiry to stout.
2 Plants with rhizomes; fertile lemma 1.6-4 mm long.
3 Rhizomes short and stout, usually < 4 cm long, > 4 mm wide and ascending; spikelets (2.5-) 2.7-3.9 mm long, acuminate, often falcate distally; first glume with 3-5 prominent nerves; leaves to 50 cm long and 18 mm wide..... ***C. anceps ssp. anceps***
3 Rhizomes long and slender, usually > 3 cm long, < 5 mm wide and spreading; spikelets 2.2-2.8 mm long, acute to short-acuminate, not noticeably falcate distally; first glume with 1-3 prominent nerves; leaves to 30 (-40) cm long and 10 mm wide ..... ***C. anceps** ssp. **rhizomata***
2 Plants with hard crowns, lacking rhizomes; fertile lemma 1.2-1.6 mm long.
4 Ligule of white hairs 0.5-3 mm long; culms to 1 m long; cauline blades 2-8 mm wide, usually pilose adaxially near the base; spikelets 2.0-4.0 mm long; upper leaves usually shorter than the panicle.
5 Ligules 0.5-1.5 mm long; spikelets 2.4-4.0 mm long, 3.5-5× as long as wide, erect on pedicels; first glume 1.3-2.9 mm long, > ½-¾ as long as the spikelet..... ***C. longifolia** ssp. **combsii***
5 Ligules 1-3 mm long; spikelets 2.4-4.0 mm long, 2.5-4 × as long as wide, often obliquely set on pecidels; first glume 0.9-1.4 mm long, about 2/5-1/2 as long as the spikelet..... ***C. longifolia** ssp. **longifolia***
4 Ligule a tawny membrane 0.5-1.0 mm long, often erose or lacerate, or with a minute ciliate fringe; culms to 1.8 m long; cauline blades 4-12 mm wide, usually glabrous; spikelets 1.6-2.8 mm long; upper leaves usually equaling or exceeding the panicle.
6 Spikelets 2.4-2.8 mm long, long-acuminate, usually < 0.7 mm wide; fertile lemma often conspicuously stipitate ..... ***C. stipitata***
6 Spikelets 1.6-2.5 mm long, short-acuminate, usually > 0.7 mm wide; fertile lemma estipitate to short stipitate.
7 Culms to 1.8 m long; mature panicle < 1/3 as wide as long, the branches erect; spikelets 2.0-2.5 mm long..... ***C. rigidula** ssp. **condensa***
7 Culms to 1 m long; mature panicle ½ to nearly as wide as long, the branches ascending to spreading; spikelets 1.6-2.2 mm long.... ***C. rigidula** ssp. **rigidula***

Coleataenia anceps (Michaux) Soreng *ssp.* ***anceps***, Beaked Panic Grass. Mt (NC, SC, VA, WV), Pd (DE, NC, SC, VA), Cp (DE, FL, NC, SC, VA), {GA}: moist sandy woods, swamps, sloughs, roadsides, fields, waste places; common. June-October. NJ west to IL, south to FL and TX. The leaves of ssp. *rhizomata* tend to be hairier than those of ssp. *anceps*. [= U, V; = *Sorengia anceps* (Michaux) Zuloaga & Morrone ssp. *anceps* – X; = *Panicum anceps* Michaux var. *anceps* – RAB, F, G, Z; < *P. anceps* – C, GW, K, Pa, W; = *P. anceps* ssp. *anceps* – FNA; = *P. anceps* – HC, S, WV]

Coleataenia anceps (Michaux) Soreng *ssp.* ***rhizomata*** (Hitchcock & Chase) Soreng, Small Beaked Panic Grass. Cp (FL, GA, NC, SC, VA): moist to dry sandy or loamy pinelands, ditches; common (rare in VA). July-October. Se. VA and KY south to FL and TX. See note under ssp. *anceps*. [= U, V; = *Sorengia anceps* (Michaux) Zuloaga & Morrone ssp. *rhizomata* (Hitchcock & Chase) Zuloaga & Morrone – X; = *Panicum anceps* Michaux var. *rhizomatum* (A.S. Hitchcock & Chase) Fernald – RAB, F, G, Z; < *P. anceps* – C, GW, K; = *P. anceps* ssp. *rhizomatum* (A.S. Hitchcock & Chase) Freckmann & Lelong – FNA; = *P. rhizomatum* A.S. Hitchcock & Chase – HC, S]

Coleataenia longifolia (Torrey) Soreng *ssp.* ***combsii*** (Scribner & C.R. Ball) Soreng, Combs Panic Grass. Cp (DE, FL, GA, NC, SC, VA): pond shores, depression meadows, cypress savannas, marshes, low woods; uncommon (rare in DE and VA). July-October. Scattered on the outer Coastal Plain from se. MA, NJ, se. VA, se. NC, e. SC, e. GA, and FL, west to se. LA. [= U, V; = *Sorengia longifolia* (Torrey) Zuloaga & Morrone ssp. *combsii* (Scribner & C.R. Ball) Zuloaga & Morrone – X; = *Panicum longifolium* Torrey var. *combsii* (Scribner & C.R. Ball) Fernald – RAB, F, G; = *P. rigidulum* Bosc ex Nees ssp. *combsii* (Scribner & Ball) Freckmann & Lelong – FNA; = *P. rigidulum* Bosc ex Nees var. *combsii* (Scribner & C.R. Ball) Lelong – K, Z; < *P. longifolium* – C, Pa; = *P. combsii* Scribner & C.R. Ball – HC, S]

Coleataenia longifolia (Torrey) Soreng *ssp.* ***longifolia***, Long-leaved Panic Grass. Cp (DE, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (NC, SC, VA): wet sandy or peaty soils of bogs, savannas, pond shores, depression meadows; common (uncommon in Piedmont, rare in Mountains). July-October. NS, NH, MA, PA, and IN south to FL, west to TX. [= U, V; = *Sorengia longifolia* (Torrey) Zuloaga & Morrone ssp. *longifolia* – X; = *Panicum longifolium* Torrey var. *longifolium* – RAB, G; = *P. rigidulum* Bosc ex Nees ssp. *pubescens* (Vasey) Freckmann & Lelong – FNA; = *P. rigidulum* Bosc ex Nees var. *pubescens* (Vasey) Lelong – K, W, Z; < *P. longifolium* – C, GW, Pa; = *P. longifolium* – HC, S; > *P. longifolium* var. *longifolium* – F; > *P. longifolium* var. *pubescens* (Vasey) Fernald – F]

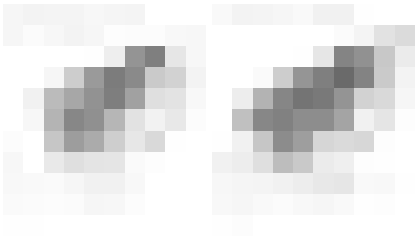
Coleataenia rigidula (Bosc ex Nees) LeBlond *ssp.* ***condensa*** (Nash) LeBlond, Dense Panic Grass. Cp (DE, FL, GA, NC, SC, VA): marshes, meadows, low woods, ditches, stream and pond shores, freshwater tidal shores; uncommon. September-October. Coastal Plain south from se. MA to FL, west to se. TX and AR; disjunct in the West Indies. Usually readily identified by its tall stature and compact inflorescence, somewhat resembling a large *P. hemitomon*, with which it occasionally occurs. [=

U; < *Coleataenia longifolia* (Torrey) Soreng ssp. *rigidula* (Bosc ex Nees) Soreng – V; < *Sorengia longifolia* (Torrey) Zuloaga & Morrone ssp. *rigidula* (Bosc ex Nees) Zuloaga & Morrone – X; = *P. agrostoides* Sprengel var. *condensum* (Nash) Fernald – RAB, F; < *P. rigidulum* – C, GW, Pa; < *P. rigidulum* Bosc ex Nees ssp. *rigidulum* – FNA; < *P. agrostoides* – G; = *P. condensum* Nash – HC, S; < *P. rigidulum* var. *rigidulum* – K, Z; = *Panicum rigidulum* Bosc ex Nees var. *condensum* (Nash) Mohlenbrock]

Coleataenia rigidula (Bosc ex Nees) LeBlond *ssp.* ***rigidula***, Redtop Panic Grass. Cp (DE, FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (WV): wet sandy or peaty soils low woods, meadows, marshes, shores, swamps, ditches; common. July-October. ME and MI south to FL and TX; also in CA and BC; disjunct in Central America. [= U; < *Coleataenia longifolia* (Torrey) Soreng ssp. *rigidula* (Bosc ex Nees) Soreng – X < *Sorengia longifolia* (Torrey) Zuloaga & Morrone ssp. *rigidula* (Bosc ex Nees) Zuloaga & Morrone – X; = *Panicum rigidulum* Bosc ex Nees var. *rigidulum* – W; = *P. agrostoides* Sprengel var. *agrostoides* – RAB, G; < *P. rigidulum* Bosc ex Nees ssp. *rigidulum* – FNA; < *P. rigidulum* var. *rigidulum* – K, Z; < *P. rigidulum* – C, GW, Pa; > *P. agrostoides* var. *agrostoides* – F, HC; > *P. agrostoides* var. *ramosius* (C. Mohr) Fernald – F, HC; = *P. agrostoides* – S, WV]

Coleataenia stipitata (Nash) LeBlond, Tall Flat Panic Grass. Marshes, low woods, ditches, swamps, shores, meadows. August-October. CT and NY west to IN, south to GA, LA, and ne. TX. [= U; = *Coleataenia longifolia* (Torrey) Soreng ssp. *elongata* (Pursh) Soreng – V = *Sorengia longifolia* (Torrey) Zuloaga & Morrone ssp. *elongata* (Pursh) Zuloaga & Morrone – X; = *Panicum rigidulum* Bosc ex Nees var. *elongatum* (Pursh) Lelong – K, W, Z; = *P. stipitatum* Nash – RAB, F, HC, Pa, S, WV; = *P. rigidulum* Bosc ex Nees ssp. *elongatum* (Pursh) Freckmann & Lelong – FNA; < *P. rigidulum* – C, GW; = *P. agrostoides* Sprengel var. *elongatum* (Pursh) Scribner – G]

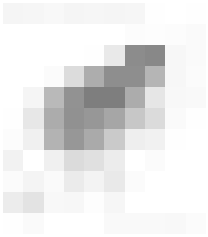
Coleataenia tenera (Beyrich ex Trinius) Soreng, Southeastern Panic Grass. Cp (FL, GA, NC, SC): limesink ponds, depression meadows, cypress savannas, wet pinelands, bogs; uncommon (rare north of FL). June-September. Coastal Plain from se. NC to FL, west to e. TX; disjunct in the West Indies. The rhizomes produce lines of closely spaced culms. Though 0.5-1 m tall, the culms are narrow and inconspicuous. [= U, V; = *Sorengia tenera* (Beyrich ex Trinius) Zuloaga & Morrone – X; = *Panicum tenerum* Beyrich ex Trinius – RAB, FNA, GW, HC, K, S, Z]



Cortaderia Stapf 1897 (Pampasgrass)

A genus of ca. 20 species, native to South America. References: Allred in FNA (2003a).

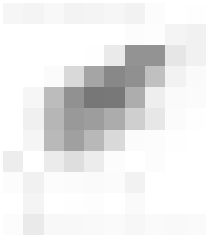
* ***Cortaderia selloana*** (J.A. & J.H. Schultes) Ascherson & Graebner, Pampasgrass. Disturbed areas; native of South America. This grass is a popular ornamental, rarely escaping. [= RAB, FNA, HC, K]



Crypsis Aiton (Pricklegrass)

A genus of 8 species, annuals, of Eurasia. References: Hammel & Reeder in FNA (2003b); Peterson, Romaschenko, & Johnson (2010).

Crypsis schoenoides (Linnaeus) Lamarck, Swamp Pricklegrass. Disturbed areas, ballast; native of Mediterranean Europe. [= C, FNA, Pa; = *Heleochloa schoenoides* (Linnaeus) Host – F, G, HC]



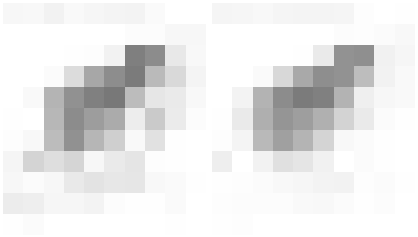
Ctenium Panzer 1813 (Toothache Grass)

A genus of about 20-22 species, of tropical and subtropical Africa and the Americas. References: Barkworth in FNA (2003a); Longhi-Wagner & Renvoize (2004).

1 Spikelets with numerous glands in rows on the back of the second glume; plant short-rhizomatous (nearly cespitose); [widespread in the Coastal Plain] ..... ***C. aromaticum***
1 Spikelets with very few or no glands on the back of the second glume; plant rhizomatous (the rhizomes slender and scaly); [se. GA and ne. FL] ..... ***C. floridanum***

Ctenium aromaticum (Walter) Wood, Toothache Grass, Orange Grass. Wet savannas, pocosin-savanna ecotones, seepage bogs, sandhill-pocosin ecotones, sandhill seeps. June-August (or later in response to late summer fires). Southeastern Coastal Plain endemic: se. VA south to FL and west to LA and e. TX (Singhurst, Keith, & Holmes 2005). The entire plant is aromatic and numbs the mouth, tongue, and lips when chewed, hence the specific epithet and common names. Like many species of the longleaf pine ecosystem, toothache grass generally flowers only following fire (MacRoberts & MacRoberts 1992). Sterile clumps can be recognized by the rather broad, bicolored leaves (bluish on the upper surface, bright green on the lower surface). [= RAB, C, F, FNA, G, GW, HC, K; = *Campulosus aromaticus* (Walter) Trinius – S]

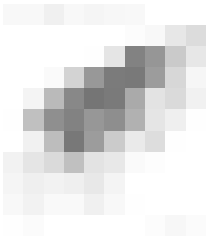
Ctenium floridanum (A.S. Hitchcock) A.S. Hitchcock, Florida Toothache Grass. Dry pinelands, sandhills, upper ecotones of pineland pools. June-September. A Southeastern Coastal Plain endemic: se. GA to ne. FL. Like *Ct. aromaticum*, generally flowering only following fire. [= FNA, GW, HC, K; = *Campulosus floridanus* A.S. Hitchcock – S]



Cynodon L.C. Richard 1805 (Bermuda Grass)

A genus of ca. 9 species, native to the tropical Old World. References: Barkworth in FNA (2003a).

* ***Cynodon dactylon*** (Linnaeus) Persoon, Bermuda Grass, Scutch Grass. Lawns, gardens, roadsides, pastures, fields, disturbed areas; native of Eurasia. May-October. *C. dactylon* is here treated broadly; various authors have recognized additional taxa at specific or varietal rank (see discussion in FNA). [= RAB, C, F, G, HC, K, Pa, W, WV; > *C. dactylon* var. *dactylon* – FNA; < *Capriola dactylon* (Linnaeus) Kuntze – S]



Cynosurus Linnaeus 1753 (Dogtail)

A genus of 8 species, annuals and perennials, native of the Mediterranean region and w. Asia. References: Long in FNA (2007a); Tucker (1996)=Z.

1 Panicle linear-oblong, 1-10 (-14) cm long, 0.4-1 cm wide; leaves 1-3 (-4) mm wide; perennial; fertile lemma 3-4 mm long, plus a 0-1 mm long mucro; [section *Cynosurus*] ..... ***C. cristatus***
1 Panicle ovoid, 1-4 (-8) cm long, 0.7-2 cm wide; leaves (2-) 3-10 mm wide; annual; fertile lemma 4.5-7 mm long, plus a 6-16 mm long awn; [section *Falona*] ..... ***C. echinatus***

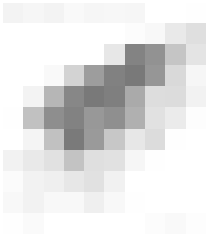
* ***Cynosurus cristatus*** Linnaeus, Crested Dogtail. Lawns, roadsides; native of Eurasia. June-July. [= RAB, C, F, FNA, G, HC, K, Pa, WV, Z]

* ***Cynosurus echinatus*** Linnaeus, Rough Dogtail, Bristly Dogtail. Lawns, roadsides; native of Eurasia. May-June. [= RAB, C, F, FNA, HC, K, Pa, WV, Z]

Dactylis Linnaeus 1753 (Orchard Grass)

A genus of 1 variable species, perennial, native of Eurasia. References: Allred in FNA (2007a); Tucker (1996)=Z.

* ***Dactylis glomerata*** Linnaeus, Orchard Grass, Cock's-foot. Pastures, fields, woodland edges, roadsides; native of Europe. May-October. In Europe there are various chromosome races, often accorded subspecies or species status. Their status in North America has been little investigated. See various references cited in Tucker (1996) for further information about these taxa in Europe. [= RAB, C, FNA, G, HC, Pa, S, W, WV; > *D. glomerata* var. *glomerata* – F; > *D. glomerata* var. *detonsa* Fries – F; > *D. glomerata* var. *ciliata* Petermann – F; > *D. glomerata* ssp. *glomerata* – K, Z; > *D. glomerata* ssp. *aschersoniana* (Graebner) Thellung – K; > *D. aschersoniana* Graebner]



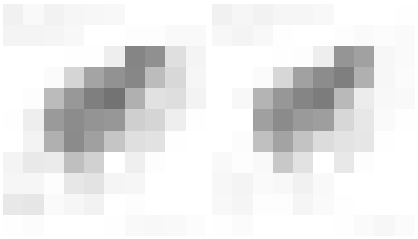
Dactyloctenium Willdenow 1809 (Crowfoot Grass)

A genus of 1-13 species, of Africa and Australia. References: Hatch in FNA (2003a).

1 Panicle branches 1.5-6 cm long, well-separated from each other at their tips ..... ***D. aegyptium***
1 Panicle branches 0.4-1.5 cm long, the spikelets of each mostly in contact with the spikelets of adjacent branches ..... ***D. radulans***

* ***Dactyloctenium aegyptium*** (Linnaeus) Willdenow, Crowfoot Grass. Lawns, roadsides, disturbed areas; native of Old World tropics. June-November. [= RAB, C, F, FNA, G, HC, K, S]

* ***Dactyloctenium radulans*** (R. Brown) Palisot de Beauvois, Buttongrass. Waste areas at wool-combing mills, perhaps only a waif; native of Australia. May-July. Collected repeatedly from 1957-1960 at the Santee Wool Combing Mill, Jamestown, Berkeley County, SC. [= FNA, K]



Danthonia A.P. de Candolle 1805 (Oat-grass)

A genus of about 20 species, of North America, Europe, and the Americas, but the generic limits are unclear. References: Darbyshire in FNA (2003a).

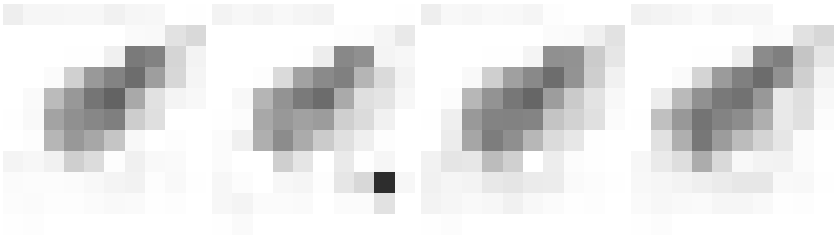
1 Lemma teeth (flanking the awn) 0.8-1.8 mm long, triangular, acuminate; glumes 8-13 mm long ..... ***D. spicata***
1 Lemma teeth (flanking the awn) (1.8-) 2.0-4.5 mm long, setaceous; glumes 9-19 mm long.
  2 Lemma awn 4-10 mm long; glumes 9-13 mm long ..... ***D. compressa***
  2 Lemma awn 11-18 mm long; glumes 11-19 mm long.
    3 Sheaths villous; lemmas herbaceous in texture, villous on the back and sides; awn twisted at base several times, forming an awn column 2.5-3 mm long ..... ***D. sericea***
    3 Sheaths glabrous; lemmas membranaceous in texture, villous only on the margins and toward the base; awn twisted at base a single time, forming a loose awn column 0.5-1.5 mm long ..... ***D. epilis***

Danthonia compressa Austin ex Peck, Mountain Oat-grass, Allegheny Flyback. Grassy balds, thin soils around rock outcrops, woodlands. June-August. NS, QC and ON south to SC, GA, and AL. [= RAB, C, F, FNA, G, HC, K, Pa, S, W, WV]

Danthonia epilis Scribner, Bog Oat-grass. Peaty bogs in the Coastal Plain and Mountains, seeps around rock outcrops in the Piedmont and Mountains, granitic domes. April-June. The range is apparently bogs in pinelands from NJ to SC, in mountain bogs in NC, VA (?), and GA, in seepage in the Cumberland Plateau and Blue Ridge of TN and AL. This taxon appears to be valid, with a distinct range, habitat, and variety of morphologic characters separating it from *D. sericea*, but further study is needed. Material from the mountains seems to differ from Coastal Plain material. RAB's description of the habitat as "dry woods, rare; pied. of N.C." appears to be in error. Blomquist listed the taxon (as a variety) for bogs in the mountains of sw. NC. It has since been found in bogs in the Sandhills region of NC and in seepage bogs in the adjacent Piedmont. [= F, HC, K, S; = *D. sericea* var. *epilis* (Scribner) Blomquist – RAB, C; < *D. sericea* Nuttall – FNA]

Danthonia sericea Nuttall, Silky Oat-grass. Dry woodlands, especially common in sandy soils in the Coastal Plain, dry oak, oak-pine, and pine forests in the Piedmont and low Mountains. April-June. Primarily a Coastal Plain species northward, ranging from e. MA south to FL and west to LA. [= F, HC, K, S, W; = *D. sericea* var. *sericea* – RAB, C, G; < *D. sericea* – FNA]

Danthonia spicata (Linnaeus) Palisot de Beauvois ex Roemer & J.A. Schultes, Poverty Oat-grass, Moonshine Grass. Dry woodlands, rock outcrops, shale barrens. May-August. NL (Newfoundland) and BC south to FL and NM. [= RAB, C, FNA, G, HC, K, Pa, S, W, WV; > *D. spicata* var. *longipila* Lamson-Scribner & Merrill – F; > *D. spicata* var. *spicata* – F; < *D. allenii* Austin – F]



Deschampsia Palisot de Beauvois 1812 (Hairgrass)

A genus of about 20-40 species, perennials and annuals, north and south temperate. References: Barkworth in FNA (2007a); Tucker (1996)=Z. [also see *Avenella*]

1 Awn 4-8 mm long, geniculate, exserted beyond the tips of the glumes; lemmas minutely scabrous, dull; leaf blades involute, appearing filiform (rounded in cross-section); ligule 0.5-3 (-5) mm long ..... [see ***Avenella***]
1 Awn 2-3 mm long, straight or nearly so, scarcely (or not at all) exserted beyond the tips of the glumes; lemmas smooth, shiny; leaf blades flat or folded at the midvein (V-shaped in cross-section); ligule 3-10 (-17) mm long..... ***D. cespitosa*** *ssp.* ***glauca***

Deschampsia cespitosa (Linnaeus) Palisot de Beauvois *ssp.* ***glauca*** (Hartman) Hartman, Tufted Hairgrass. Thin soil of rock outcrops or barrens over calcareous, mafic, and ultramafic rocks (such as serpentinized olivine, amphibolite, limestone, and dolostone), seepages. June-July. *D. cespitosa* is a complex species, with a complicated polyploid and aneuploid series, variously subdivided (or not) by various taxonomists. As a whole, *D. cespitosa* is circumboreal, ranging south in North America to NJ, sw. NC, WV, c. KY, IL, MN, and AZ. Ssp. *glauca* is the most widespread American subspecies, and extends the farthest south. Other subspecies occur farther north and in Eurasia. In our area, *D. cespitosa* is at its southern limit and is a rare species limited to barrens and outcrops over mafic or ultramafic rocks. Barkworth in FNA (2007a) states that there is no legitimate name available for this taxon. [= K; = *D. caespitosa* var. *glauca* (Hartman) Lindman f. – RAB, F, WV; < *D. cespitosa* ssp. *cespitosa* – FNA; < *D. cespitosa* – C, Pa, Z; < *D. cespitosa* var. *cespitosa* – G; < *D. caespitosa* var. *caespitosa* – HC; = *D. cespitosa* ssp. *cespitosa* var. *glauca* (Hartman) Lindman f.; < *Aira caespitosa* Linnaeus – S; < *D. caespitosa* – W]

* *Deschampsia elongata* (Hooker) Munro, Slender Hairgrass. Waste areas near wool-combing mills, perhaps only a waif; native of w. North America. [= FNA, HC, K] {not keyed}

Desmazeria Dumortier 1822

A genus of about 7 species, annuals, native of the Mediterranean region. References: Tucker in FNA (2007a); Soreng et al. (2003)=Z.

* ***Desmazeria rigida*** (Linnaeus) Tutin, Fern Grass. Cp (FL, SC): waste areas around wool-combing mills, other disturbed areas; rare, perhaps only a waif, native of Mediterranean Europe. [= FNA, K; = *Catapodium rigidum* (Linnaeus) Dony – Z; = *Scleropoa rigida* (Linnaeus) Grisebach]

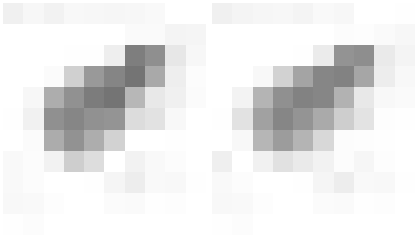
Diarrhena Palisot de Beauvois 1812 (Beakgrain, Twingrass)

Depending on circumscription, a genus of either 2 species of perennial grasses of e. North America, or of ca. 6 species of e. North America and e. Asia. References: Brandenburg in FNA (2007a); Brandenburg, Estes, & Collins (1991)=Z. Key from Z.

1 Callous pubescent on all mature lemmas except the first; lemmas widest below the middle and gradually tapering into a cusp at the apex, those of the first floret 7.1-10.8 mm long; mature fruit 1.3-1.8 mm broad, gradually tapering into a broad, blunt beak..... ***D. americana***
1 Callous glabrous on all mature lemmas; lemmas widest near or above the middle and more-or-less abruptly contracted into a cusp at the apex, those of the first floret 4.6-7.5 mm long; mature fruit 1.8-2.5 mm broad, abruptly contracted into a bottlenose-shaped beak..... ***D. obovata***

Diarrhena americana Palisot de Beauvois, Eastern Beakgrain. Rich moist forests, usually over calcareous rocks. July-August; August-October. W. VA and WV west to IN, south to TN, sw. NC, and nw. GA (Jones & Coile 1988); disjunct in MO. This species forms large clonal patches. [= FNA, K, Pa, Z; = *Diarrhena americana* var. *americana* – C, G, WV; < *Diarrhena americana* – F, HC, W; < *Diarina festucoides* Rafinesque – S]

Diarrhena obovata (Gleason) Brandenburg, Western Beakgrain. Alluvial forests, other moist forests. July-August; August-October. Sw. PA and IN west to SD, KA, south to w. VA, c. TN, and ne. TX. First reported for VA by Fleming & Ludwig (1996). The floodplain of the Potomac River (in Fairfax County, VA) has a number of disjuncts of species with more midwestern affinities, including *Diarrhena obovata, Erigenia bulbosa, Valeriana pauciflora,* and *Erythronium albidum* (Fleming & Ludwig 1996). [= FNA, K, Pa, Z; = *Diarrhena americana* var. *obovata* Gleason – C, G, WV; < *Diarrhena americana* – F, HC, W; < *Diarina festucoides* Rafinesque – S]



Dichanthelium (A.S. Hitchcock & Chase) Gould 1974 (Witchgrass)
(by Richard J. LeBlond)

A genus of 70-100 species, perennials, of temperate and tropical America. References: Gould and Clark (1978)=Z; Freckmann (1981)=Y; Lelong (1984)=X; LeBlond (2001)=Q; Weakley et al. (2011)=V; Davidse and Polh (1992); Hansen & Wunderlin (1988); Hitchcock & Chase (1910); Freckmann & Lelong (2002). The treatment of *Dichanthelium* sect. *Lanuginosa* (=*D. acuminatum* group) is based closely on Y. The contributor must take responsibility for the treatment of sect. *Angustifolia* (including *D. hirstii*), sections *Dichotoma* and *Ensifolia* (the *D. dichotomum* group), and for sect. *Lancearia*. Other treatments are based largely on Z.

"We admit that our failure to distinguish the several named taxa ... was born of despair!" – Godfrey & Wooten (1979).

"The recognition of only four species and six varieties in this complex [*sabulorum*] to which almost 50 species names have been applied admittedly is somewhat arbitrary and certainly not entirely satisfactory." – Gould & Clark (1978).

Identification notes: *Dichanthelium* has often been treated as subgenus *Dichanthelium* of *Panicum*. It is most readily (though not consistently) separated from *Panicum* by the following combination of features: plants producing over-wintering rosettes of leaves often shorter and broader than the culm leaves; plants producing simple culms with terminal panicles in spring, the culms branching and producing panicles only on branches in the summer and autumn.

Perhaps the most complex and confusing genus in our region, *Dichanthelium* requires careful collection and close observation of several characters to determine to which taxon a specimen belongs, or at least to which taxa it seems most closely aligned. A taxon that is distinct in one part of its range may be indistinguishable from another taxon elsewhere. This is particularly true of Coastal Plain species adapted to natural (and now human) disturbances. Although hybridization is frequently suspected in *Dichanthelium*, documentation of natural hybrids is rare.

When collecting specimens in the field, mature spikelets are essential. This is determined by examining the usually whitish fertile lemma, which is firm and plump at maturity. Immature spikelets often are longer than mature ones (they shorten as they fatten); only mature spikelet length is used in the various manuals and keys. It is also important to note whether a plant is in its "vernal" or "autumnal" fruiting phase before collecting. "Vernal" plants produce panicles only at the summits of the culms (typically April-June). "Autumnal" plants produce panicles from leafy axillary branches below the summit (typically July-September). The autumnal panicles in most species are much smaller than the vernal panicles (and often hidden by fascicled leaves), but the spikelets are the same. When collecting autumnal plants, it is important to select specimens still possessing their vernal leaf blades and panicles, even though these will likely be senescent. It is also important to collect the whole plant, with the basal rosette intact (whether senescent or of current year's growth). When several plants are growing together, compare the culm, leaf, and spikelet features for differences; *Dichanthelium* taxa are gregarious.

When analyzing the character of the culm internodes and nodes, look at the first elongate internode above the base (the lowest internode is often very short and uncharacteristic). Determining whether a node is bearded is often difficult. A bearded node usually is characterized by pubescence that is longer and of a different orientation or structure than that of the internodes and sheaths. Nodes with short pubescence generally are not regarded as bearded. Lower nodes are more likely to be bearded than upper nodes. Some internodes are described as “crisp-puberulent.” This condition is characterized by a dense covering of minute hairs mostly less than 0.1 mm long, and usually crimped or curved. Glandular hairs or protuberences are often intermixed. When analyzing sheaths, look at those on the lower half of the culm. Senescent vernal sheaths often lose their pubescence (though in some species hair papillae are evident). All references in the key to sheath glabrousness or pubescence is without regard to the presence or absence of marginal hairs (cilia). A sheath that is glabrous except for marginal cilia is called glabrous. All culm leaves should be analyzed for blade characters; in general, the key relies on the size and character of the vernal blades. A "cordate" blade is one where the basal lobes of the blade extend outward and partially surround the culm when the culm is enclosed by the sheath. As with sheaths, references in the key to blade glabrousness or pubescence is without regard to marginal cilia. The ligule is an important diagnostic character for many *Dichanthelium* taxa; at least three ligules per specimen should be examined before making conclusions about its structure and length. Ligules form a distinct ring from a cartilaginous base at the inner summit of the sheath; in some species the ligule is membranous, but in most it is pubescent. Care must be taken to distinguish the pubescence of the ligule from any pubescence emanating from the inner surface of the blade base, and from marginal cilia. Ligules of senescent vernal leaves frequently lose their integrity. Spikelet shape as well as length should be determined only from mature spikelets. Measure the length from the base of the first glume (usually at an articulation) to the

apex of the second glume or sterile lemma (whichever is longer). A micrometer is essential for determining the length of spikelets, first glumes, ligules, and various pilosity features. Sometimes one-tenth of a millimeter is all that separates two *Dichanthelium* taxa.

Certain characters, particularly node bearding, cordate/non-cordate blade bases, and ligule length, can be quite variable, and an effort has been made to account for this variability in the key. Nonetheless, some specimens just won't "fit," and the road not taken may have to be reconsidered.

1 Plants densely tufted, often cushion-forming; leaves basally disposed, the blades ascending or spreading-ascending, not forming a distinct rosette of basal leaves shorter than the culm leaves; autumnal culms branching basally or from the lower nodes.....**Key A**
1 Plants less densely or sparsely tufted, not cushion-forming; leaves well-distributed on the culm, usually much longer than the short, often broad and spreading basal rosette leaves; autumnal culms usually branching from the mid and upper nodes.
2 Spikelets 3.3-5.2 mm long.....**Key B**
2 Spikelets 0.8-3.2 mm long.
3 Spikelets 0.8-2.0 mm long.
4 Lower culm internodes variously hairy .....**Key F**
4 Lower culm internodes glabrous .....**Key G**
3 Spikelets 2.1-3.2 mm long.
5 Larger culm blades 13-25 mm wide .....**Key C**
5 Larger culm blades < 13 mm wide.
6 Culm nodes (at least the lower) bearded .....**Key D**
6 Culm nodes not bearded, the lowermost sometimes puberulent or sparsely hairy.....**Key E**

Key A - Plants densely tufted, often cushion-forming; leaves basally disposed, the blades ascending or spreading-ascending, not forming a distinct rosette of basal leaves shorter than the culm leaves; autumnal culms branching basally or from the lower nodes

1 Spikelets 2.4-4.5 mm long.
2 Nodes, internodes, and sheaths glabrous; blades 4-13 cm, 5-8 mm, the surfaces smooth, glabrous; spikelets 2.4-2.9 mm long, glabrous; not known to produce axillary (autumnal) inflorescences .....***[D. nudicaule]***
2 Nodes bearded or otherwise pubescent; internodes and sheaths variously pubescent to glabrate; blades 6-35 cm, 2-5 mm, one or both surfaces scabrous and often pubescent; spikelets 1.7-4.5 mm long, glabrous or pubescent; plants produce axillary (autumnal) inflorescences.
3 Spikelets 2.8-3.8 (-4.5) mm long, the second glume and sterile lemma pointed or beaked and extended beyond the summit of the fertile lemma; first glume 1.2-2 mm long.....***D. depauperatum***
3 Spikelets 1.7-2.8 mm long, the second glume and sterile lemma blunt or broadly pointed, not extending beyond the summit of the fertile lemma; first glume 0.7-1.2 mm long.....***D. linearifolium***
1 Spikelets 0.9-2.3 mm long.
4 Longer blades > 6 cm; if only 6 cm, then sheaths retrorsely long-pilose (*D. laxiflorum*).
5 Spikelets 1.2-1.5 mm long, glabrous.....***[D. dichotomum*** *var.* ***glabrifolium]***
5 Spikelets 1.7-2.3 (-2.8) mm long, pubescent.
6 Longer blades 10-35 cm long, 2-4 mm wide; sheaths glabrous to variously pilose, but not conspicuously retrorsely long-pilose; nodes variously pubescent to glabrate; spikelets 1.7-2.3 (-2.8) mm long.....***D. linearifolium***
6 Longer blades 6-18 cm long, 7-12 mm wide; sheaths conspicuously retrorsely long-pilose; nodes bearded with retrorse or spreading hairs; spikelets 1.9-2.3 mm long.....***D. laxiflorum***
4 Longer blades 1.5-6 cm; sheaths glabrous or pubescent, but not retrorsely long-pilose.
7 Blades 1-3 mm wide, glabrous, eciliate or basally ciliate; spikelets 0.9-1.4 mm long.
8 Spikelets pubescent, 1.2-1.4 mm long; blades involute, often falcate, 2.5-6 cm long.....***[D. chamaelonche*** *ssp.* ***breve]***
8 Spikelets glabrous, 0.9-1.2 mm long; blades flat, not falcate, 1.5-4 (-5) cm long..... ***D. chamaelonche*** *ssp.* ***chamaelonche***
7 Blades 3-8 mm wide; spikelets 1.1-2.1 mm long (if < 1.5 mm, then blades either pubescent on one or both surfaces or ciliate to the apex).
9 Spikelets pubescent, 1.5-2.1 mm long; blade surfaces glabrous .....***D. strigosum*** *var.* ***leucoblepharis***
9 Spikelets glabrous, 1.1-1.8 mm long; blade surfaces pubescent or glabrous.
10 Blades glabrous, or sparsely pilose only near the adaxial base; spikelets 1.4-1.8 mm long..... ***D. strigosum*** *var.* ***glabrescens***
10 Blades pilose, at least abaxially; spikelets 1.1-1.6 mm long..... ***D. strigosum*** *var.* ***strigosum***

Key B - Spikelets 3.3-5.2 mm long

1 Nodes (at least lower) densely bearded with retrorse hairs; spikelets 3.7-5.2 mm long.
2 Ligule 2.5-4 mm long; internodes pubescent with long ascending or spreading hairs; blades 8-15 cm long, 10-25 mm wide; first glume 1.8-2.5 mm long .....***D. ravenelii***
2 Ligule 0.4-0.9 (-1.3) mm long; internodes glabrous to puberulent; blades 7-12 cm long 12-40 mm wide; first glume 1.5-2.2 mm long .....***D. boscii***
1 Nodes glabrous, pubescent, or sparsely pilose; spikelets (2.4-) 3.3-4.2 mm long.
3 Ligule 1.6-3 mm long; blades 4-9 mm wide, > 10× as long as wide .....***D. oligosanthes*** *var.* ***oligosanthes***
3 Ligule 0.3-1.5 mm long; if larger blades < 9 mm wide and mostly 15× or more as long, then ligule 0.5-1 mm long (*D. fusiforme*).
4 Larger blades 2-6 (-8) mm wide, mostly 15× or more as long as wide; spikelets fusiform to elliptic, acute, basally constricted.....***D. fusiforme***
4 Larger blades 6-35 mm wide, mostly 10× or less as long as wide; spikelets broadly elliptic to obovate, rounded to sub-acute, not basally constricted.
5 Spikelets strongly papillose-hispid with spreading hairs 0.5-1 mm long; blades papillose-hispid.....***[D. leibergii]***
5 Spikelets glabrous to pubescent with hairs < 0.5 mm long; blades glabrous, scabrous, or pubsecent.
6 Ligules 1-1.5 mm long; blades 5-10 cm long by 6-15 mm wide, glabrous or pubescent, basally rounded; spikelets glabrous to pubescent .....***D. oligosanthes*** *var.* ***scribnerianum***

6 Ligules 0.3-1 mm long; blades 7-35 cm long by 8-35 mm wide, glabrous or scabrous, basally cordate or rounded; spikelets pubescent to glabrate.
7 Sheaths (at least lower) papillose-hispid with spreading hairs; ligule 0.5-1.2 mm long, an eciliate membrane; culm blades 10-28 cm long; spikelets 2.4-3.6 mm long; first glume 1.2-.18 mm long.....***D. clandestinum***
7 Sheaths glabrous or pubescent (the upper papillose-pubescent in *D. xanthophysum*); ligules 0-0.7 mm long, ciliate if more than 0.3 mm long; culm blades 5-18 cm long; spikelets 2.2-4.1 mm long; first glume 0.7-2.6 mm long.
8 Upper sheaths glabrous to softly villous basally; ligules 0.4-0.7 mm long, a short-ciliate membrane; culm blades 15-40 mm wide, the bases cordate-clasping; panicle usually more than half as wide as long.....***D. latifolium***
8 Upper sheaths glabrous, puberulent, or papillose-pubescent; ligules 0-0.5 mm long, eciliate or ciliate; culm blades 5-25 mm wide, the bases cordate-clasping or rounded; panicles less or more than half as wide as long.
9 Upper sheaths glabrous or puberulent; ligules 0.1-0.3 mm long, eciliate; culm blade bases cordate-clasping; panicles usually more than half as wide as long; spikelets 2.2-3.7 mm long, ellipsoid, pointed ...***D. commutatum*** *var.* ***commutatum***
9 Upper sheaths papillose-pubescent; ligules 0.3-0.5 mm long, ciliate; culm blade bases rounded; panicles usually less than half as wide as long; spikelets 3.2-4.1 mm long, obovoid, blunt.....***[D. xanthophysum]***

Key C - Spikelets 2.1-3.2 mm long, larger leaves 13-25 mm wide

1 Culm nodes, at least the lower, bearded (often retrorsely).
2 Ligule a stramineous to light brown membrane (with or without ciliate or lacerate extensions); peduncle and often internodes scabrous .....
.....***D. scabriusculum***
2 Ligule entirely of white hairs; peduncle and internodes either smooth or densely hairy (velvety).
3 Lower internodes glabrous, without a viscid band below the nodes; larger blades 7-15 mm wide.....***D. dichotomum*** group
3 Lower internodes densely hairy except for a viscid band below the nodes; larger blades 10-20 mm wide ..... ***D. scoparium***
1 Culm nodes glabrous or slightly hairy, but not bearded.
4 Second glume and sterile lemma acute to short-acuminate, conspicuously longer than the fertile lemma; spikelets glabrous (occasionally sparsely pubescent in *D. scabriusculum*).
5 Panicle rachis pellucid-punctate; ligule a stramineous to light brown membrane, with or without terminal cilia; peduncle and often internodes scabrous; first glume 0.3-0.6 (-0.8) mm long, reniform to suborbicular .....***D. scabriusculum***
5 Panicle rachis not pellucid-punctate; ligule entirely of white hairs; peduncle and internodes smooth; first glume 0.7-1.2 mm long, ovate to lanceolate.....***D. yadkinense***
4 Second glume and sterile lemma blunt to subacute, shorter than, equaling, or barely exceeding the fertile lemma; spikelets pubescent (sometimes sparsely so in *D. clandestinum*).
6 Sheaths, at least the lower, papillose-hispid with spreading hairs; blades 10-28 cm long.....***D. clandestinum***
6 Sheaths glabrous, puberulent, finely pubescent, or sparsely pilose; blades 5-18 cm long.
7 Ligule 0-0.3 mm long; spikelets 2.2-3.7 mm long, 1.1-1.3 mm wide; first glume 0.6-2.6 mm long.....
.....***D. commutatum var. commutatum***
7 Ligule 0.4-0.7 mm long; spikelets 2.9-3.9 mm long, 1.6-2.0 mm wide; first glume 1.5-2.2 mm long.....***D. latifolium***

Key D - Spikelets 2.1-3.2 mm long, larger culm blades < 13 mm wide,
at least the lower culm nodes bearded with a usually spreading-ascending collar of dense and/or longish hairs

1 Ligule with a dense ring of short hairs 0.5-1 mm long in front of a usually less dense ring of longer hairs (pseudoligule) 1-5 mm long.
2 Nodes retrorsely bearded; internode and sheath hairs spreading to restrorse; blade surfaces velvety-pubescent or long-pilose.
3 Spikelets 2.5-3.2 mm long; longer hairs of pseudoligule 1-3 mm long; blade surfaces velvety-pubescent; panicle rachis densely pubescent; [of cedar glades and dry limestone soils] .....***[D. malacophyllum]***
3 Spikelets 1.8-2.5 mm long; longer hairs of pseudoligule 3-5 mm long; blade surfaces long-pilose; panicle rachis sparsely pilose; [of dry sandy soil of pine and oak woodlands] .....***D. villosissimum*** *var.* ***villosissimum***
2 Node beard hairs spreading to ascending; internode and sheath hairs ascending to appressed; blade surfaces glabrate to appressed-pubescent.
4 Spikelets 2.5-3.1 mm long; lower culm blades usually glabrous adaxially except for long hairs at or near the margin (appearing ciliate), appressed-pubescent abaxially.....***D. ovale*** *var.* ***ovale***
4 Spikelets 2.1-2.6 mm long; lower culm blades usually sparsely appressed-pubescent on both surfaces, eciliate or ciliate at the base only.
.....***D. ovale*** *var.* ***addisonii***
1 Ligule a single structure, without a pseudoligule.
5 Ligule 2-5 mm long, ciliate.....***D. acuminatum* group**
5 Ligule < 2 mm long, ciliate or membranous.
6 Ligule a stramineous to light brown membrane, with or without terminal cilia; peduncle antrorsely scabrous but not hairy.
7 Panicle rachis smooth, pellucid-punctate; first glume 0.3-0.6 (-0.8) mm long, as broad as or broader than long, truncate to obtuse; larger leaves 10-25 cm long, 8-15 mm wide; ligule 0.5-1.3 mm long; lowest elongate culm internode > 2 mm in diameter; lowest nodes usually glabrous or pubescent .....***D. scabriusculum***
7 Panicle rachis scabrous or smooth, not pellucid-punctate; first glume 0.5-1.1 mm long, longer than wide, rounded to acute; larger leaves 3.5-12 cm long, 3-9 mm wide; ligule 0.1-0.6 mm long; lowest elongate culm internode < 2 mm in diameter; lowest nodes retrorsely bearded or glabrous.
8 Lowest nodes usually retrorsely bearded; ligules (0.1-) 0.3-0.6 mm long; largest vernal blades 7-12 cm long, (4.5-) 6-9 mm wide; panicle peduncle scabrous; spikelets ovate-lanceolate, acute, 2.0-2.4 mm long; first glume lanceolate, blunt to acute; fertile lemma smooth .....***D. species 9 (=cryptanthum)***
8 Lowest nodes usually glabrous; ligules 0.1-0.2 (-0.3) mm long; largest vernal blades 3.5-7 cm long, 3-6 mm wide; panicle peduncle smooth; spikelets elliptic, blunt to acute, 1.6-2.2 mm long; first glume ovate to rotund, rounded to acute; fertile lemma papillose.....***D. lucidum***
6 Ligule entirely of white hairs; peduncle variously hairy or glabrous, but not antrorsely scabrous.
9 Culms to 1.5 m tall, with a broad, glabrous, viscid band below the nodes; blades of the lower leaves typically villous or velvety-pubescent..... ***D. scoparium***

9 Culms rarely exceeding 1 m, without a viscid band below the nodes; blades various.
10 Sheaths retrorsely pilose with hairs 2-3 mm long; basal leaves usually numerous, ascending, similar in size and shape to the culm leaves; culms branching only at the base..... ***D. laxiflorum***
10 Sheaths glabrous or pilose (if pilose, then hairs not both retrorse and 2-3 mm long); basal leaves rosette-forming, usually much smaller than the culm leaves; culms branching at the nodes in age.
11 Culm internodes glabrous to sparsely pilose; culm nodes bearded with long retrorse hairs; blade surfaces glabrous to velvety-pubescent..... ***D. dichotomum* group**
11 Culm internodes, at least the lower, strigose, pilose, or villous; culm nodes bearded with ascending or spreading hairs; blade surfaces glabrous or variously hairy.
12 Lower and often mid-culm nodes bearded with spreading, stiffish, and short-to-long hairs; mid-culm blades usually 15× or less as long as wide.
13 Blades stiff, often longitudinally ribbed, at least the lower villous or strongly pilose on the abaxial surface, and usually strongly pilose at least basally on the adaxial surface..... ***D. consanguineum***
13 Blades not noticeably stiff nor longitudinally ribbed, pubescent or strigose underneath, glabrous above or with a few long hairs near the base.
14 Spikelets 2.5-3.1 mm long; lower culm blades usually glabrous adaxially except for long hairs at or near the margin (appearing ciliate), appressed-pubescent abaxially..... ***D. ovale*** *var.* ***ovale***
14 Spikelets 2.1-2.6 mm long; lower culm blades usually sparsely appressed-pubescent on both surfaces, eciliate or ciliate at the base only..... ***D. ovale*** *var.* ***addisonii***
12 Lower nodes bearded with erect-ascending, soft, and long hairs; mid-culm blades usually 20× or more as long as wide.
15 Spikelets 2.9-4.0 mm long, fusiform to elliptic, acute, basally constricted; first glume 1.4-2.6 mm long..... ***D. fusiforme***
15 Spikelets 1.5-3.1 mm long, obovate to elliptic-obovate, obtuse to sub-acute, not basally constricted; first glume 0.6-1.5 mm long.
16 Spikelets 1.5-2.2 mm long; first glume 0.6-0.8 mm long; longer cauline blades 4-8 cm, 2-5 mm wide, <20× as long as wide; lower cauline leaves glabrous to sparsely pilose abaxially; autumnal leaves involute ..... ***D. aciculare***
16 Spikelets 2.1-3.1 mm long; first glume 0.7-1.5 mm long; longer cauline blades 7-12 (-15) cm, 3-8 mm wide, <20×->20× as long as wide; lower cauline leaves often villous abaxially (especially in *D. species 1=arenicoloides*); autumnal leaves involute or flat.
17 Cauline blades 4-8 mm wide, averaging 15-20 × as long as wide; autumnal blades flat; spikelets 2.3-3.1 mm long; first glume 0.8-1.5 mm long..... ***D. angustifolium***
17 Cauline blades 3-4 (-5) mm wide, averaging >20 × as long as wide; autumnal blades usually involute; spikelets 2.1-2.5 (-2.8) mm long ..... ***D. species 1=arenicoloides***
15 Spikelets (3.0-) 3.2-3.8 mm long, fusiform, pointed at summit, attenuate at base, with both glumes attached 0.3-0.5 mm below sterile lemma, the autumnal spikelets 3.5-3.8 mm long; larger vernal blades 3-6 mm wide, the lower and mid-culm blades of similar width; autumnal blades involute ..... ***D. fusiforme***
15 Spikelets 1.8-3.1 mm long, obovate, blunt, and the base not attenuate except in *D. species 1=arenicoloides* with autumnal spikelets 2.3-3.1 mm long; larger vernal blades 2-8 mm wide, the lower usually wider and often shorter than mid-culm blades; autumnal blades involute or flat.
16 Longest vernal blades to 16 cm, widest vernal blades 4-8 mm, usually longitudinally wrinkled; vernal and autumnal spikelets 2.3-3.1 mm long; autumnal blades flat, the larger to 9 cm × 2-4 mm ..... ***D. angustifolium***
16 Longest vernal blades to 6 (*D. aciculare*) or 12 (*D. species 1=arenicoloides*) cm long, 2-5 mm wide, not noticeably wrinkled; vernal spikelets 1.5-2.8 mm long, autumnal spikelets either 1.5-2.3 (*D. aciculare*) or 2.3-3.1 (*D. species 1=arenicoloides*); autumnal blades involute, the larger to 6 cm × 1.5 mm.
17 Longest vernal blades to 6 (-8) cm, widest vernal blades 2-5 mm; vernal and autumnal spikelets 1.7-2.3 mm long, blunt, not attenuate, the glumes attached <0.2 mm below sterile lemma; first glumes 0.6-0.9 mm long; larger autumnal blades to 3 cm by 1 mm..... ***D. aciculare***
17 Longest vernal blades to 12 cm, widest vernal blades 3-4 (-5) mm; vernal spikelets 2.1-2.8 mm long; autumnal spikelets 2.3-3.1 mm long, pointed, attenuate, the glumes attached 0.3-0.5 mm below sterile lemma; first glumes 0.7-1.5 mm long; larger autumnal blades to 6 cm by 1.5 mm ..... ***D. species 1=arenicoloides***

Key E - Spikelets 2.1-3.2 mm long, larger culm blades < 13 mm wide, culm nodes not bearded, the lowermost sometimes puberulent or sparsely pilose

1 Ligule 1.6-4 mm long..... ***D. oligosanthes*** *var.* ***oligosanthes***
1 Ligule < 1.5 mm long.
2 Blades, at least the lower, cordate or subcordate at the base, mostly 6-12 mm wide.
3 Spikelets obpyriform when viewed dorsally, strongly plano-convex when viewed laterally, usually markedly reddish-purple basally; fertile lemma papillose..... ***D. webberianum***
3 Spikelets elliptic to elliptic-obovoid when viewed dorsally or laterally, greenish to faintly purple-tinged basally; fertile lemma not papillose.
4 Internodes crisp-puberulent; ligules 0-0.3 mm long, eciliate; larger culm blades 4-8 (-11) cm long, 5-10 (-12) mm wide, broadest near the base; spikelets 2.1-2.7 mm long; first glumes 0.7-0.9 mm long ..... ***D. commutatum*** *var.* ***ashei***
4 Internodes glabrous to sparsely pubescent; ligules either 0-0.3 mm long and eciliate, or about 0.5 mm long and ciliate; larger culm blades 5-16 cm long, 6-25 mm wide, broadest above the base or broadly linear; spikelets 2-3.7 mm long; first glumes 0.5-2.6 mm long.
5 Ligule 0-0.3 mm long, eciliate; larger culm blades 5-25 mm wide; spikelets 2.2-3.7 mm long; first glumes 0.6-2.6 mm long..... ***D. commutatum*** *var.* ***commutatum***
5 Ligule about 0.5 mm long, ciliate; larger culm blades 6-13 mm wide; spikelets 2-3 mm long; first glumes 0.5-1 mm long..... ***D. boreale***
2 Blades tapering to the base, 2-12 mm wide.
6 Ligule a stramineous to light brown membrane, with or without terminal cilia; peduncle antrorsely scabrous but not hairy.

7 Panicle rachis smooth, pellucid-punctate; first glume 0.3-0.6 (-0.8) mm long, as broad as or broader than long, truncate to obtuse; larger leaves 10-25 cm long, 8-15 mm wide; ligule 0.5-1.3 mm long; lowest elongate culm internode > 2 mm in diameter; lowest nodes usually glabrous or pubescent ..... ***D. scabriusculum***

7 Panicle rachis scabrous or smooth, not pellucid-punctate; first glume 0.5-1.1 mm long, longer than wide, rounded to acute; larger leaves 3.5-12 cm long, 3-9 mm wide; ligule 0.1-0.6 mm long; lowest elongate culm internode < 2 mm in diameter; lowest nodes retrorsely bearded or glabrous.

8 Lowest nodes usually retrorsely bearded; ligules (0.1-) 0.3-0.6 mm long; largest vernal blades 7-12 cm long, (4.5-) 6-9 mm wide; panicle peduncle scabrous; spikelets ovate-lanceolate, acute, 2.0-2.4 mm long; first glume lanceolate, blunt to acute; fertile lemma smooth ..... ***D. cryptanthum***

8 Lowest nodes usually glabrous; ligules 0.1-0.2 (-0.3) mm long; largest vernal blades 3.5-7 cm long, 3-6 mm wide; panicle peduncle smooth; spikelets elliptic, blunt to acute, 1.6-2.2 mm long; first glume ovate to rotund, rounded to acute; fertile lemma papillose ..... ***D. lucidum***

6 Ligule of short white hairs or absent; peduncle variously hairy or glabrous, but not antrorsely scabrous.

9 Leaves basally disposed, usually matted or cushion-forming, larger than the mid and upper culm leaves; blade margins uniformly papillose-ciliate; culms branching only at the base, 0.5-3.5 dm tall; internodes glabrous or sparsely pubescent ..... ***D. strigosum*** *var.* ***leucoblepharis***

9 Basal leaves rosette-forming, usually much smaller than culm leaves; blade margins glabrous, or ciliate only below the middle (or papillose-ciliate throughout in *=lancearium*, which has densely puberulent internodes); culms branching at the nodes in age, 1.5-7.5 mm tall.

10 Blades of mid-culm leaves typically long and stiff, acuminate, linear or narrowly lanceolate, usually > 10× as long as wide, only 2-5 mm wide when < 8 cm long.

11 Vegetative parts glabrous (spikelets pubescent, lowest internodes and sheaths sometimes sparsely pubescent, blades and sheaths sometimes ciliate); mature panicles less than ¼ as wide as long, the branches erect-ascending, the spikelets often subsecond; autumnal blades 4-10 cm long, involute, <2 mm wide; spikelets 1.8-2.2 mm long ..... ***D. neuranthum***

11 Vegetative parts pubescent, at least in the lower portion of plant; mature panicles usually more than half as wide as long, the branches spreading-ascending, the spikelets not noticeably subsecond; autumnal blades 1-6 cm long, involute and <2 mm wide in *D. aciculare* ssp. *aciculare* and *D. species 1=arenicoloides*, or to 9 cm long, flat and 2-4 mm wide in *D. angustifolium*; spikelets 1.5-3.1 mm long.

12 Spikelets (3.0-) 3.2-3.8 mm long, fusiform, pointed at summit, attenuate at base, with both glumes attached 0.3-0.5 mm below sterile lemma, the autumnal spikelets 3.5-3.8 mm long; larger vernal blades 3-6 mm wide, the lower and mid-culm blades of similar width; autumnal blades involute ..... ***D. species 8 (=fusiforme)***

12 Spikelets 1.8-3.1 mm long, obovate, blunt, and the base not attenuate (except in *D. species 1=arenicoloides* with autumnal spikelets 2.3-3.1 mm long); larger vernal blades 2-8 mm wide, the lower usually wider and often shorter than mid-culm blades; autumnal blades involute or flat.

13 Longest vernal blades to 16 cm, widest vernal blades 4-8 mm, usually longitudinally wrinkled; vernal and autumnal spikelets 2.3-3.1 mm long; autumnal blades flat, the larger to 9 cm by 2-4 mm ..... ***D. angustifolium***

13 Longest vernal blades to 6 (*D. aciculare* ssp. *aciculare*) or 12 (*D. species 1=arenicoloides*) cm long, 2-5 mm wide, not noticeably wrinkled; vernal spikelets 1.5-2.8 mm long, autumnal spikelets either 1.5-2.3 (*D. aciculare* ssp. *aciculare*) or 2.3-3.1 (*D. species 1=arenicoloides*); autumnal blades involute, the larger to 6 cm by 1.5 mm.

14 Longest vernal blades to 12 cm, widest vernal blades 3-4 (-5) mm; vernal spikelets 2.1-2.8 mm long; autumnal spikelets 2.3-3.1 mm long, pointed, attenuate, the glumes attached 0.3-0.5 mm below sterile lemma; first glumes 0.7-1.5 mm long; larger autumnal blades to 6 cm by 1.5 mm ..... ***D. species 1=arenicoloides***

14 Longest vernal blades to 6 (-8) cm, widest vernal blades 2-5 mm; vernal and autumnal spikelets 1.7-2.3 mm long, blunt, not attenuate, the glumes attached <0.2 mm below sterile lemma; first glumes 0.6-0.9 mm long; larger autumnal blades to 3 cm by 1 mm ..... ***D. aciculare*** *ssp.* ***aciculare***

10 Blades of mid-culm leaves lanceolate, thin or firm but not stiff, usually < 10× as long as wide, usually 7 mm or more wide when as much as 8 cm long.

15 Spikelets 2.9-3.8 mm long, broadly elliptic, rounded at the summit, with broad and thick nerves ..... ***D. oligosanthes*** *var.* ***scribnerianum***

15 Spikelets 2.1-2.9 mm long, elliptic or obovate, rounded or pointed at the summit, the nerves often raised, but not broad and thick.

16 Culm internodes and sheaths glabrous or sparsely pilose.

17 Spikelets strongly plano-convex when viewed laterally, obpyriform when viewed dorsally, 2.2-2.6 mm long; fertile lemma and palea papillose; first glume and base of second glume usually strongly reddish-purple ..... ***D. webberianum***

17 Spikelets biconvex to elliptic when viewed laterally, variously shaped but not obpyriform when viewed dorsally; fertile lemma and palea smooth or reticulate (or papillose in *D. lucidum* with weak and sprawling culms and spikelets 1.7-2.3 mm long); first and second glume various.

18 Culms tending to be stiffly erect; blades erect or erect-spreading, broad, usually but not always tapering from just below the middle to both ends, often yellowish green; plants not or only sparingly branched in age, not developing leafy fascicles of reduced leaves and inflorescences ..... ***D. boreale***

18 Culms not stiffly erect; leaves usually spreading, broad or narrow, dark to bright green; plants often freely branched in age, becoming top-heavy with a mass of fascicled, reduced leaves and inflorescences ..... ***D. dichotomum*** group

16 Culm internodes crisp-puberulent (sparsely so in *D. webberianum)*; sheaths puberulent or glabrous.

19 Spikelets elliptic, sub-acute to pointed, greenish or faintly purple-tinged basally ..... ***D. commutatum var. ashei***

19 Spikelets strongly plano-convex when viewed laterally, obpyriform when viewed dorsally, broadly rounded, usually markedly reddish-purple basally.

20 Fertile lemma and palea papillose; spikelets 2.2-2.6 mm long; lower culm blades 6-12 mm wide, glabrous ..... ***D. webberianum***

20 Fertile lemma and palea smooth (minutely reticulate but not papillose); spikelets (1.8) 1.9-2.2 (-2.3) mm long; lower culm blades 4-8 mm wide, glabrous, glabrate, or puberulent (especially abaxially) ..... ***D. species 3 (=lancearium)***

Key F - Spikelets 0.8-2.0 mm long, lower culm internodes variously hairy

1 Longer hairs of ligule 2-5 mm long.
2 Ligule without a distinct ring of short hairs in front of the long hairs.
3 Blades of mid-culm leaves linear or narrowly lanceolate, stiff, acuminate, often involute, 4-10 cm long, 2-5 mm wide, about 15-20× as long as wide ..... ***D. species 12 (=chrysopsidifolium)***
3 Blades of mid-culm leaves lanceolate, thin or firm but not stiff, length and width various, less than 15× as long as wide ..... ***D. acuminatum* group**
2 Ligule with a distinct ring of short hairs in front of the long hairs.
4 Peduncle, panicle axis, and sheaths puberulent with hairs 0.1 mm long; larger blades 3-6 cm long, 3-5 mm wide; spikelets 1.3-1.7 mm long ..... ***D. meridionale***
4 Peduncle panicle axis hairs > 0.1 mm long; sheaths and internodes densely clothed with straight retrorse (occasionally spreading to spreading-ascending) hairs often > 4 mm long ..... ***D. villosissimum*** *var.* ***villosissimum***
1 Longer hairs of ligule < 2 mm long.
5 Culm leaves basally crowded, ascending, usually matted or cushion-forming, larger than the mid and upper culm blades.
6 Sheaths conspicuously retrorsely long-pilose; longer blades 6-18 cm long and 7-12 mm wide; spikelets 1.9-2.3 mm long .. ***D. laxiflorum***
6 Sheaths variously pubescent or glabrous, but not conspicuously retrorsely long-pilose; longer blades 2-6 cm long and 1-8 mm wide; spikelets 0.9-2.1 mm long.
7 Blades 1-4 mm wide, glabrous, the margins eciliate or basally ciliate; spikelets 0.9-1.5 mm long, glabrous; autumnal form branched from lower and mid nodes as well as from basal nodes.
8 Blades 1.5-4 (-5) cm long; spikelets 0.9-1.2 mm long..... ***D. chamaelonche***
8 Blades 4-12 (-20) cm long, some at least 7 cm long; spikelets 1.2-1.5 mm long..... ***[D. dichotomum*** *var.* ***glabrifolium]***
7 Blades 2-10 mm wide, pubescent or glabrous, the margins coarsely papillose-ciliate throughout; spikelets 1.1-2.1 mm long, glabrous or pubescent; autumnal form branched from basal nodes only.
9 Spikelets pubescent, 1.5-2.1 mm long; blade surfaces glabrous..... ***D. strigosum*** *var.* ***leucoblepharis***
9 Spikelets glabrous, 1.1-1.8 mm long; blade surfaces pubescent or glabrous.
10 Blades glabrous, or sparsely pilose only near the adaxial base; spikelets 1.4-2.1 mm long ..... ***D. strigosum*** *var.* ***glabrescens***
10 Blades pilose, at least abaxially; spikelets 1.1-1.6 mm long ..... ***D. strigosum*** *var.* ***strigosum***
5 Culm leaves not basally crowded, the lowest leaves spreading and rosette-forming, usually smaller than the culm leaves.
11 Blades of mid-culm leaves linear or narrowly lanceolate, stiff, acuminate, often involute, 4-10 cm long, 2-5 mm wide, about 15-20× as long as wide.
12 Ligule less than 1 mm long; nodes glabrous to sparsely pubescent, not bearded; blades glabrous (lowest sometimes sparsely pilose); autumnal blades involute; first glume firm, nerved, similar in color to second glume..... ***D. aciculare***
12 Ligule (1-) 1.5-2 (-2.5) mm long; nodes bearded with spreading-ascending hairs; blades moderately hirsute; autumnal blades flat; first glume soon becoming hyaline, nerveless, stramineous ..... ***D. species 12 (=chrysopsidifolium)***
11 Blades of mid-culm leaves lanceolate, thin or firm but not stiff, length and width various, less than 15× as long as wide.
13 Internodes crisp-puberulent.
14 Ligule 0.7-1.5 mm long; first glume acute; spikelets elliptic when viewed dorsally, biconvex or elliptic when viewed laterally, not strongly nerved ..... ***D. columbianum***
14 Ligule < 0.5 mm long; first glume obtuse to truncate; spikelets obovate when viewed dorsally, plano-convex when viewed laterally, strongly nerved.
15 Spikelets 1.5-1.8 mm long; first glume 0.5-0.8 mm long; lower culm blades 2-5 mm wide..... ***D. portoricense***
15 Spikelets (1.8-) 1.9-2.2 (-2.3) mm long; first glume 0.8-1.2 mm long; lower culm blades 4-8 mm wide ..... ***D. species 3 (=lancearium)***
13 Internodes variously hairy but not crisp-puberulent.
16 Internodes (sparsely-) moderately to densely pubescent to pilose; ligule 1-5 mm long; blade margins either weakly ciliate, papillose-ciliate basally only, or eciliate, lacking a white-beige cartilagionous edge 0.2 mm wide.
17 Larger mid-culm blades 4-7 cm long, 4-7 mm wide, glabrous to sparsely pubescent adaxially; ligule 1-5 mm long; spikelets 1.1-1.5 mm long ..... ***D. leucothrix***
17 Larger mid-culm blades 3-6 cm long, 3-5 mm wide, long-pilose adaxially; ligule often with a ring of hairs < 1 mm and scattered longer hairs to 4 mm; spikelets 1.3-1.7 mm long..... ***D. meridionale***
16 Internodes sparsely pilose; ligule < 1 mm long; blade margins **either** coarsely papillose-ciliate throughout **or** glabrous with a white-beige cartilaginous edge about 0.2 mm wide.
18 Blades with white-beige cartilaginous margins 0.2 mm wide; spikelets 1.4-1.7 mm long; autumnal form branching from middle and upper nodes..... ***D. tenue***
18 Blade margins coarsely papillose-ciliate throughout; spikelets 1.1-2.1 mm long; autumnal form branching from the base.
19 Spikelets pubescent, 1.5-2.1 mm long; blade surfaces glabrous..... ***D. strigosum*** *var.* ***leucoblepharis***
19 Spikelets glabrous, 1.1-1.8 mm long; blade surfaces pubescent or glabrous.
20 Blades glabrous, or sparsely pilose only near the adaxial base; spikelets 1.4-1.8 mm long.... ***D. strigosum*** *var.* ***glabrescens***
20 Blades pilose; spikelets 1.1-1.6 mm long..... ***D. strigosum*** *var.* ***strigosum***

Key G - Spikelets 0.8-2.0 mm long, lower culm internodes glabrous

1 Ligule 1-5 mm long.
2 Ligule (1.5-) 2-5 mm long; sheaths glabrous to variously pubescent; internodes glabrous or pubescent; nodes glabrous, or bearded with ascending, spreading, or tangled hairs; leaves 3-10 cm long, 3-10 mm wide; spikelets 0.8-1.9 mm long ..... ***D. acuminatum* group**
2 Ligule 1-2 mm long; sheaths sparsely to moderately spreading short-pilose; internodes glabrous; nodes retrorsely bearded; leaves 1-4 cm long, 2-5 mm wide; spikelets 1.2-1.4 mm long ..... ***D. curtifolium***
1 Ligule < 1 mm long.
3 Basal leaves rosette-forming, usually much smaller than the culm leaves, not matted or cushion-forming; culms branching at the mid and upper nodes in age.
4 Blades of mid-culm leaves typically long and acuminate, linear or narrowly lanceolate, usually 10-20× as long as wide, only 2-5 mm wide when < 8 cm long.
5 Spikelets (glandular-) papillose-pubescent; blades 1-3 (-5) mm wide; first glume 0.8-1.0 mm long; culms to 4 dm tall..... ***D. neuranthum***

5 Spikelets glabrous; blades 3-8 mm wide; first glume 0.3-1.1 mm long; culms to 10 dm tall.
6 Leaves 3-8 mm wide; panicle (8-) 20-40 mm wide; first glume 0.6-1.1 mm long, blunt to acute ..... ***D. dichotomum* group**
6 Leaves 3-5.5 mm wide; panicle 2-5 mm wide; first glume 0.3-0.4 mm long, truncate to obtuse..... ***D. hirstii***
4 Blades of mid-culm leaves lanceolate, mostly 10× or less as long as wide, usually 7 mm or more wide when as much as 8 cm long.
7 Spikelets elliptic, oblong, or obovate; lower culm blades 3-12 (-15) mm wide, thin, tapered to the base; plants often freely branching in age, becoming top-heavy with a mass of fascicled, reduced leafy branches and inflorescences..... ***D. dichotomum* group**
7 Spikelets broadly elliptic to suborbicular; lower culm blades 6-30 mm wide, thickish, broad, and cordate to subcordate at the base; plants sparingly branched in age, not becoming top-heavy with fascicled, reduced leafy branches and inflorescences.
8 Spikelets 0.9-1.2 mm long; longer blades 6-8 cm long, erect to erect-ascending ..... ***D. erectifolium***
8 Spikelets 1.2-1.9 mm long; longer blades 8-20 cm long, ascending or the uppermost erect.
9 Mid-culm blades to 25 cm long, 14-30 mm wide, the uppermost 10-15+ cm long; vernal panicles to 20 cm long, often less than half as wide as long; spikelets 1.3-1.6 (-1.7)..... ***D. polyanthes***
9 Mid-culm blades to 10 cm long, 5-11 (-14) mm wide, the uppermost 3-9 cm long; vernal panicles to 14 cm long, usually more than half as wide as long; spikelets (1.4-) 1.5-1.8 mm long..... ***D. sphaerocarpon* var. *sphaerocarpon***
3 Basal leaves similar to or larger than the mid and upper culm leaves, often matted or cushion-forming; culms branching at the base (also at mid and upper nodes in *D. chamaelonche* vars. and *D. dichotomum* var. *glabrifolium*).
10 Longer blades > 6 cm; if only 6 cm, then sheaths retrorsely long-pilose (*D. laxiflorum*).
11 Spikelets 1.2-1.5 mm long, glabrous ..... ***[D. dichotomum* var. *glabrifolium]***
11 Spikelets 1.7-2.3 (-2.8) mm long, pubescent.
12 Longer blades 6-18 cm long by 7-12 mm wide; sheaths conspicuously retrorsely long-pilose; nodes bearded with retrorse or spreading hairs; spikelets 1.9-2.3 mm long..... ***D. laxiflorum***
12 Longer blades 10-35 cm long by 2-4 mm wide; sheaths glabrous to variously pilose, but not conspicuously retrorsely long-pilose; nodes variously pubescent to glabrate; spikelets 1.7-2.3 (-2.8) mm long..... ***D. linearifolium***
10 Longer blades 1.5-6 cm; sheaths glabrous or pubescent, but not retrorsely long-pilose.
13 Blades 1-3 mm wide, glabrous, eciliate or basally ciliate; spikelets 0.9-1.4 mm long.
14 Spikelets pubescent, 1.2-1.4 mm long; blades involute, often falcate, 2.5-6 cm long..... ***[D. chamaelonche* ssp. *breve]***
14 Spikelets glabrous, 0.9-1.2 mm long; blades flat, not falcate, 1.5-4 (-5) cm long..... ***D. chamaelonche* ssp. *chamaelonche***
13 Blades 3-8 mm wide; spikelets 1.1-2.1 mm long (if < 1.5 mm, then blades either pubescent on one or both surfaces or ciliate to the apex).
15 Spikelets pubescent, 1.5-2.1 mm long; blade surfaces glabrous..... ***D. strigosum* var. *leucoblepharis***
15 Spikelets glabrous, 1.1-1.8 mm long; blade surfaces pubescent or glabrous.
16 Blades glabrous, or sparsely pilose only near the adaxial base; spikelets 1.4-2.1 mm long ..... ***D. strigosum* var. *glabrescens***
16 Blades pilose, at least abaxially; spikelets 1.1-1.6 mm long ..... ***D. strigosum* var. *strigosum***

Key to the *Dichanthelium acuminatum* group

1 Internodes glabrous.
2 Ligule 1-2 mm long; sheaths sparsely to moderately spreading short-pilose; nodes retrorsely bearded; leaves 1-4 cm long, 2-5 mm wide; spikelets 1.2-1.4 mm long ..... ***D. curtifolium***
2 Ligule (1.5-) 2-5 mm long; sheaths glabrous to variously pubescent, but not spreading short-pilose; nodes glabrous or pubescent, but not bearded; leaves 4-11 cm long, 4-8 mm wide.
3 Leaf blade basal cilia usually conspicuous; larger vernal blades 6-10 cm by 6-10 mm; internodes, especially lower, sometimes pilose; spikelets obovoid; plant often yellowish-green (orange-brown in age)..... ***D. acuminatum* var. *lindheimeri***
3 Leaf blade basal cilia usually inconspicuous or absent; larger vernal blades 2.5-10 cm long, 2-9 mm wide; all internodes glabrous (rarely the lowest sparsely pilose); spikelets ellipsoid; plant often green to purplish.
4 Spikelets 1.1-1.4 (-1.5) mm long, moderately densely to densely puberulent, most hairs < 0.1 mm long; panicles 3-8 cm long, usually more than ½ as wide as long; larger blades 2.5-8 cm long..... ***D. longiligulatum***
4 Spikelets (1.3-) 1.4-1.9 mm long, (glabrous-) sparsely to moderately pubescent, most hairs > 0.1 mm long; panicles 4-12 cm long, usually less than ½ as wide as long; larger blades 7-10 cm long ..... ***D. spretum***
1 Internodes variously pubescent.
5 Peduncle, panicle axis, and/or sheaths of vernal culms puberulent with hairs 0.1 mm long, sometimes also pubescent with longer hairs, but never grayish-villous; larger blades 2-7 cm long, 2-7 mm wide.
6 Spikelets 0.8-1.1 mm long; blades 2-4.5 cm long, 2-5 mm wide; sheaths sparsely puberulent, lacking papillose-based longer hairs..... ***D. wrightianum***
6 Spikelets 1.1-1.7 mm long; mid-culm blades generally 3-7 cm long and 3-7 mm wide; sheaths with some papillose-based hairs 2 mm or more long.
7 Larger mid-culm blades 4-7 cm long, 4-7 mm wide, glabrous to sparsely pubescent adaxially; ligule 1-5 mm long; spikelets 1.1-1.5 mm long ..... ***D. leucothrix***
7 Larger mid-culm blades 3-6 cm long, 3-5 mm wide, long-pilose adaxially; ligule often with a ring of hairs < 1 mm and scattered longer hairs to 4 mm; spikelets 1.3-1.7 mm long..... ***D. meridionale***
5 Peduncle, panicle axis, and sheaths of vernal culms glabrous, or pilose, or grayish-villous with some shorter hairs 0.2-0.5 mm long, but not puberulent with hairs 0.1 mm long; larger blades 4-12 cm long, 4-12 mm wide.
8 Sheaths and internodes of vernal culms gray-villous with a dense, tangled, or matted mixture of slender hairs 2-4 mm long, variously ascending, spreading, and retrorse, papillose or non-papillose, often with shorter hairs beneath; blades velvety-pubescent on abaxial surface, the margins ciliate for half or more their length..... ***D. acuminatum* var. *acuminatum***
8 Sheaths and internodes of vernal culms puberulent, pubescent or papillose-pilose to hispid with ascending straight hairs, but never grayish-villous; blades glabrous to variously pilose abaxially, but not velvety-pubescent, the margins eciliate or ciliate only below the middle.
9 Spikelets 0.8-1.1 mm long; blades 2-4.5 cm long, 2-5 mm wide..... ***D. wrightianum***
9 Spikelets 1.1-2.0 mm long; blades 3-12 mm long, 3-12 mm wide.
10 Peduncle, panicle axis, and often middle and upper internodes glabrous; sheaths lacking hairs or papillae, at least near mid-length. ..... ***D. acuminatum* var. *lindheimeri***
10 Peduncle, panicle axis, and internodes puberulent, pubescent, or pilose; sheaths papillose-pilose to hispid.

11 Blades 5-12 cm long, 6-12 mm wide; spikelets 1.5-2.0 mm long; peduncle, panicle axis, and sheaths variously pilose, but lacking puberulent hairs 0.1 mm long..... ***D. acuminatum*** *var.* ***fasciculatum***

11 Blades 3-7 cm long, 3-7 mm wide; spikelets 1.1-1.7 mm long; puberulent hairs 0.1 mm long often present on peduncle, panicle axis, or sheaths.

12 Larger mid-culm blades 4-7 cm long, 4-7 mm wide, glabrous to sparsely pubescent adaxially; ligule 1-5 mm long, the hairs of one series; spikelets 1.1-1.5 mm long ..... ***D. leucothrix***

12 Larger mid-culm blades 3-6 cm long, 3-5 mm wide, long-pilose adaxially; ligule often with a short series of hairs <1 mm long in front of a series with hairs to 4 mm long; spikelets 1.3-1.7 mm long ..... ***D. meridionale***

Key to the *Dichanthelium dichotomum* Group

1 Lower cauline nodes bearded, the hairs usually retrorse.

2 Spikelets glabrous.

3 Ligule an eciliate membrane; leaves 3.5-7 cm long by 3-6 mm wide ..... ***D. species 11***

3 Ligule ciliate; leaves either 1.5-4 (-5) cm long by 1-5 mm wide, or 5-12 cm long by 3-15 mm wide.

4 Spikelets 0.9-1.4 mm long; vernal cauline blades 1.5-4 (-5) cm long and 1-5 mm wide; internodes or sheaths glabrous or pubescent.

5 Spikelets 0.9-1.2 mm long; sheaths glabrous; vernal cauline blades 1-2 (-3) mm wide; ligule < 1 mm long; node beard hairs erect and often only partially encircling the node; internodes glabrous or puberulent ..... ***D. chamaelonche***

5 Spikelets 1.2-1.4 mm long; sheaths spreading-pilose; vernal cauline blades 2-5 mm wide; ligule 1-2 mm long; node beard hairs usually spreading or reflexed; internodes glabrous ..... ***D. curtifolium***

4 Spikelets 1.4-2.3 mm long; vernal cauline blades 5-12 cm long and 3-15 mm wide; internodes and sheaths glabrous.

6 Spikelets 1.8-2.3 mm long; first glume 0.6-1.1 mm long; fertile lemma 0.8–1.0 mm wide; widest vernal blades 3-8 (-10) mm wide; nodes, often only the lower, usually sparsely to moderately bearded with retrorse hairs..... ***D. dichotomum*** *var.* ***dichotomum***

6 Spikelets 1.4-1.9 mm long; first glume 0.3-0.6 (-0.7) mm long; fertile lemma 0.6-0.8 mm wide; widest vernal blades 7-15 mm wide; usually all nodes densely bearded with retrorse hairs ..... ***D. dichotomum*** *var*. ***ramulosum***

2 Spikelets pubescent.

7 Spikelets 1.2-1.4 mm long; sheaths spreading-pilose; vernal cauline blades 1-4 cm long and 2-5 mm wide; ligule 1-2 mm long..... ***D. curtifolium***

7 Spikelets 1.4-2.8 mm long; sheaths glabrous to appressed-pilose; vernal cauline blades 5-12 cm long and 5-15 mm wide; ligule < 1 mm long.

8 Usually all culm nodes bearded; internodes glabrous, or middle and upper internodes and peduncle sparsely to moderately spreading short-hairy, sometimes also glandular; upper as well as lower vernal sheaths and both surfaces of cauline blades pubescent, often densely so; spikelets (1.5-) 1.8-2.2 mm long; [of dry rocky or sandy basic soil and barrens]..... ***D. annulum***

8 Often only lower culm nodes bearded; internodes glabrous; at least middle and upper cauline blades glabrous; spikelets 1.4-2.8 mm long; [mostly of wet acid soils and mesic to dry woodlands].

9 Spikelets (2.0-) 2.2-2.8 mm long; first glume 0.5-1.3 mm long; fertile lemma 1.8-2.3 mm long; lowest vernal cauline blades pubescent at least abaxially..... ***D. mattamuskeetense***

9 Spikelets 1.4-2.2 mm long; first glume 0.3-0.9 mm long; fertile lemma 1.4-1.7 mm long; lowest vernal cauline blades glabrous.

10 Spikelets 1.7-2.2 mm long; first glume 0.6-0.9 mm long; fertile lemma 0.7-1.0 mm wide..... ***D. dichotomum*** *var.* ***nitidum***

10 Spikelets 1.4-1.9 mm long; first glume 0.3-0.6 (-0.8) mm long; fertile lemma 0.6-0.8 mm wide..... ***D. dichotomum*** *var.* ***ramulosum***

1 Lower cauline nodes glabrous or puberulent, but not bearded.

11 Spikelets pubescent.

12 Spikelets (1.5-) 1.7-2.7 mm long, if shorter than 1.8 mm then fertile lemma and palea densely papillose; culms soon sprawling.

13 Spikelets (1.5-) 1.7-2.3 mm long, glabrous (rarely pubescent); first glume 0.7-1.1 mm long; fertile lemma and palea densely papillose at 20× ..... ***D. lucidum***

13 Spikelets 2.2-2.7 mm long, pubescent; first glume 1.0–1.4 mm long; fertile lemma and palea smooth or with a few weak papillae at 20× ..... ***D. sphagnicola***

12 Spikelets 1.2-1.7 mm long; fertile lemma and palea smooth; culms erect.

14 Blades involute and often falcate, 3-6 cm long, about 1.5 mm wide when flattened, 20-50× as long as wide; lower internodes often strigose; spikelets 1.2-1.4 mm long; culms 5-20 cm long..... ***[D. chamaelonche*** *ssp.* ***breve]***

14 Blades neither involute (except apically) nor falcate, 1-7 cm long, 1.5-7 mm wide, about 10× as long as wide; lower internodes glabrous or sparsely pilose, but not strigose; spikelets 1.1-1.7 mm long; culms 15-60 cm long.

15 Blades 1-3 (-5) cm long, 1.5-3 (-4) mm wide, the cartilaginous margins typically gray-green to white-beige and about 0.1 mm wide; spikelets 1.2-1.5 mm long; culms to 40 cm long ..... ***D. ensifolium***

15 Blades 2-7 cm long, 3-6 mm wide, the cartilaginous margins typically white-beige and about 0.2 mm wide; spikelets (1.2-) 1.4-1.7 mm long; culms to 60 cm long..... ***D. tenue***

11 Spikelets glabrous.

16 Cauline leaves mostly basally disposed, strongly ascending, much larger than the 2-3 remote middle and upper cauline leaves of fertile culms; spikelets 2.4-2.9 mm long; culms branch from basal and lower nodes, but are not known to produce autumnal inflorescences..... ***[D. nudicaule]***

16 Cauline leaves well-distributed along the culm, > 3, gradually reduced upward and often spreading; spikelets 0.9-2.6 mm long; culms produce autumnal inflorescences from lower, middle, and/or upper nodes, if from lower only, then spikelets only 0.9-1.2 mm long.

17 Fertile lemma and palea densely papillose; culms weak, soon sprawling..... ***D. lucidum***

17 Fertile lemma and palea smooth, with few or no papillae; culms stiffer, erect to ascending.

18 Spikelets 0.9-1.5 mm long; vernal blades 1-4 mm wide.

19 Spikelets 0.9-1.2 mm long; blades 1.5-4 (-5) cm long, 1-2.5 (-3) mm wide, mostly 15-20 times as long as wide; autumnal plants cushion-forming ..... ***D. chamaelonche ssp. chamaelonche***

19 Spikelets 1.2-1.5 mm long; blades 1-12 (-20) cm long; autumnal plants not cushion-forming.

20 Blades 1-3 (-5) cm long, 1.5-3 (-4) mm wide, about 10 times as long as wide; autumnal plants sparsely tufted..... ***D. ensifolium***

20 Blades 4-12 (-20) cm long (the longer at least 7 cm), 2-4 mm wide, 20-30 (-50) times as long as wide ..... ***[D. dichotomum*** *var.* ***glabrifolium]***

18 Spikelets 1.4-2.6 mm long; vernal blades 3-15 mm wide (if spikelets < 1.6 mm long and vernal blades < 5 mm wide, then larger blades > 5 cm long in *D. caerulescens*).
21 Widest vernal cauline blades 7-15 mm wide; upper sheaths often glutinous-warty; spikelets 2.1-2.6 mm long, some or most acute to beaked, second glume and sterile lemma extending 0.3-0.5 mm beyond fertile lemma in at least some spikelets..... ..... ***D. yadkinense***
21 Widest vernal cauline blades 3-10 mm wide; upper sheaths not glutinous-warty; spikelets 1.4-2.3 mm long, blunt to subacute, second glume and sterile lemma often equal to or shorter than fertile lemma, or extending < 0.3 mm beyond it.
22 Ligule an eciliate membrane; largest vernal blades 3-6 cm long, usually 10-15× as long as wide ..... ***D. species 11***
22 Ligule ciliate; largest vernal blades 5-12 cm long, usually 15-20× as long as wide.
23 Spikelets 1.4-1.8 mm long; first glume 0.3–0.8 mm long; fertile lemma 1.3-1.5 mm long; mature vernal panicles usually short-exserted with ascending branches; fresh foliage bluish-glaucous ..... ***D. caerulescens***
23 Spikelets 1.7-2.3 mm long; first glume 0.6-1.1 mm long; fertile lemma 1.6-1.9 mm long; mature vernal panicles exserted with spreading branches; fresh foliage not bluish-glaucous.
24 Vernal cauline blades spreading to deflexed, flexuous; [of wet-mesic to dry woods and thickets]..... ..... ***D. dichotomum*** *var.* ***dichotomum***
24 Vernal cauline blades stiffly erect; [of wet pine savannas and open swamps]..... ***D. dichotomum*** *var.* ***roanokense***

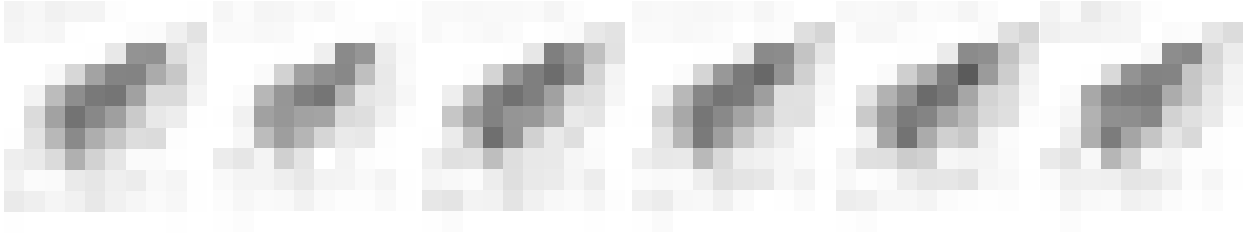
Dichanthelium aciculare (Desvaux ex Poiret) Gould & Clark, Needle Witchgrass. Sandy woods and fields. May-October. NJ south to n. FL, west to TX and OK, also in West Indies and n. South America. Blades typically are strongly involute. Can be confused with autumnal forms of *D. ovale* var. *addisonii*, which has vernal blades 5-10 mm wide. Plants referable to *Panicum chrysopsidifolium* by HC have ligules <1 mm long; blades 5-10 cm long and 3-5 mm wide; densely villous nodes, internodes, sheaths, and blades; and villous, obovate spikelets 1.9-2.2 mm long. This entity needs further study. [= V; = *Panicum aciculare* Desvaux ex Poiret – RAB, F; < *P. aciculare* – C; = *D. aciculare ssp. aciculare* – FNA; > *P. aciculare* – G, HC, S; > *P. chrysopsidifolium* Nash – G, HC, S; > *P. bennettense* M.V. Brown – HC, S; < *D. aciculare* – K, Z]

Dichanthelium acuminatum (Swartz) Gould & Clark. *var*. ***acuminatum***, Woolly Witchgrass. Dryish sandy or clayey soils of open woods and disturbed areas. May-October. MA south to FL, west to TX, also in West Indies, Mexico, Central America, and n. South America. Internodes and sheaths gray-villous with usually non-papillate hairs. Plants tend to be low and "bushy" with several spreading-ascending culms and dense autumnal branching. See note at end of descriptions regarding *Panicum chrysopsidifolium*. [= Y; < *Panicum lanuginosum* Elliott – RAB; > *P. lanuginosum* var. *lanuginosum* – C, F, G; < *P. leucothrix* Nash – C; > *P. auburne* Ashe – F, G, HC, S, WV; < *D. acuminatum* ssp. *acuminatum* – FNA; > *P. lanuginosum* – HC, S, WV; >< *D. acuminatum* var. *acuminatum* – K, Z; >< *D. acuminatum* var. *implicatum* (Scribner) Gould & Clark – K, Z; < *P. acuminatum* Swartz var. *acuminatum* – X; < *P. thurowii* Scribner & J.G. Smith – HC, S; < *D. acuminatum* var. *thurowii* (Scribner & J.G. Smith) Gould & C.A. Clark – K, Y, Z]

Dichanthelium acuminatum (Swartz) Gould & Clark *var*. ***fasciculatum*** (Torrey) Freckmann, Slender-stemmed Witchgrass. Open or cut-over woods, thickets, fields, meadows, and shores, frequently on disturbed soils. May-August. NL (Newfoundland) south to FL, west to CA, north to s. BC. Typically much less pilose than var. *acuminatum*, the hairs usually papillate. Plants referable to *Panicum glutinoscabrum* Fernald may be a hybrid of var. *fasciculatum* with *D. scoparium*. Known only from se. VA, they are described as having culms 7-9 dm high; elongate internodes with cinereous puberulence and black, warty, viscid glands; villous nodes; glutinous-warty and scabrous sheaths and blades; ligule 4-5 mm long; minutely puberulent panicle axis; spikelets ellipsoid, subacute, 1.7-1.8 mm long, pubescent; first glume subacute, 0.6-0.7 mm long. [= Y; < *Panicum lanuginosum* Elliott – RAB; > *P. lanuginosum* var. *fasciculatum* (Torrey) Fernald – C, F, G; > *P. lanuginosum* var. *tennesseense* (Ashe) Gleason – C, G; > *P. lanuginosum* var. *implicatum* (Scribner) Fernald – C, F, G; = *D. acuminatum* ssp. *fasciculatum* (Torrey) Freckmann & Lelong – FNA; > *P. implicatum* Scribner – HC, WV; > *P. huachucae* Ashe var. *huachucae* – HC, S; > *P. huachucae* var. *fasciculatum* (Torrey) Hubb. – HC; > *P. tennesseense* Ashe – HC, S; > *P. huachucae* var. *silvicola* Hitchcock & Chase – S; >< *D. acuminatum* var. *acuminatum* – K, Z; >< *D. acuminatum* var. *implicatum* (Scribner) Gould & Clark – K, Z; > *P. huachucae* Ashe – WV; > *P. acuminatum* Swartz var. *fasciculatum* (Torrey) Lelong – X; > *P. acuminatum* var. *unciphyllum* (Trinius) Lelong – X]

Dichanthelium acuminatum (Swartz) Gould & Clark *var*. ***lindheimeri*** (Nash) Gould & Clark, Lindheimer's Witchgrass. Open or cut-over woods, thickets, fields, meadows, and shores, often on wet soils. May-September. NS west to MB, south to FL and MO, west to s. CA. Internodes as well as sheaths often nearly glabrous. Panicle axis sometimes sparsely pilose at branch nodes, but otherwise glabrous. [= Y; < *Panicum lanuginosum* Elliott – RAB; >< *P. lanuginosum* var. *lindheimeri* (Nash) Fernald – C, G; > *P. lanuginosum* var. *septentrionale* Fernald – C, F, G; > *P. lanuginosum* var. *lindheimeri* – F; = *D. acuminatum ssp. lindheimeri* (Nash) Freckmann & Lelong – FNA; < *P. spretum* Schultes – GW; > *P. lindheimeri* Nash – HC, S, WV; < *D. acuminatum* var. *acuminatum* – K, Z; > *D. acuminatum* var. *lindheimeri* – K, Z; > *P. acuminatum* Swartz var. *lindheimeri* (Nash) Lelong – X; *? D. lanuginosum* (Elliott) Gould var. *lindheimeri* (Nash) Harvill]

Dichanthelium angustifolium (Elliott) Gould, Narrow-leaved Witchgrass. Sandy pinelands and fields. May-October. NJ south to FL, west to AR and e. TX. Vernal blades typically are flat (often involute distally). Can be confused with *D. consanguineum*, which has spreading-pilose nodes and blades 10-15× as long as wide; *D. angustifolium* blades typically are 20× or more as long as wide. Plants with involute blades to 8 cm long, spikelets 2.1-2.5 mm long, and first glumes 0.7-1.1 mm long are referable to *Panicum species 1=arenicoloides*. They are transitional to *D. aciculare*. [= *Panicum angustifolium* Elliott – RAB, F, G; < *P. aciculare* Desvaux ex Poiret – C; = *D. aciculare* ssp. *angustifolium* (Elliott) Freckmann & Lelong – FNA; > *P. angustifolium* – HC, S; > *P. arenicoloides* Ashe – HC, S; < *D. aciculare* – K, Z]



Dichanthelium annulum (Ashe) LeBlond, Ringed Witchgrass. Dry sandy or rocky soil of open woods, dry grasslands, and barrens, and glades over serpentine, limestone, calcareous shales, and other high pH dry soils. May-October. NJ, IN, and MO south to AL and MS, primarily in the Appalachian Province with very few occurrences in the Coastal Plain. One of the more distinctive taxa within the *D. dichotomum* group by morphology, habitat, and range. Plants from se. MA with all leaves pubescent, glabrous internodes, and spikelets 2.2-2.5 mm long were described as *Panicum annulum* var. *glabrescens*, but belong to *D. mattamuskeetense*. [= Pa, Q; < *P. dichotomum* Linnaeus – RAB, C, GW; = *Panicum annulum* Ashe – F, HC, S; = *P. annulum* var. *annulum* – G; < *D. dichotomum* ssp. *mattamuskeetense* (Ashe) Freckmann & Lelong – FNA; < *D. dichotomum* (Linnaeus) Gould – K, Z; < *P. dichotomum* var. *mattamuskeetense* (Ashe) Lelong - X]

Dichanthelium boreale (Nash) Freckmann, Northern Witchgrass. Open woods and grassy slopes, usually in moist soil. April-September. NL (Newfoundland) and ON south to NC, GA, and AR. Our plants are =*Panicum bicknellii*, regarded as a "putative hybrid" (along with =*P. calliphyllum*) by FNA, which cites WV as the southern limit of *D. boreale*. [= K, Z; > *Panicum bicknellii* Nash – RAB, F, HC, S; > *P. boreale* Nash – C, F, G, HC; > *P. calliphyllum* Ashe – F, HC; > *D. boreale* – FNA, Pa; > *P. bicknellii* var. *bicknellii* – G; > *P. bicknellii* var. *calliphyllum* (Ashe) Gleason – G]

Dichanthelium boscii (Poiret) Gould & Clark, Bosc's Witchgrass. Shaded mesic to dry woodlands. April-September. MA and IL south to n. FL and e. TX. [= FNA, K, Pa, Z; = *Panicum boscii* Poiret – RAB, C, G; > *P. boscii* var. *boscii* – F, HC, S, WV; > *P. boscii* var. *molle* (Vasey) Hitchcock & Chase – F, HC, S, WV]

Dichanthelium caerulescens (Hackel ex Hitchcock) Correll, Blue Witchgrass. Marshes, swamps, wet pinelands, maritime grasslands, damp sandy soil. June-October. NJ to NC, and from FL to LA, also in the Bahamas and West Indies. Not treated by FNA, where it presumably would have been placed in synonymy with *D. dichotomum* ssp. *roanokense*. [= Q; < *Panicum dichotomum* Linnaeus – RAB, GW; = *P. caerulescens* Hackel ex Hitchcock – F, HC, S; < *D. dichotomum* ssp. *roanokense* – FNA; < *P. roanokense* Ashe – G; < *D. dichotomum* var. *dichotomum* – K, Z; < *P. dichotomum* var. *roanokense* (Ashe) Lelong – X]

Dichanthelium chamaelonche (Trinius) Freckmann & Lelong *ssp. breve* (Hitchcock & Chase) Freckmann & Lelong, Short Witchgrass, endemic to c. and s. FL, primarily near the east coast. [= FNA; = *Panicum breve* Hitchcock & Chase – HC, S; = *D. dichotomum* (Linnaeus) Gould var. *breve* (Hitchcock & Chase) Gould & Clark – K, Z; = *P. chamaelonche* Trinius var. *breve* (Hitchcock & Chase) Lelong – X]

Dichanthelium chamaelonche (Trinius) Freckmann & Lelong *ssp.* ***chamaelonche***, Carpet Witchgrass. Moist pine savannas and flatwoods, pineland pondshores. April-September. Se. VA south to FL, west to LA, also in Cuba and Belize. Internodes can be glabrous or puberulent, and nodes glabrous, pubescent, or bearded, but the glabrous spikelets 0.9-1.2 mm long are diagnostic. The concept of this taxon in FNA (as ssp. *chamaelonche*) appears to include *D. dichotomum* var. *glabrifolium* (see descriptions of Floridian *D. chamaelonche* ssp. *breve* and *D. dichotomum* var. *glabrifolium* at end of this treatment). [= *Panicum chamaelonche* Trinius – RAB, G, GW, HC, S; < *P. ensifolium* Baldwin – C; < *D. chamaelonche* ssp. *chamaelonche* – FNA; < *D. dichotomum* (Linnaeus) Gould var. *ensifolium* (Baldwin) Gould & Clark – K, Z; = *P. chamaelonche* var. *chamaelonche* – X]

Dichanthelium clandestinum (Linnaeus) Gould, Deer-tongue Witchgrass. Shaded to filtered woodlands, ditches and low areas, and often in moist sandy soil. May-October. NS and QC south to n. FL, west to IA, KA, and TX. [= FNA, K, Pa, Z; = *Panicum clandestinum* Linnaeus – RAB, C, F, G, HC, S, WV, X]

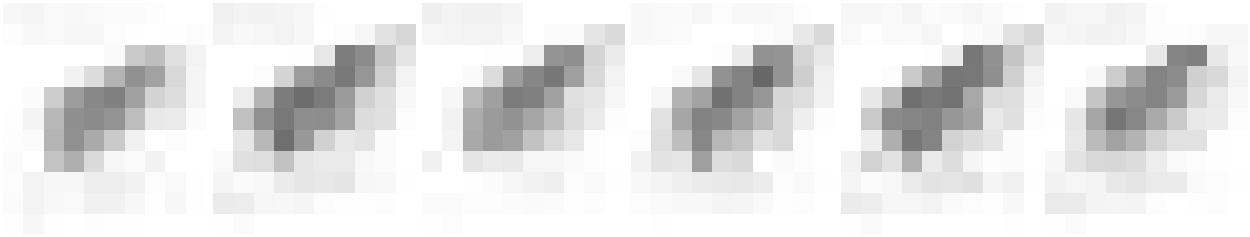
Dichanthelium columbianum (Scribner) Freckmann, American Witchgrass. Dry to moist thin woods and open ground, usually in sandy soil. June-October. S. ME, s. ON, and WI south to GA, TN, and IL. [= Pa; = *Panicum columbianum* Scribner – RAB, C, G, WV; > *P. columbianum* var. *columbianum* – F, HC; > *P. columbianum* var. *oricola* (Hitchcock & Chase) Fernald – F; = *D. acuminatum* ssp. *columbianum* (Scribner) Freckmann & Lelong – FNA; > *P. tsugetorum* Nash – HC, S; < *D. sabulorum* (Lamarck) Gould & Clark var. *thinium* (Hitchcock & Chase) Gould & Clark – K, Z; > *P. columbianum* – S; < *P. acuminatum* Swartz var. *unciphyllum* (Trinius) Lelong – X]

Dichanthelium commutatum (Schultes) Gould *var.* ***ashei*** (Pearson ex Ashe) Mohlenbrock, Ashe's Witchgrass. Dry rocky or sandy woods and openings. May-October. MA south to FL and MS, west to MI, MO, and OK. [< *Panicum commutatum* – RAB, C; = *P. commutatum* Schultes var. *ashei* (Pearson ex Ashe) Fernald – F, G; = *D. commutatum ssp. ashei* (Pearson ex Ashe) Freckman & Lelong – FNA, Pa; = *P. ashei* Pearson ex Ashe – HC, S, WV; < *D. commutatum* – K]

Dichanthelium commutatum (Schultes) Gould *var.* ***commutatum***, Variable Witchgrass. Low, shaded, moist woodlands and woodland edges, and dry, thin, often rocky woods and thickets. May-October. ME south to FL, west to MI, MO, OK, and TX, also in Mexico. Plants with spikelets 3.0-3.7 mm long, first glumes half or more as long, and with broadly linear leaves about 10× as long as wide have been recognized as ssp. *equilaterale* by FNA, and *Panicum equilaterale* by HC and S, but intermediates occur throughout the NC to FL portion of the range of specimens bearing the *equilaterale* name. [< *Panicum commutatum* Schultes – RAB, C; > *P. commutatum* var. *commutatum* – F, G; > *P. commutatum* – HC, S, WV; > *P. mutabile* Scribner & Smith ex Nash – F, G, HC, S; > *D. commutatum* ssp. *commutatum* Freckmann & Lelong – FNA, Pa; > *D. commutatum ssp. equilaterale* (Scribner) Freckmann & Lelong – FNA; > *D. commutatum ssp. joori* (Vasey) Freckmann & Lelong – FNA; < *D. commutatum* – K; > *P. joorii* Vasey – HC, S; > *P. equilaterale* Scribner – HC, S]

Dichanthelium consanguineum (Kunth) Gould & Clark, Kunth's Witchgrass. Moist or dry sandy soils of pinelands. April-September. Occasional from se. VA south to FL, west to TX and IN. Often not easily separated from *D. angustifolium* and *D. ovale*. It is distinguished from *D. angustifolium* by spreading-hirsute nodes and leaves 10-15× as long as wide (*D. angustifolium* has beardless nodes, or nodes bearded with erect-ascending soft hairs, and longer leaves 20× or more as long as wide). *D. consanguineum* is distinguished from *D. ovale* by having strongly pilose upper blade surfaces (*D. ovale* upper blade surfaces are

glabrous or with a few long hairs basally). The hairs of *D. consanguineum* frequently are strongly papillate. [= FNA, K, Z; = *Panicum consanguineum* Kunth – RAB, C, F, G, HC, S]



Dichanthelium cryptanthum (Ashe) LeBlond, Hidden-flowered Witchgrass. Wet meadows and ditches, streamside openings. May-September. NC (or NJ?) to MS (or TX?) (previous concepts of this taxon and its range are unclear). In the field, this taxon can be mistaken for *D. yadkinense*; it is readily distinguished by its scabrous peduncle and membranous ligules. [= V; = *Panicum cryptanthum* Ashe – F, HC, S; < *P. scabriusculum* Elliott – RAB, C, GW; < *D. scabriusculum* (Elliott) Gould & Clark – FNA, K, Z; = *P. scabriusculum* var. *cryptanthum* (Ashe) Gleason – G]

Dichanthelium curtifolium (Nash) LeBlond, Short-leaved Witchgrass. Bogs, sphagnous streamhead swamps, mountain streams. April-September. Disjunctly distributed in w. NC and e. TN, e. SC, FL, and MS. The combination of characters is quite distinctive for the genus in our region. [= V; = *Panicum curtifolium* Nash – RAB, HC, S; = *D. ensifolium* (Baldwin ex Elliott) Gould ssp. *curtifolium* (Nash) Freckmann & Lelong – FNA; < *D. acuminatum* (Swartz) Gould & C.A. Clark var. *implicatum* (Scribn.) Gould & C.A. Clark – K, Z; = *Panicum ensifolium* Baldwin ex Elliott var. *curtifolium* (Nash) Lelong – X]

Dichanthelium depauperatum (Muhlenberg) Gould, Starved Witchgrass. Dry soils of grasslands and open woods, often on disturbed soils of roadsides and ditches. May-September. NL (Newfoundland) and MN south to GA and TX. [= FNA, K, Pa, Z; = *Panicum depauperatum* Muhlenberg – RAB, C, HC, S, WV; > *P. depauperatum* var. *depauperatum* – F, G; > *P. depauperatum* var. *psilophyllum* Fernald – F, G]

Dichanthelium dichotomum (Linnaeus) Gould *var.* ***dichotomum***, Forked Witchgrass. Wet-mesic to dry woods, thickets, and woodland openings. May-October. S. Canada and MI south to FL and TX. Plants with bearded nodes and larger leaves are referable to *Panicum dichotomum* var. *barbulatum* (here included) but intermediates abound. [= Q; < *Panicum dichotomum* Linnaeus – RAB, C, GW; > *P. dichotomum* var. *dichotomum* – F, WV; > *P. dichotomum* var. *barbulatum* (Michaux) Wood – F, WV; = *D. dichotomum* ssp. *dichotomum* – FNA; = *P. dichotomum* – G; > *P. dichotomum* – HC, S; > P. *barbulatum* Michaux – HC, S; < *D. dichotomum* var. *dichotomum* – K, Z; < *D. dichotomum* – Pa; = *P. dichotomum* var. *dichotomum* – X]

Dichanthelium dichotomum (Linnaeus) Gould *var. glabrifolium* (Nash) Gould & Clark, Smooth-leaved Witchgrass, endemic to peninsular FL, mostly near the west coast. Like *D. chamaelonche* ssp. *breve*, this taxon appears to be more closely related to *D. chamaelonche* than to *D. dichotomum* or *D. ensifolium*. [= K, Z; = *Panicum glabrifolium* Nash – HC, S; < *P. chamaelonche* Trinius var. *chamaelonche* – X]

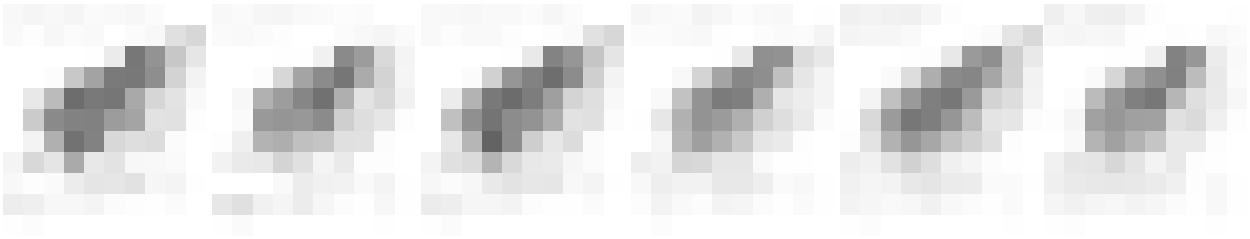
Dichanthelium dichotomum (Linnaeus) Gould *var.* ***nitidum*** (Lamarck) LeBlond, Shining Witchgrass. Moist sandy or peaty soil of wet pine savannas and pocosin ecotones, wet meadows near the coast, swamps, and marshes. PA and NJ south to FL, west to MO and TX; also the Bahamas (Sorrie & LeBlond 1997) and West Indies, and Mexico to Venezuela. [= Q; < *Panicum dichotomum* Linnaeus – RAB, C, GW; = *P. nitidum* Lamarck – F, HC, S; = *D. dichotomum* ssp. *nitidum* (Lamarck) Freckmann & Lelong – FNA; = *P. nitidum* var. *nitidum* – G; < *D. dichotomum* var. *dichotomum* – K, Z; < *D. dichotomum* – Pa; = *P. dichotomum* var. *nitidum* (Lamarck) Wood – X]

Dichanthelium dichotomum (Linnaeus) Gould *var.* ***ramulosum*** (Torrey) LeBlond, Branched Witchgrass. Floodplain forests, swamps, openings, and borders of streams and ponds, and occasionally in dry upland woods. May-October. MA and MI south to FL and TX. All nodes usually densely retrorsely bearded. [= Q; < *Panicum dichotomum* Linnaeus – RAB, C, GW; = *P. microcarpon* Muhlenberg ex Elliott – F, HC, S, WV; = *D. dichotomum* ssp. *microcarpon* (Muhlenberg ex Elliott) Freckmann & Lelong – FNA; = *P. nitidum* Lamarck var. *ramulosum* Torrey – G; < *D. dichotomum* var. *dichotomum* – K, Z; = *D. microcarpon* (Muhl. ex Elliott) Mohlenbrock – Pa; = *P. dichotomum* var. *ramulosum* (Torrey) Lelong – X]

Dichanthelium dichotomum (Linnaeus) Gould *var.* ***roanokense*** (Ashe) LeBlond, Roanoke Witchgrass. Wet pine savannas, swamp openings, and wet peaty meadows. May-September. DE south to FL, west to e. TX; also in Jamaica. See note under *D. caerulescens* regarding FNA treatment. [= Q; < *Panicum dichotomum* Linnaeus – RAB, C, GW; = *P. roanokense* Ashe – F, HC, S; < *D. dichotomum* ssp. *roanokense* (Ashe) Freckmann & Lelong – FNA; < *P. roanokense* – G; < *D. dichotomum* var. *dichotomum* – K, Z; < *P. dichotomum* var. *roanokense* (Ashe) Lelong – X]

Dichanthelium ensifolium (Baldwin ex Elliott) Gould, Small-leaved Witchgrass. Wet to mesic peaty, sandy, or mucky soils, often in open pinelands or with sphagnum. May-October. NJ south to FL, west to e. TX and AR. Plants with pubescent spikelets are frequent. [= *D. ensifolium* ssp. *ensifolium* – FNA; < *Panicum ensifolium* Baldwin ex Elliott – RAB, C, G, GW; = *P. ensifolium* – F; > *P. ensifolium* – HC, S; > *P. flavovirens* Nash – HC, S; > *P. vernale* Hitchcock & Chase – HC, S; < *D. dichotomum* (Linnaeus) Gould var. *ensifolium* (Baldwin ex Elliott) Gould & Clark – K, Z; < *P. ensifolium* var. *ensifolium* – X]

Dichanthelium erectifolium (Nash) Gould & Clark, Erect-leaved Witchgrass. Limesink ponds, depression meadows, cypress savannas, pine savannas. May-August. Se. NC to FL, west to LA; Cuba. [= FNA, K, Z; = *Panicum erectifolium* Nash – RAB, GW, HC, S]



Dichanthelium fusiforme (Hitchcock) Harvill, Spindle-fruited Witchgrass. Dry to moist sand of open pine and pine/oak woods and clearings. May-November. Se. VA south to FL, west to MS, also in West Indies, Mexico, Central America, and Venezuela; perhaps most abundant in FL. Autumnal blades often flat. The autumnal form of *D. oligosanthes* var. *oligosanthes* can be very similar to *D. fusiforme* if the vernal blades of the former are missing. They are best separated by ligule length (0.5-1 mm in *fusiforme*, 1.5-3 mm in *oligosanthes*) and the more attenuated ends of the *fusiforme* spikelet. [= *Panicum fusiforme* Hitchcock – RAB, F, G, HC, S; < *P. aciculare* Desvaux ex Poiret – C; = *D. aciculare* ssp. *fusiforme* (Hitchcock) Freckmann & Lelong – FNA; < *D. aciculare* – K, Z]

Dichanthelium hirstii (Swallen) Kartesz, Hirsts' Witchgrass. Pond-cypress savannas and limesink depressions. June-September. This distinctive species is known from only seven sites: two in NC, one in DE, two in NJ (one not seen since 1992), and two historical populations in GA. Described in 1961 (Swallen 1961), it is treated by some taxonomists as part of the *D. aciculare* group and by others as part of the *D. dichotomum* group; its affinities appear to lie with the former. See Schuyler (1996) for a discussion of the taxonomic distinctiveness of this species. The occurrence of this species in NC is documented in LeBlond & Sorrie (2001). [= K; < *Panicum aciculare* Desvaux ex Poiret – C; < *D. dichotomum* ssp. *roanokense* (Ashe) Freckmann & Lelong – FNA]

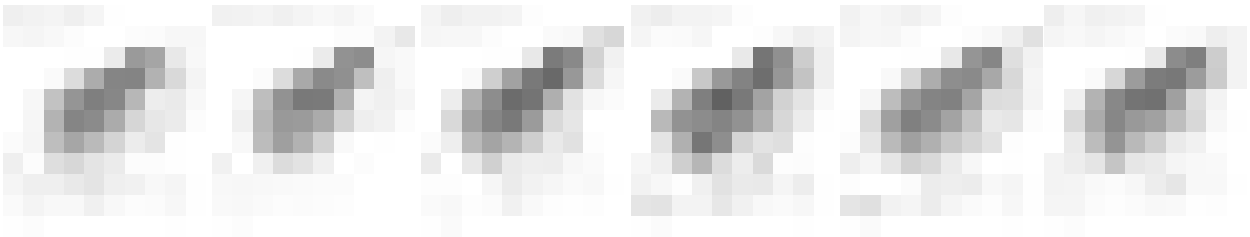
Dichanthelium latifolium (Linnaeus) Harvill, Broad-leaved Witchgrass. Open or shady well-drained forests. Late May-September. ME south to n. GA, west to WI and MS. [= FNA, Pa; = *Panicum latifolium* Linnaeus – RAB, C, F, G, HC, S, WV; = *D. latifolium* (Linnaeus) Gould & Clark – K, Z, a later combination]

Dichanthelium laxiflorum (Lamarck) Gould, Open-flower Witchgrass. Open or shaded woodlands, often in moist soil. April-September. MD south to FL, west to TX, north to IN, also in Mexico, Central America, and West Indies. [= FNA, K, Pa, Z; = *Panicum laxiflorum* Lamarck – RAB, C, F, G; > *P. laxiflorum* – HC, S; > *P. xalapense* Humboldt, Bonpland, & Kunth var. *xalapense* – HC, S; > *P. xalapense* var. *strictirameum* Hitchcock & Chase – HC, S; > *P. xalapense* – WV]

Dichanthelium leibergii (Vasey) Freckmann, Leiberg's Witchgrass. NY and PA west to AB, ND, and KS. [= FNA, K, Pa, Z; = *Panicum leibergii* (Vasey) Scribner – C, F, G, HC]

Dichanthelium leucothrix (Nash) Freckmann, Roughish Witchgrass. Wet sandy, peaty, or mucky soil of pinelands. May-October. S. NJ south to FL, west to TX, also in TN, West Indies and n. South America. A micrometer is needed to measure the very short puberulence (0.1 mm) that distinguishes this taxon, *D. meridionale*, and *D. wrightianum* from other members of the *D. acuminatum* group. [= K, Y; = *Panicum leucothrix* Nash – RAB, F, G, HC, S; < *P. leucothrix* – C; = *D. acuminatum ssp. leucothrix* (Nash) Freckmann & Lelong – FNA; < *P. spretum* Schultes – GW; = *P. acuminatum* Swartz var. *leucothrix* (Nash) Lelong – X; < *D. acuminatum* (Swartz) Gould & Clark var. *implicatum* (Scribner) Gould & Clark – Z]

Dichanthelium linearifolium (Scribner) Gould, Low White-haired Witchgrass. Dry open woods. May-October. Se. Canada and MN south to GA and TX. [= FNA, K, Pa, Z; = *Panicum linearifolium* Scribner – RAB, C, S; > *P. linearifolium* var. *linearifolium* – F, G, WV; > *P. linearifolium* var. *werneri* (Scribner) Fernald – F, G, WV; > *P. linearifolium* – HC; > *P. werneri* Scribner – HC]



Dichanthelium longiligulatum (Nash) Freckmann, Long-ligule Witchgrass. Limesink ponds, depression meadows, cypress savannas, pine savannas, bogs, swamps. May-September. NJ and PA south to FL, also in TN, e. TX, and Central America. Intermediate forms between this taxon and *D. spretum* occur. [= K, Y; = *Panicum longiligulatum* Nash – RAB, HC, S; < *P. lanuginosum* Elliott var. *lindheimeri* (Nash) Fernald – C, G; = *D. acuminatum* ssp. *longiligulatum* (Nash) Freckmann & Lelong – FNA; < *P. spretum* Schultes – GW; = *P. acuminatum* Swartz var. *longiligulatum* (Nash) Lelong – X; = *D. acuminatum* (Swartz) Gould & Clark var. *longiligulatum* (Nash) Gould & Clark – Z]

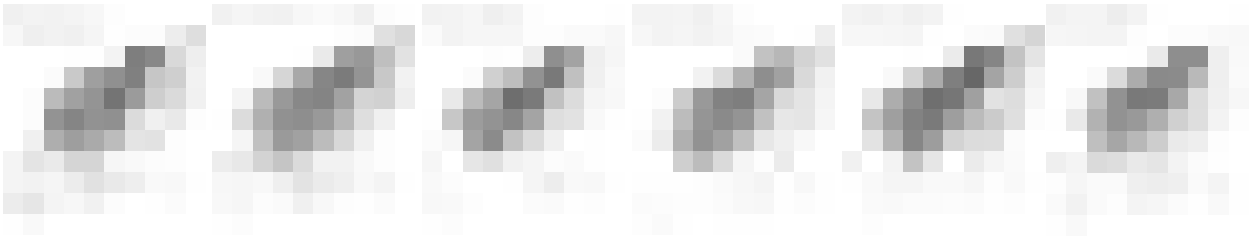
Dichanthelium lucidum (Ashe) LeBlond, Bog Witchgrass. Wet meadows, sphagnous swamps, bogs, wet woods, sphagnous streamhead pocosins, baygalls. May-October. MA and MI south to FL and TX. Vernal culms soon recline, producing a tangled mass. The papillose fertile lemma is diagnostic. Rarely, entire populations of *D. lucidum* can have eciliate ligules composed of a membrane 0.1-0.3 mm long. Even rarer are plants within these populations with retrorsely bearded nodes. Both conditions may reflect intergradation with another taxon, possibly within the *dichotomum* complex, or with =*cryptanthum* in section *Clandestina*. [= Pa, Q; < *Panicum dichotomum* Linnaeus – RAB, C, GW; = *P. lucidum* Ashe – G, S; > *P. lucidum* var. *lucidum* – F, HC; > *P. lucidum* var. *opacum* Fernald – F, HC; < *D. dichotomum* ssp. *lucidum* (Ashe) Freckmann & Lelong – FNA; < *D. dichotomum* var. *dichotomum* – K, Z; < *P. dichotomum* var. *lucidum* (Ashe) Lelong – X]

Dichanthelium malacophyllum (Nash) Gould, Soft-leaf Witchgrass. KY and TN west to KS and TX. Primarily a plant of cedar glades and dry calcareous soils. Reported from SC by FNA, but source of record has not been identified. [= FNA, K, Z; = *Panicum malacophyllum* – F, G, HC, S]

Dichanthelium mattamuskeetense (Ashe) Mohlenbrock, Mattamuskeet Witchgrass. Wet savannas, meadows, borders of pocosin shrub swamps, thickets. May-October. Se. MA south to ne. SC. Typically a robust plant, often richly tinged with dark purple-maroon. [= Q; < *Panicum dichotomum* Linnaeus – RAB, C, GW; > *P. mattamuskeetense* var. *mattamuskeetense* – F; > *P. mattamuskeetense* var. *clutei* (Nash) Fernald – F; < *D. dichotomum* (Linnaeus) Gould ssp. *mattamuskeetense* (Ashe) Freckmann & Lelong – FNA; > *P. mattamuskeetense* Ashe – G, HC, S; > *P. annulum* Ashe var. *glabrescens* Gleason – G; > *P. clutei* Nash – HC, S, WV; < *D. dichotomum* var. *dichotomum* – K, Z; < *P. dichotomum* var. *mattamuskeetense* (Ashe) Lelong – X]

Dichanthelium meridionale (Ashe) Freckmann, Matting Witchgrass. Dry to damp sand of shores and woods. May-October. Sw. NS and MA to MN, south to e. NC, n. GA, and n. AL. A micrometer is needed to measure the very short puberulence (0.1 mm) that distinguishes this taxon, *D. leucothrix*, and *D. wrightianum* from other members of the *D. acuminatum* group. [= K, Pa, Y; < *Panicum lanuginosum* Elliott – RAB; < *P. leucothrix* Nash – C; > *P. meridionale* var. *meridionale* – F; > *P. meridionale* var. *albemarlense* (Ashe) Fernald – F; = *D. acuminatum* (Swartz) Gould & Clark ssp. *implicatum* (Scribner ex Nash) Freckmann & Lelong – FNA; = *P. meridionale* Ashe – G; > *P. meridionale* – HC, S, WV; > *P. albemarlense* Ashe – HC, S, WV; > *P. columbianum* var. *thinium* Hitchcock & Chase – HC; > *P. oricola* Hitchcock & Chase – HC; < *P. acuminatum* Swartz var. *unciphyllum* (Trinius) Lelong – X; < *D. acuminatum* var. *implicatum* (Scribner) Gould & Clark – Z]

Dichanthelium neuranthum (Grisebach) LeBlond, Nerved Witchgrass. Maritime wet grasslands, Piedmont prairie-like barrens. May-November. Disjunct in se. and central NC, se. SC, GA, FL, MS, e. TX, AR, Bahamas, Cuba, and Belize. Can occur with the similar-appearing *D. caerulescens*, from which it differs by having spikelets that are longer (1.8-2.2 mm vs. 1.4-1.8), rounded summits vs. obtuse to sub-acute, and pubescent vs. glabrous; longer first glumes (0.8-1.0 mm vs. 0.3-0.8); leaves 15× or more as long as wide vs. 10-15×; and a nearly strict panicle. FNA gives a spikelet length of 2-2.8 mm, well beyond the length of spikelets on specimens we have seen. Although FNA provides no synonymy, it appears that its concept of *D. neuranthum* includes *Panicum pinetorum* of s. FL, with spikelets 2.3-3 mm long according to Silveus (1942). The plants from the Piedmont of NC match descriptions of *Panicum ovinum*, known from dry to moist open ground and prairies in e. TX, MS, and AR when last recognized (HC). Both of these taxa are treated here as synonyms of *D. neuranthum*. [= V; = FNA; > *Panicum neuranthum* Grisebach – RAB, HC, S; > *P. ovinum* Scribner & J.G. Smith – HC, S; > *P. pinetorum* Swallen – HC, S; < *D. aciculare* – K, Z]



Dichanthelium nudicaule (Vasey) B.F. Hansen & WunderlinBogs, wet pine savannas. W. FL Panhandle and s. AL west to MS. [= Q; = *Panicum nudicaule* Vasey] {add synonymy}

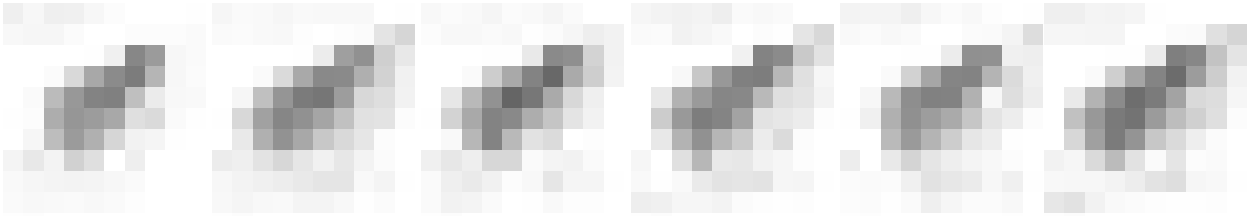
Dichanthelium oligosanthes (Schultes) Gould *var*. ***oligosanthes***, Few-flowered Witchgrass. Sandy fields and open woods. April-October. MA and MN south to FL and TX. See note under *D. fusiforme*. [= K, Z; = *Panicum oligosanthes* Schultes – RAB, HC, S; < *P. oligosanthes* – C, G; = *P oligosanthes* var. *oligosanthes* – F; = *D. oligosanthes* ssp. *oligosanthes* – FNA; < *D. oligosanthes* – Pa]

Dichanthelium oligosanthes (Schultes) Gould *var*. ***scribnerianum*** (Nash) Gould, Scribner's Witchgrass. Calcareous maritime forests, dry thin woods and openings, dry prairies, usually in basic soil. April-November. Sw. ME to s. BC, south to se. NC, n. GA, and CA, also in n. Mexico. [= K, Z; < *Panicum oligosanthes* Schultes – RAB, C, G; = *P. oligosanthes* var. *scribnerianum* (Nash) Fernald – F; = *D. oligosanthes* ssp. *scribnerianum* (Nash) Freckmann & Lelong – FNA; = *P. scribnerianum* Nash – HC, S; < *D. oligosanthes* – Pa]

Dichanthelium ovale (Elliott) Gould & Clark *var*. ***addisonii*** (Nash) Gould & Clark, Low Stiff Witchgrass. Dry to damp sandy woods and fields. May-October. MA and MN south to FL and TX, also in n. Mexico. See note under *D. ovale* var. *ovale* and *D. aciculare* ssp. *aciculare*. [= K, Z; = *Panicum commonsianum* Ashe – RAB, C; > *P. commonsianum* var. *commonsianum* – F, G, Pa; > *P. commonsianum* var. *addisonii* (Nash) Fernald – F, G; > *P. mundum* Fernald – F, G, HC; > *P. villosissimum* var. *pseudopubescens* (Nash) Fernald – F, G; = *D. ovale* ssp. *pseudopubescens* (Nash) Freckmann & Lelong – FNA; > *P. commonsianum* – HC, S; > *P. pseudopubescens* Nash – HC, S; > *P. addisonii* Nash – HC, S; > *P. wilmingtonense* Ashe – HC, S; = *P. ovale* Elliott var. *pseudopubescens* (Nash) Lelong – X]

Dichanthelium ovale (Elliott) Gould & Clark *var*. ***ovale***, Oval-flowered Witchgrass. Dry to damp sandy pinelands. May-October. NY to WI, south to FL and e. TX. Infrequent over most of its range except FL. In our region, the *D. ovale* double ligule character is more evident in var. *ovale*, with var. *addisonii* often having only a single ligule about 1 mm long. Plants referable to *Panicum malacon* have spikelets 3-3.2 mm long with a first glume attached conspicuously below the second glume and sterile lemma, and half or more as long as the spikelet; leaves 3-5 mm wide, puberulent beneath, and puberulent to glabrous above. It needs further study. Also see note under *D. consanguineum* regarding *D. ovale*. [= K, Z; = *Panicum ovale* Elliott – RAB, X; = *D. ovale* ssp. *ovale* – FNA; > *P. ovale* – HC, S; > *P. malacon* Nash – HC, S; = *P. ovale* var. *ovale* – X]

Dichanthelium polyanthes (Schultes) Mohlenbrock, Small-fruited Witchgrass. Damp to dry soil of open woods and ditches. June-October. VA to s. IL, south to GA and e. TX. [= FNA, Pa; = *Panicum polyanthes* Schultes – RAB, C, F, G, GW, HC, S, WV; = ***D. sphaerocarpon*** (Elliott) Gould var. ***isophyllum*** (Scribner) Gould & Clark – K, Z]



Dichanthelium portoricense (Desvaux ex Hamilton) B.F. Hansen & Wunderlin, Puerto Rican Witchgrass. Moist pine savannas and flatwoods. May-September. NC south to FL, west to TX, also in West Indies. [= *Panicum portoricense* Desvaux ex Hamilton – RAB, HC, S; = *D. portoricense* ssp. *portoricense* – FNA; < *D. sabulorum* (Lamarck) Gould & Clark var. *thinium* (Hitchcock & Chase) Gould & Clark – K, Z; = *P. portoricense* var. *portoricense* – X]

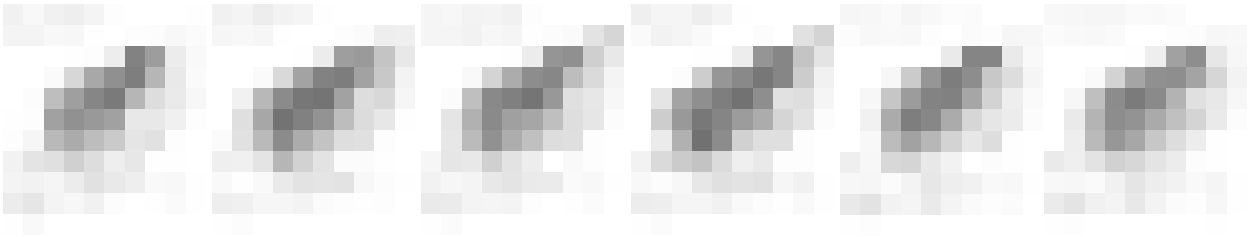
Dichanthelium ravenelii (Scribner & Merrill) Gould, Ravenel's Witchgrass. Dry sandy or rocky thin woods and openings, sometimes in moist soils. May-October. NJ south to FL, west to e. TX, north to IA. [= FNA, K, Z; = *Panicum ravenelii* Scribner & Merrill – RAB, C, F, G, HC, S]

Dichanthelium scabriusculum (Elliott) Gould & Clark, Tall Swamp Witchgrass. Moist, low, open or shaded woodlands, often along streams or ditches. May-October. Se. MA south to FL, west to e. TX and AR. [< *Panicum scabriusculum* – RAB, C, GW; > *P. scabriusculum* – F, HC, S; > *P. aculeatum* Hitchcock & Chase – F, G, HC, S; < *D. scabriusculum* – FNA, K, Z; > *P. scabriusculum* var. *scabriusculum* – G]

Dichanthelium scoparium (Lamarck) Gould, Velvet Witchgrass. Moist sandy soil of woodland openings and ditches. May-October. MA and MI south to FL and TX, also in Mexico and West Indies. The dense, velvety pubescence of the internodes, sheaths, and blades of this taxon, combined with the viscid band below the nodes, are diagnostic. See note under *D. acuminatum* var. *fasciculatum* regarding *Panicum glutinoscabrum*. [= FNA, K, Pa, Z; = *Panicum scoparium* Lamarck – RAB, C, F, G, GW, HC, S]

Dichanthelium species 1 (=arenicoloides), Sandy Woods Witchgrass. In open sandy soil of pinelands and dunes, primarily near the coast; possibly uncommon, but long overlooked. May-November. NC south to FL and west to TX and AR; also in West Indies, Central America, and n. South America. Should be sought in VA. Autumnal form strongly resembling *D. aciculare* but with larger spikelets and longer first glumes. Vernal cauline leaves are longer than those of *D. aciculare* but of similar width. Panicle branches often ascending. [= *Panicum arenicoloides* Ashe – HC, S; < *D. aciculare* (Desvaux ex Poiret) Gould & C.A. Clark ssp. *angustifolium* (Elliott) Freckmann & Lelong – FNA; < *D. aciculare* – K, Z]

Dichanthelium species 3 (=lancearium), Nash's Witchgrass. Moist pine savannas and flatwoods, moist to dry openings in maritime forests, dry pine and oak sandhills. May-September. Se. VA to FL, west to e. TX, also in West Indies and Central America. This and *D. portoricense* appear to intergrade in our region, and =*lancearium* is treated as part of *D. portoricense* ssp. *patulum* in FNA, whose concept of ssp. *patulum* includes our *D. webberianum* and *P. patentifolium*, both of which appear to merit recognition (*D. webberianum* as a species and =*patentifolium* as at least a variety). [= *Panicum lancearium* Trinius – RAB, C, G; > *P. lancearium* var. *lancearium* – F; > *P. lancearium* var. *patulum* (Scribner & Merrill) Fernald – F; < *D. portoricense* (Desvaux ex Hamilton) B.F. Hansen & Wunderlin ssp. *patulum* (Scribner & Merrill) Freckmann & Lelong – FNA; > *P. lancearium* – HC, S; > *P. patulum* (Scribner & Merrill) Hitchcock – HC, S; < *D. sabulorum* (Lamarck) Gould & Clark var. *patulum* (Scribner & Merrill) Gould & Clark – K, Z; < *P. portoricense* Desvaux ex Hamilton var. *nashianum* (Scribner) Lelong – X]



Dichanthelium species 12 (=chrysopsidifolium). Dry to moist sandy pinelands. May-October. E. MD south to FL, west to TX and AR; also in West Indies. [= *Panicum chrysopsidifolium* Nash – G, HC, S; < *P. consanguineum* Kunth – RAB; < *P. aciculare* Desvaux ex Poiret – F; < *P. lanuginosum* Elliott var. *lanuginosum* – C; < *D. acuminatum* (Swartz) Gould & C.A. Clark var. *acuminatum* – K, Z]

Dichanthelium sphaerocarpon (Elliott) Gould, Round-fruited Witchgrass. Moist or dry thin woods, meadows, and ditches, often in dry sandy soil. May-October. MA, VT, OH, and KA south to FL and TX, also in Mexico. [= FNA, K, Pa, Z; = *Panicum sphaerocarpon* Elliott – RAB, C, WV; > *P. sphaerocarpon* var. *sphaerocarpon* – F, G, HC, S; > *P. sphaerocarpon* var. *inflatum* (Scribner & J.G. Smith) Hitchcock & Chase – F, G, HC, S]

Dichanthelium sphagnicola (Nash) LeBlond, Peaty Witchgrass. Edges of cypress swamps, in sphagnous bogs, moist shady places. May-October. GA (Chatham, Camden, Lanier counties) (Carter, Baker, & Morris 2009) to FL; should be sought in se. SC. Treated in synonymy with *Panicum dichotomum* by RAB, but no specimen is known from the Carolinas. This species is similar to *D. lucidum* in appearance, and differs most readily by its larger pubescent spikelets with smooth fertile lemma and palea. [= Q; < *Panicum dichotomum* Linnaeus – RAB; < *D. dichotomum* (Linnaeus) Gould ssp. *lucidum* (Ashe) Freckmann & Lelong – FNA; = *P. sphagnicola* Nash – HC, S; < *D. dichotomum* var. *dichotomum* – K, Z; < *P. dichotomum* var. *lucidum* (Ashe) Lelong – X]

Dichanthelium spretum (Schultes) Freckmann, Eaton's Witchgrass. Wet sands and peats of bogs, savannas, meadows, and shores. May-September. ME south to n. FL, LA and e. TX. Intermediate forms between this taxon and *D. longiligulatum* occur. [= K, Pa, Y; = *Panicum spretum* Schultes – RAB, C, F, G, HC, S; = *D. acuminatum* (Swartz) Gould & Clark ssp. *spretum* (Schultes) Freckmann & Lelong – FNA; < *P. spretum* – GW; = *P. acuminatum* Swartz var. *densiflorum* (Rand & Redfield) Lelong – X; = *D. acuminatum* var. *densiflorum* (Rand & Redfield) Gould & Clark – Z]

Dichanthelium strigosum (Muhlenberg) Freckmann *var*. ***glabrescens*** (Grisebach) Freckmann, Hairless Witchgrass. Low, open sandy pinelands and hammocks. May-October. S. GA and FL west to LA; disjunct in se. NC; also in West Indies, Belize. Included in synonymy with *Panicum strigosum* by RAB, but no specimen from the Carolinas had been found prior to discovery of a population in Onslow County in 2009. [= K; = *D. strigosum* ssp. *glabrescens* (Grisebach) Freckmann & Lelong – FNA; < *Panicum strigosum* Muhlenberg – GW, RAB; = *P. polycaulon* Nash – HC, S; = *D. leucoblepharis* (Trinius) Gould & Clark var. *glabrescens* (Grisebach) Gould & Clark – Z]

Dichanthelium strigosum (Muhlenberg) Freckmann *var*. ***leucoblepharis*** (Trinius) Freckmann, Dwarf Witchgrass. Sandy, acidic soils of pinelands. May-October. NC south to FL, west to TX, also in Mexico. [= K; = *Panicum ciliatum* Elliott – RAB, HC, S; = *D. strigosum* ssp. *leucoblepharis* (Trinius) Freckmann & Lelong – FNA; = *P. strigosum* Muhlenberg var. *leucoblepharis* (Trinius) Lelong – X; = *D. leucoblepharis* (Trinius) Gould & Clark var. *leucoblepharis* – Z]

Dichanthelium strigosum (Muhlenberg) Freckmann *var*. ***strigosum***, Rough-hairy Witchgrass. Moist soils of pine flatwoods, savannas, and pocosins, also in boggy situations. May-September. Se. VA south to FL, west to TX, also in TN, e. Mexico, Mesoamerica, n. South America, and West Indies. [= K; = *Panicum strigosum* Muhlenberg – C, F, G, HC, S; = *D. strigosum* ssp. *strigosum* – FNA; < *P. strigosum* – GW, RAB; = *P. strigosum* var. *strigosum* – X; = *D. leucoblepharis* (Trinius) Gould & Clark var. *pubescens* (Vasey) Gould & Clark – Z]

Dichanthelium tenue (Muhlenberg) Freckmann & Lelong, White-edged Witchgrass. Wet peaty or sandy soil pineland savannas, flatwoods, bogs, and meadows. May-October. NJ south to FL, west to TX; also in Mesoamerica and Cuba. This treatment of *D. tenue* includes plants from n. Alabama formerly recognized as *Panicum concinnius*, with spikelets 1.2-1.4 mm long but otherwise possessing the characters of *D. tenue*. [= FNA; = *Panicum tenue* Muhlenberg – RAB, C; > *P. tenue* – F, HC, S; > *P. albomarginatum* Nash – F, HC, S; > *P. trifolium* Nash – F, G, HC, S; < *P. ensifolium* Baldwin – G; > *P. concinnius* Hitchcock & Chase – HC, S; < *D. dichotomum* (Linnaeus) Gould var. *tenue* (Muhlenberg) Gould & Clark – K, Z]

Dichanthelium villosissimum (Nash) Freckmann *var*. ***villosissimum***, White-haired Witchgrass. Dry sandy soil of open woods and prairies. April-September. MA south to FL, west to TX, also in Mexico and Mesoamerica. Appearing to be related to *D. ovale* based on such characters as the double ligule. [= K, Y; = *Panicum villosissimum* Nash – RAB, C, HC, S, WV; = *P. villosissimum* var. *villosissimum* – F, G; = *D. ovale* (Elliott) Gould & Clark ssp. *villosissimum* (Nash) Freckmann & Lelong – FNA; = *P. ovale* Elliott var. *villosum* (A. Gray) Lelong – X; < *D. acuminatum* (Swartz) Gould & Clark var. *villosum* (A. Gray) Gould & Clark – Z; < *D. villosissimum* – Pa]

Dichanthelium webberianum (Nash) LeBlond, Webber's Witchgrass. Moist pine savannas and flatwoods. May-August. Disjunct in se. NC and SC from GA and FL. [= V; = *Panicum webberianum* Nash – RAB, HC, S; < *D. portoricense* (Desvaux ex Hamilton) B.F. Hansen & Wunderlin ssp. *patulum* (Scribner & Merrill) Freckmann & Lelong – FNA; < *D. sabulorum* (Lamarck) Gould & Clark var. *patulum* (Scribner & Merrill) Gould & Clark – K, Z; < *P. portoricense* Desvaux ex Hamilton var. *nashianum* (Scribner) Lelong – X]

Dichanthelium wilcoxianum (Vasey) Freckmann is shown as occurring in SC and MS on the range map in FNA, but the source of these records is not known for this plant primarily of dry prairies in the Upper Midwest. [= FNA] {rejected as a component of our flora; not keyed; not mapped}

Dichanthelium wrightianum (Scribner) Freckmann, Wright's Witchgrass. Limesink ponds and meadows, cypress savannas, pine savannas, bogs. May-September. MA south to FL, west to TX, also in Cuba and Mesoamerica. A micrometer is needed to measure the very short puberulence (0.1 mm) that distinguishes this taxon, D. *meridionale*, and *D. leucothrix* from other members of the *D. acuminatum* group. [= FNA, K, Y; = *Panicum wrightianum* Scribner – RAB, C, F, G, HC, S; < *P. spretum* Schultes – GW; = *D. acuminatum* (Swartz) Gould & Clark var. *wrightianum* (Scribner) Gould & Clark – Z]

Dichanthelium xanthophysum (A. Gray) Freckmann, Slender Witchgrass. {habitats}. NS and ME west to SK, south to PA, ne. WV, and SD. [= FNA, K, Pa, Z; = *Panicum xanthophysum* A. Gray – C, F, G, HC, WV]

Dichanthelium yadkinense (Ashe) Mohlenbrock, Spotted-sheath Witchgrass. Floodplain forests, thickets, bottomlands, and swamps, often on alluvial deposits. May-October. NJ and MI south to GA and TX, also in Mexico. Sheaths often with wart-like glands. This taxon resembles *D. species 9 (=cryptanthum)*, from which it differs most readily by its hairy ligule (vs. membranous) and smooth peduncle (vs. antrorsely scabrous). [= Pa, Q; < *Panicum dichotomum* Linnaeus – RAB, GW; = *P. yadkinense* Ashe – C, F, G, HC, S, WV; = *D. dichotomum* ssp. *yadkinense* (Ashe) Freckmann & Lelong – FNA; < *D. dichotomum* var. *dichotomum* – K, Z; = *P. dichotomum* var. *yadkinense* (Ashe) Lelong – X]

Digitaria Haller 1768 (Crab Grass)

A genus of about 200 species, primarily in the tropics and subtropics. Most of our species occur primarily in disturbed situations; their original distributions and habitats are now obscure. References: Wipff in FNA (2003a); Webster (1987)=Z; Wipff & Hatch (1994)=Y; Wipff (1996b)=X; Webster (1980).

1 Inflorescence an open panicle; spikelets long-pedicellate, borne singly at the ends of long panicle branches; [section *Pennatae*]..... .....***D. cognata*** *var.* ***cognata***
1 Inflorescence of 2-several spikelike racemes borne digitately or in close proximity near the summit of the culm; spikelets sessile or short-pedicellate, borne more-or-less closely spaced along the racemes.
2 Rachis of each raceme narrow, trigonous, only slightly (if at all) winged.
3 Spikelets 4.2-5.9 mm long ..... ***D. insularis***
3 Spikelets 1.3-3.6 mm long.
4 Spikelets in 2s on the middle portions of the primary branches, the pedicels not adnate; upper lemmas gray, yellow, and/or purple-tinged when immature, purple at maturity .....***D. texana***
4 Spikelets in groups of 2-5 on the middle portions of the primary branches, the longer pedicels often adnate to the primary branch for a portion of their lengths; upper lemmas brown when immature, dark brown at maturity.
5 Spikelets 1.7-2.2 mm long; plants 3-10 dm tall; racemes to 10 cm long; upper sheaths glabrous, lower sheaths glabrous to sparsely pilose..... ***D. filiformis*** *var.* ***filiformis***
5 Spikelets 2.0-2.8 mm long; plants 8-15 dm tall; racemes to 25 cm long; upper sheaths glabrous or pilose, lower sheaths densely pilose.....***D. villosa***
2 Rachis of each raceme broad (0.5-1 mm wide), winged, the wings as wide as or wider than the rachis proper.
6 Lower sheaths glabrous; second glume 0.75-1× as long as the first glume (which may be ; fertile lemma dark brown or black at maturity (or pale brown or gray in *D. longiflora*).
7 Hairs of the spikelet minutely capitate; second glume ca. 1× as long as the first glume; spikelets 1.7-2.3 mm long.....***D. ischaemum***
7 Hairs of the spikelet not minutely capitate; second glume ca. 0.75× as long as the first glume; spikelets 1.2-1.7 mm long ....***D. violascens***
6 Lower sheaths pilose; second glume 0.3-0.6× as long (to 0.8× as long in *D. ciliaris*) as the first glume; fertile lemma white, tan, or grayish-brown at maturity.
8 Spikelets 1.5-1.8 mm long, villous with crinkled hairs; pedicels glabrous, terete in cross-section ..... ***D. serotina***
8 Spikelets (1.7-) 2.4-4.1 mm long, glabrous, scabrous, or pubescent with straight hairs; pedicels scabrous, 3-angled in cross-section; [section *Digitaria*].
9 Spikelets (1.7-) 2.5-3.4 mm long, averaging 3.0 mm long or shorter; leaf blades pilose over the upper surface.....***D. sanguinalis***
9 Spikelets 2.6-4.1 mm long, averaging 3.1 mm long or longer; leaf blades glabrous except for a few hairs on the upper surface at the base.
10 Lower lemma of the sessile spikelet with 5 equidistant nerves; lowermost inflorescence node glabrous or pubescent with hairs < 0.4 mm long; apex of the first glume rounded to truncate ..... ***D. bicornis***
10 Lower lemma of sessile spikelet with the lateral nerves crowded to the margins; lowermost inflorescence node pubescent with hairs > 0.4 mm long; apex of the first glume acute..... ***D. ciliaris***

Digitaria bicornis (Lamarck) Roemer & J.A. Schultes. Cp (FL, GA, NC, SC): sandy fields, lawns, roadsides, disturbed places; common. Webster (1980) believed that this species is likely to occur in VA and MD, as well. Whether or not it is introduced is unclear; it is now widely distributed in the tropics and subtropics worldwide. [= FNA, K, Z]

Digitaria ciliaris (Retzius) Köler, Southern Crab Grass. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC), Mt (GA, NC, SC): sandy fields, roadsides, and disturbed areas; common? August-October. [= C, FNA, K, Pa, Z; = *D. sanguinalis* var. *ciliaris* (Retzius) Parlatore – F, HC]

Digitaria cognata (J.A. Schultes) Pilger, Fall Witchgrass. Cp (DE, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (VA): sandy fields and roadsides; common (rare in VA). July-October. Wipff & Hatch (1994) discuss the reasons for including *Leptoloma* in *Digitaria*. [= FNA; = *Digitaria cognata* var. *cognata* – K; = *Leptoloma cognatum* (J.A. Schultes) Chase – RAB, C, F, G, HC, S; = *Digitaria cognatum* – Pa, orthographic variant; = *D. cognatum* ssp. *cognatum* – Y]

* ***Digitaria eriantha*** Steudel *ssp.* ***pentzii*** (Stent) Kok, Pangola Grass. Cp (FL): pastures; rare, native of Africa. Introduced in n. FL (Wunderlin & Hansen 2003, 2006). [= FNA; < *D. eriantha* – K; = *D. pentzii* Stent] {not yet keyed; add to synonymy}

Digitaria filiformis (Linnaeus) Köler *var.* ***filiformis***. Cp (DE, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): fields, roadsides, disturbed areas; common (uncommon in Mountains, rare in WV). September-October. Var. *filiformis*, with pubescent spikelets, is widespread in e. North America. Var. *laeviglumis* (Fernald) J. Wipff, with glabrous spikelets, occurs in New England. Var. *dolichophylla* (Henrard) J. Wipff occurs in s. FL, Cuba, and PR. See Wipff (1996) for additional discusion. [= RAB, C, F, FNA, G, X; = *D. filiformis* – HC, K; = *Syntherisma filiformis* (Linnaeus) Nash – S; < *D. filiformis* – Pa, W, WV]

* ***Digitaria horizontalis*** Willdenow, Jamaican Crabgrass. Reported for SC on the basis of a specimen at NCU (Kartesz 1999). {check specimen} [= FNA, K] {not yet keyed; add to synonymy

Digitaria insularis (Linnaeus) Mez ex Ekman, Sourgrass. Cp (AL, FL, MS): moist areas; rare. FL, AL, and MS west to TX; West Indies; Mexico, Central America, South America. [= FNA, K; = *Trichachne insularis* (Linnaeus) Nees – HC; = *Valota insularis* (Linnaeus) Chase – S]

* ***Digitaria ischaemum*** (Schreber) Muhlenberg, Smooth Crab Grass. Cp (DE, FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): fields, lawns, disturbed areas; common, native of Eurasia. July-October. Two varieties have sometimes been recognized. Var. *ischaemum* has racemes (1-) 2-6, 1-9 (-10) cm long, mostly curved and plants mostly to 4 dm tall. Var. *mississippiensis* (Gattinger) Fernald has racemes 5-7, 6-15 cm long, mostly stiff and straight and plants to 10 dm tall. [= C, FNA, K, Pa, W, WV; > *D. ischaemum* var. *ischaemum* – F, G, HC; > *D. ischaemum* (Schreber) Muhlenberg var. *mississippiensis* (Gattinger) Fernald – F, G, HC; = *D. ischaemum* var. *ischaemum* – RAB; = *Syntherisma ischaemum* (Schreber) Nash – S]

* ***Digitaria longiflora*** (Retzius) Persoon, Indian Crabgrass. Cp (FL): lawns, roadsides, pastures; uncommon, native of Asia and Africa. Alachua, Dixie Duval, and Holmes counties southward to s. FL. [= FNA, K] {not yet keyed}

* ***Digitaria nuda*** Schumacher. Cp (FL): disturbed areas; rare, native of Africa. In our area, known only from Columbia County, FL. [= FNA, K; *Syntherisma nuda* (Schumacher) A.S. Hitchcock] {not yet keyed; add to synonymy}

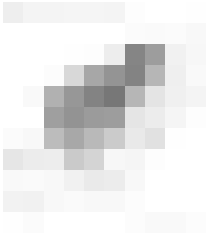
* ***Digitaria sanguinalis*** (Linnaeus) Scopoli, Northern Crab Grass. Cp (DE, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): fields, roadsides, disturbed areas; common. July-October. [= RAB, FNA, C, G, K, Pa, W, WV, Z; = *D. sanguinalis* var. *sanguinalis* – F, HC; = *Syntherisma sanguinalis* (Linnaeus) Dulac – S]

Digitaria serotina (Walter) Michaux, Dwarf Crab Grass. Cp (FL, GA, SC, VA): sandy woodlands; rare (rare in VA). October. [= RAB, C, F, FNA, G, GW, HC, K, Pa; = *Syntherisma serotina* Walter – S]

* ***Digitaria texana*** A.S. Hitchcock, Texas Crabgrass. Cp (VA): disturbed areas; rare, native of coastal Texas. Established in City of Virginia Beach, VA (VBA 2007). Also reported for St. Johns County, FL, adjacent to our area. [= FNA, HC, K] {add to synonymy}

Digitaria villosa (Walter) Persoon. Cp (GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC): sandy fields, roadsides; common (rare in VA). September-October. [= HC, K; = *D. filiformis* var. *villosa* (Walter) Fernald – RAB, C, F, FNA, G, X; = *Syntherisma villosa* Walter – S]

* ***Digitaria violascens*** Link. Cp (FL, GA, NC, SC), Pd (GA, SC), Mt (GA): sandy fields, roadsides, and woodland borders; common. September-October. [= C, FNA, G, HC, K; = *D. ischaemum* var. *violascens* (Link) Radford – RAB; *? Syntherisma floridana* (A.S. Hitchcock) A.S. Hitchcock – S]



Dinebra Jacquin 1809 (Viper Grass)

A genus of ca. 25 species, annuals, of the tropics and subtropics. The circumscription of *Dinebra* here follows the greatly expanded course of Peterson et al. (2012). References: Peterson et al. (2012)=Z; Barkworth in FNA (2003a); Snow in FNA (2003a).

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* ***Dinebra decipiens*** (R. Brown) P.M. Peterson & N. Snow *ssp.* ***peacockii*** (Maiden & Betche) P.M. Peterson & N. Snow. Waif at wool-combing mill, probably not established; native of Australia. [= Z; = *Leptochloa decipiens* (R. Brown) Stapf ex Maiden ssp. *peacockii* (Maiden & Betche) N. Snow – K] {not keyed}

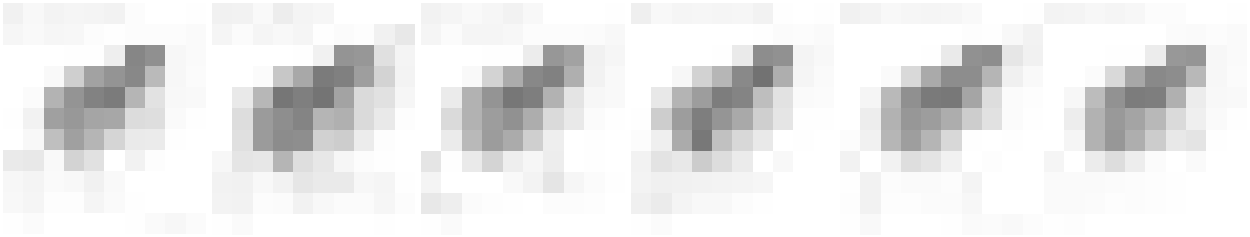
Dinebra panicea (Retzius) P.M. Peterson & N. Snow *ssp.* ***brachiata*** (Steudel) P.M. Peterson & N. Snow, Red Sprangletop. Disturbed areas. June-October. Widespread in the Western Hemisphere. The more familiar name, *L. filiformis*, must be replaced for reasons of nomenclatural priority. [= Z; = *Leptochloa panicea* (Retzius) Ohwi ssp. *brachiata* (Steudel) N. Snow – FNA, K, Pa; < *L. filiformis* (Lamarck) Palisot de Beauvois – RAB, C, F, G, GW, HC, K, S, W]

Dinebra panicea (Retzius) P.M. Peterson & N. Snow *ssp.* ***mucronata*** (Michaux) P.M. Peterson & N. Snow. {habitats}. [= Z; = *Leptochloa panicea* (Retzius) Ohwi ssp. *mucronata* (Michaux) Nowack – FNA, K] {not yet keyed; add to synonymy}

* ***Dinebra panicoides*** (J. Presl) P.M. Peterson & N. Snow, Amazon Sprangletop. Drawdown habitats on lake margins; native of South America. Belden et al. (2004) discuss the VA occurrences along the banks of the Roanoke (Staunton) River at Kerr Reservoir. Also reported for e. GA in the Coastal Plain (Sorrie, pers. comm.). [= Z; = *Leptochloa panicoides* (J. Presl) A. Hitchcock & Chase – C, FNA, G, GW, HC, K; ? *Diplachne halei* Nash – F; ? *Leptochloa floribunda* Doell – S; = *Diplachne panicoides* (J. Presl) McNeill]

* ***Dinebra retroflexa*** (Vahl) Panzer, Viper Grass. Disturbed areas, probably just a waif; native of Africa and s. Asia. This species has been collected as a waif in Mecklenburg County, NC (Mellichamp, Matthews, & Smithka 1987). [= FNA, K, Z] {not keyed}

* ***Dinebra species 1***, Spreading Sprangletop. Waif at wool-combing mill, probably not established; native of {}. [= *Leptochloa divaricatissima* S.T. Blake – K] {not keyed}



Diplachne Palisot de Beauvois 1812

A genus … References: Snow & Peterson (2012); Peterson et al. (2012, in press)= Z; Snow in FNA (2003a); Snow (1998); Weakley et al. (2011); Cronquist (1991).

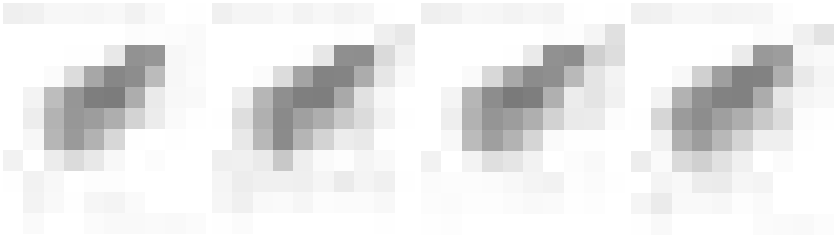
1 Lemmas 2-3 mm long, the apex obtuse to truncate, with the midrib often extended as a mucro.....***D. uninervia***
1 Lemmas 3-5 mm long, the apex acuminate or awned.
2 Low sprawling grasses, < 5 dm tall; lemma awns (1-) 2.5-5 mm long; first glume 2.5-3.5 mm long; second glume 4-7 mm long.....***D. maritima***
2 Taller grasses, usually 5-10 dm tall; lemma awns 0.5-2.5 mm long; first glume 1.3-3.4 mm long; second glume 2.2-5 mm long.
3 First glume 2.3-3.4 mm long; second glume 3.4-5.0; lemmas 4-5 mm long, with an awn 0.5-2.5 mm long.....***D. acuminata***
3 First glume 1.3-2 mm long; second glume 2.2-3.5; lemmas 3-4 mm long, with an awn 0.5-1 mm long.....***D. fascicularis***

* ***Diplachne acuminata*** Nash. Reported as adventive in PA and along highways in WV from halophytic habitats of w. United States (Cusick 1994). [= F; = *Leptochloa fascicularis* (Lamarck) A. Gray var. *acuminata* (Nash) Gleason – C, G; = *Diplachne acuminata* Nash – F; < *Leptochloa fascicularis* – HC; < *Leptochloa fusca* (Linnaeus) Kunth ssp. *fascicularis* (Lamarck) N. Snow – FNA, K; = *Leptochloa acuminata* (Nash) Mohlenbrock; < ***Diplachne fusca*** (Linnaeus) Palisot de Beauvois ex Roemer & Schultes *var.* ***fascicularis*** (Lamarck) P.M. Peterson & N. Snow – Z] {not yet keyed}

Diplachne fascicularis (Lamarck) Palisot de Beauvois, Bearded Sprangletop. Bed of artificial impoundment, brackish habitats, disturbed areas. September. Widespread in e. North America, primarily west of the Appalachians (adventive farther east), and extending into South America. Reported (as *L. fascicularis*) for SC by Nelson & Kelly (1997). [= F; = *Leptochloa fascicularis* (Lamarck) A. Gray var. *fascicularis* – C, G; < *Leptochloa fascicularis* – RAB, GW, HC, S; < *Leptochloa fusca* (Linnaeus) Kunth ssp. *fascicularis* (Lamarck) N. Snow – FNA, K, Pa; = *Diplachne fascicularis* (Lamarck) Palisot de Beauvois – F; < ***Diplachne fusca*** (Linnaeus) Palisot de Beauvois ex Roemer & Schultes *var.* ***fascicularis*** (Lamarck) P.M. Peterson & N. Snow – Z]

Diplachne maritima E.P. Bicknell, Salt-meadow Grass. Fresh to brackish marshes, overwash flats, other disturbed brackish habitats. August-October. Along the coast from s. NH south to se. NC. This taxon appears to warrant status as a species separate from *D. fascicularis*; see Weakley et al. (2011) for discussion of the rationale for recognition. [= F; = *Leptochloa fascicularis* (Lamarck) A. Gray var. *maritima* (E.P. Bicknell) Gleason – C, G; < *Leptochloa fascicularis* – RAB, GW, HC, S; = ***Diplachne maritima*** E.P. Bicknell – F; < *Leptochloa fusca* (Linnaeus) Kunth ssp. *fascicularis* (Lamarck) N. Snow – FNA, K; = *Leptochloa maritima* (E.P. Bicknell) LeBlond & Sorrie, nom. illeg. ; < ***Diplachne fusca*** (Linnaeus) Palisot de Beauvois ex Roemer & Schultes *var.* ***fascicularis*** (Lamarck) P.M. Peterson & N. Snow – Z]

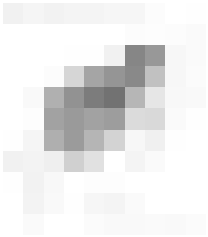
* ***Diplachne uninervia*** (J. Presl) Parodi. Disturbed areas; adventive from farther west. July-August. Widespread in the Western Hemisphere, the native range obscure, but not likely native in our area. Reported for SC by Nelson & Kelly (1997). [= *Leptochloa uninervia* (J. Presl) A. Hitchcock & Chase – C, G, GW, HC, K, RAB, S; = *Leptochloa fusca* (Linnaeus) Kunth ssp. *uninervia* (J. Presl) N. Snow – FNA, K; = ***Diplachne fusca*** (Linnaeus) Palisot de Beauvois ex Roemer & Schultes *var.* ***uninervia*** (J. Presl) P.M. Peterson & N. Snow – Z]



Disakisperma Steudel 1854

A genus of 3 species of warm temperate, subtropical, and tropical America and Africa. References: Peterson et al. (2012, in press)= Z; Snow in FNA (2003a); Snow (1998).

* ***Disakisperma dubia*** (Kunth) P.M. Peterson & N. Snow (in press), Green Sprangletop. Waif at wool-combing mill, probably not established; native of sw. United States south through Central America and South America. Also reported for NC by Kartesz (1999), but the documentation indicates that it was cultivated at a Soil Conservation Service test nursery in Chapel Hill, Orange County. [= Z; = *Leptochloa dubia* (Kunth) Nees – FNA, HC, K2] {not keyed}



Distichlis Rafinesque 1819 (Saltgrass)

A genus of about 10 species, of North, Central, and South America, and Australia. Bell & Columbus (2008) recircumscribe *Distichlis* to include *Monanthochloe* Engelmann and *Reederochloa* Soderstrom & H.F. Decker. References: Bell & Columbus (2008)=Z; Thieret in FNA (2003a); Barkworth in FNA (2003a). [including *Monanthochloe*]

Identification notes: When sterile, *Distichlis spicata* is easily confused with *Sporobolus virginicus*, with which it sometimes occurs. *Distichlis spicata* is generally a coarser plant, and lacks long hairs around the collar of the sheath; *Sporobolus virginicus* is more delicate, and typically has long hairs on either side of the collar.

1 Leaf blades < 1.5 cm long, subulate; plant colonial by surficial stolons (rarely rhizomatous); pistillate and staminate inflorescence with 1 spikelet; [FL and other subtropical shores] ..... ***D. littoralis***
1 Leaf blades 2.5-14 cm long, flat (though often involute when dry); plants colonial by subterranean rhizomes; pistillate and staminate inflorescences with > 1 spikelet; [widespread] ..... ***D. spicata***

Distichlis littoralis (Engelmann) H.L. Bell & Columbus, Shoregrass, Key Grass. Brackish shores. From n. peninsular FL (Taylor and Dixie cos. on the west coast and Volusia County on the east coast) southward. Also known from coastal sw. LA (Cameron Parish) and TX southward. [= *Monanthochloe littoralis* Engelmann – FNA, K, S, WH]

Distichlis spicata (Linnaeus) Greene, Saltgrass, Spike Grass. Coastal marshes and shores, especially common in hypersaline flats (where infrequent tidal inundation is followed by evaporation). June-October. Two varieties (or subspecies or species) have often been recognized: var. *spicata* ranging along the Atlantic coast from NS and PE south to tropical America, and on the Pacific coast of North America, and var. *stricta* (Torrey) Scribner widespread in saline situations in western North America. These do not appear to warrant taxonomic recognition (Barkworth in FNA 2003a). [= RAB, FNA, GW, K, Pa, S; > *D. spicata* var. *spicata* – C; > *D. spicata* – F, G, HC; > *D. spicata* ssp. *spicata*]

Echinochloa Palisot de Beauvois 1812 (Barnyard-grass, Jungle-rice)

A genus of 4-5- species of the tropics and warm temperate regions. References: Michael in FNA (2003a). Key based in part on C.

1 Panicle elongate, the branches few, distant, unbranched, and short, to 2 (-3) cm long; spikelets awnless; leaves 3-6 (-9) mm wide ..... ***E. colonum***
1 Panicle broader, the branches numerous, approximate, often further branched, short to long, some (at least) exceeding 2 cm long; spikelets awnless or awned; leaves 5-30 mm wide.
  2 Lower sheaths usually papillate-pubescent; fertile lemma 2.5-4× as long as wide ..... ***E. walteri***
  2 Lower sheaths glabrous; fertile lemma 1.5-2.5× as long as wide.
    3 Inflorescence nodding; awns 4-29 mm long ..... ***E. cruspavonis*** *var.* ***cruspavonis***
    3 Inflorescence erect, stiff; awns 0-25 mm long.
      4 Second glume and sterile lemma hairy or scabrous to nearly glabrous, the hairs usually not papillose-based; fertile lemma obtuse or broadly acute, with a thin, membranous (later withering) tip set off from the body by a line of minute hairs.
        5 Panicle fairly open, the branches erect, appressed, or spreading; spikelets green or purple-tinged, awnless or with a well-developed awn (to 25 mm long); leaves 5-15 mm wide; plants mostly 3-7 dm tall ..... ***E. crusgalli*** *var.* ***crusgalli***
        5 Panicle very crowded, the branches appressed to slightly spreading, the tips often incurved; spikelets purplish-brown, awnless (or with awn to 2 mm long); leaves mostly 15-30 mm wide; plants mostly 7-15 dm tall ..... ***E. frumentacea***
      4 Second glume and sterile lemma usually with stout, papillose-based hairs on the veins; fertile lemma acuminate, abruptly narrowed to a firm, persistent tip.
        6 Spikelets < 3.5 mm long, not including the awn (if present); sterile lemma awnless or with an awn to 6 (-10) mm long ..... ***E. muricata*** *var.* ***microstachya***
        6 Spikelets > 3.5 mm long, not including the awn (if present); sterile lemma usually awned (rarely awnless), the awn 6-25 mm long. ..... ***E. muricata*** *var.* ***muricata***

* ***Echinochloa colonum*** (Linnaeus) Link, Jungle-rice. Fields, ditches, disturbed wet areas; native of the Old World tropics. July-October. The debate over the appropriate grammatical treatment and therefore spelling of the epithet is discussed in detail in Ward (2005b). [= RAB, C, F, G, GW, HC; = *E. colona* – FNA, K, Pa, S, orthographic variant]

* ***Echinochloa crusgalli*** (Linnaeus) Palisot de Beauvois *var*. ***crusgalli***, Barnyard-grass. Disturbed areas; native of Eurasia. July-October. [= C, G, Pa; < *E. crusgalli* – RAB, GW, WV (also see *E. muricata*); = *E. crus-galli* – K, orthographic variant; < *E. crusgalli* – F, FNA; < *E. crus-galli* ssp. *crus-galli* – S (also see *E. muricata*)]

Echinochloa cruspavonis (Kunth) J.A. Schultes *var*. ***cruspavonis***. {habitats} July-October. [< *E. crus-pavonis* – HC; = *E. crus-pavonis* var. *crus-pavonis* – FNA, K, orthographic variant]

* ***Echinochloa frumentacea*** Link, Japanese Millet, Billion-dollar Grass, White Panic, Siberian Millet. Disturbed areas; native of Asia. July-October. [= F, FNA, K, WV; < *E. crusgalli* – RAB, GW; = *E. crusgalli* (Linnaeus) Palisot de Beauvois var. *frumentacea* (Link) W. Wight – C, G, Pa; = *E. crus-galli* ssp. *edulis* A.S. Hitchcock – S]

Echinochloa muricata (Palisot de Beauvois) Fernald *var*. ***microstachya*** Wiegand, Barnyard-grass. {habitat}. July-October. [= C, FNA, K; < *E. crusgalli* – RAB, GW, WV; = *E. pungens* (Poiret) Rydberg var. *microstachya* (Wiegand) Fernald & Griscom – F; = *E. microstachya* (Wiegand) Rydberg – G; < *E. crus-galli* ssp. *crus-galli* – S]

Echinochloa muricata (Palisot de Beauvois) Fernald *var*. ***muricata***, Barnyard-grass. Interdune wetlands, various other wet to damp habitats. July-October. [= C, FNA, K; < *E. crusgalli* – RAB, GW, WV; > *E. pungens* (Poiret) Rydberg var. *pungens* – F; > *E. pungens* var. *ludoviciana* (Wiegand) Fernald & Griscom – F; > *E. pungens* var. *coarctata* Fernald & Griscom – F; = *E. muricata* – G, Pa; < *E. crus-galli* ssp. *crus-galli* – S]

Echinochloa walteri (Pursh) Heller. Marshes. July-October. MA south to FL, west to TX on the outer Coastal Plain; also inland from OH west to WI, south to w. WV, MO, and AR. [= RAB, C, F, FNA, GW, HC, K, Pa, S, W]

Eleusine Gaertner 1788 (Yard Grass)

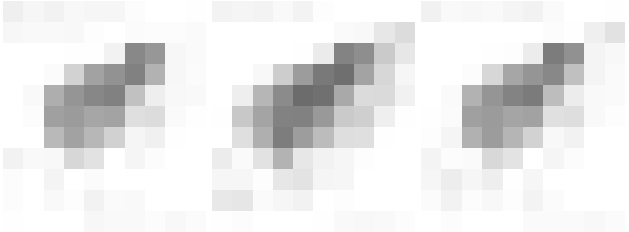
A genus of about 9 species, native to Africa and South America. References: Hilu in FNA (2003a). Key based on FNA.

1 Panicles with 1-3 branches, attached in a single digitate cluster ..... ***E. tristachya***
1 Panicles with 4-20 branches, 1-2 of these attached below the terminal digitate cluster.
  2 Lower glumes 2-3-veined; panicle branches 5-7 mm wide; ligule 1-2 mm long, ciliate with hairs 1-2 mm long.... ***E. coracana ssp. africana***
  2 Lower glumes 1-veined; panicle branches 3-5.5 mm wide; ligule 0.2-1 mm long, erose ..... ***E. indica***

* ***Eleusine coracana*** (Linnaeus) Gaertner *ssp*. ***africana*** (Kennedy & O'Byrne) Hilu & de Wet, Finger Millet. Disturbed areas; native of Africa. There remains some doubt about the identity of the population discovered. Reported by Werth, Zeng, & Baird (1997). [= FNA, K; = *E. africana* Kennedy & O'Byrne]

* ***Eleusine indica*** (Linnaeus) Gaertner, Yard Grass, Goose Grass. Lawns, roadsides, gardens, disturbed areas; native of Old World. [= RAB, C, F, FNA, G, HC, K, Pa, S, W, WV]

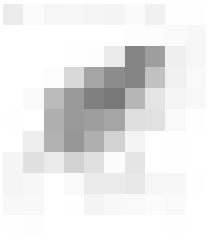
* ***Eleusine tristachya*** (Lamarck) Lamarck. Waste areas of wool-combing mills, other disturbed areas, perhaps only a waif; native of South America. Reported as introduced in additional, scattered states in e. United States, including VA (Kartesz 1999, but apparently in error), NJ (Hilu 1980) and AL (Small 1933). [= FNA, K, S]



Elionurus Humboldt & Bonpland ex Willdenow 1805 (Balsamscale)

A genus of about 15 species, native to tropical and subtropical parts of Africa and the Americas. References: Barkworth in FNA (2003a).

Elionurus tripsacoides Humboldt & Bonpland ex Willdenow, Pan-American Balsamscale. Wet savannas. S. GA south to s. FL, west to s. and w. TX, and south through Central America to s. South America. Reported for sw. GA by Jones & Coile (1988), for s. MS and FL (Sorrie & Leonard 1999). [= FNA, K; = *Elyonurus tripsacoides* – GW, HC, S, orthographic variant]



Elymus Linnaeus 1753 (Wild-rye, Rye Grass)

A genus of about 150 species, semicosmopolitan in temperate regions. The genus, as now circumscribed, includes all allopolyploid taxa with at least one chromosome complement contributed from *Pseudoroegneria*. North American *Elymus* are allopolyploids of *Pseudoroegneria* and *Hordeum* (Helfgott & Mason-Gamer 2004). Reference: Barkworth, Campbell, & Salomon in FNA (2007a); Campbell (2000); Church (1967); Tucker (1996)=Z; Barkworth (1997)=X. This treatment largely follows Barkworth, Campbell, & Salomon in FNA (2007a).

Identification notes: Measurements of the spike include the awns, but measurements of spikelets and its components do not. Rachis internodes should be measured near the middle of the spike. Glume widths are measured at the widest point, or if the widest point is not apparent, at about 5 mm above the glume base.

1 Spikelets solitary at each node (occasionally paired at the lowest nodes); glumes and lemmas awned or unawned; plants cespitose to strongly rhizomatous.
  2 Plants strongly rhizomatous; [common and weedy introduced species]; [section *Elytrigia*] ..... ***E. repens***
  2 Plants cespitose; [rare natives and introductions]; [section *Goulardia*].
    3 Spikelets 20-30 mm long; anthers 3-6 mm long; rachis internodes hirtellous below the spikelets; [very rare introduction, reported for c. GA] ..... ***E. semicostatus***
    3 Spikelets 8-25 mm long; anthers 0.8-3 mm long; rachis internodes glabrous below the spikelets; [rare natives of glades and barrens].
      4 Lemma awns 15-40 mm long, longer than the body of the lemma ..... ***E. trachycaulus*** *ssp.* ***subsecundus***
      4 Lemma awns 1-13 mm long, shorter than the body of the lemma ..... ***E. trachycaulus*** *ssp.* ***trachycaulus***
1 Spikelets 2-3 (-5) at each node; glumes and lemmas usually awned; plants usually cespitose, occasionally short-rhizomatous.
  5 Both glumes (including their awn) either 0-3 mm long and subulate or 1-20 mm long and differing in length by > 5 mm, 0.1-0.6 mm wide, tapering from the base, with 0-1 distinct veins, persistent; rachis internodes 4-12 mm long, ca. 0.5 mm thick at the narrowest section.
    6 Spikelets appressed; lemma awns straight or curving; glumes sometimes absent, but usually 1-20 mm long, 0.1-0.6 mm wide, with a distinct vein; spikes erect or nodding ..... ***E. svensonii***
    6 Spikelets widely spreading to horizontal; lemma awns straight (rarely slightly curving); glumes 0-3 mm long, with no distinct veins (rarely 1 glume to 20 mm long, 0.2 mm wide); spikes usually erect.
      7 Lemmas pubescent ..... ***E. hystrix*** *var.* ***bigelovianus***
      7 Lemmas glabrous to scabrous ..... ***E. hystrix*** *var.* ***hystrix***
  5 Both glumes (including the awns) 10-40 mm long, usually differing in length by < 5 mm, 0.2-2.3 mm wide, lanceolate to setaceous, usually widest above the base, with 2-8 veins, persistent or disarticulating; rachis internodes slender (as above) or stout (2-5 mm long and ca. 1 mm thick at the narrowest section).
    8 Glume bases flat, thin, and evidently veined, or indurate for < 1 mm, the bodies not exceeding the adjacent (usually 8-15 mm long) lemmas; lemma awns usually curving outward; spikes usually nodding to pendent; internodes (2-) 4-12 mm long.
      9 Glumes 0.5-1.6 mm wide; lemma awns 15-40 (-50) mm long; paleas acute; rachis internodes 2-5 (-7) mm long; blades (3-) 4-15 (-20) mm wide, pale green, usually glabrous or scabridulous above ..... ***E. canadensis*** *var.* ***canadensis***
      9 Glumes 0.3-0.8 mm wide; lemma awns 15-25 (-35) mm long; paleas narrowly truncate; rachis internodes 5-8 (-12) mm long; blades 8-24 mm wide, dark green, usually thinly pilose above ..... ***E. wiegandii***
    8 Glume bases terete, indurate, and lacking evident veins for 0.5-4 mm, the bodies (unless indistinct from the awns) exceeding the adjacent (usually 6-12 mm long) lemmas; lemma awns straight; spikes erect or nodding; internodes 2-5 mm long (to 7 mm in *E. sp. 1*).
      10 Glumes persistent, 0.2-1 mm wide, with 2-4 veins, the basal 0.5-2 mm essentially straight; lemmas rarely glabrous; spikelets with 1-3 (-4) florets; spikes nodding, exserted.
        11 Blades glabrous to scabrous, pale dull green; spikes 7-25 cm long; internodes usually 3-5 mm long; spikelets with 2-3 (-4) florets; lemmas usually scabrous, 7-14 mm long, 1-5 mm longer than the acute paleas; flowering usually late June to late July ..... ***E. riparius***
        11 Blades villous to pilose, dark glossy green; spikes 4-12 cm long; internodes usually 2-3 mm long; spikelets with 1-2 (-3) florets; lemmas usually villous, 5.5-9 mm long, 0-1.5 mm longer than the obtuse paleas; flowering usually early June to early July ..... ***E. villosus***
      10 Glumes disarticulating with the lowest floret, 0.7-2.3 mm wide, with (2-) 3-5 (-8) veins, the basal 1-4 mm clearly bowed-out; lemmas often glabrous; spikelets with (2-) 3-5 (-6) florets; [*Elymus virginicus* complex].
        12 Spikes 2.5-6 cm wide, exserted; lemma awns 15-40 mm long; blades glabrous or villous.
          13 Spikes with 9-18 nodes; internodes 4-7 mm long; blades usually lax, dark glossy green under the glaucous bloom; auricles 2-3 mm long, blackish at maturity; flowering usually in mid-May to mid-June ..... ***E. macgregorii***

13 Spikes with 15-30 nodes; internodes 3-5 mm long; blades lax, or often ascending and involute, pale dull green; auricles 0-2 mm long, brownish at maturity; flowering usually in mid-June to late July.
14 Spikelets (and usually also the foliage) pubescent; spikes usually 6-12 cm long; lemmas 6-10 mm long ..... ***E. glabriflorus*** *var.* ***australis***
14 Spikelets (and usually also the foliage) glabrous to scabrous); spikes usually 9-16 cm long; lemmas 7-13 mm long ..... ***E. glabriflorus*** *var.* ***glabriflorus***
12 Spikes 0.7-2 cm wide (including the awns), exserted or sheathed; lemma awns 1-15(20) mm long; spikelets appressed to slightly spreading; blades usually glabrous to scabridulous.
15 Lemma awns 1-3(5) mm long; blades often ascending, somewhat involute, those higher on the stiffly erect culms broader and more persistent; flowering usually in early July to mid-August ..... ***E. curvatus***
15 Lemma awns 5-15(20) mm long; blades usually spreading or lax, not markedly broader or more persistent toward the culm summit; flowering usually in mid-June to late July.
16 Spikes glaucous, hispidulous to villous-hirsute, often intermediate in exsertion; glumes indurate in the lowest 1-2 mm; ligules and auricles usually absent; flowering usually early July to mid-August ..... ***E. virginicus*** *var.* ***intermedius***
16 Spikes green to glaucous, usually glabrous to scabrous, partly included in the sheath to fully exserted; ligules and auricles often present; flowering usually mid-June to mid-July.
17 Spikes partly sheathed; glumes 1-2.3 mm wide, strongly indurate and bowed-out in the lowest 2-4 mm; plants usually green to yellowish-brown; nodes mostly covered ..... ***E. virginicus*** *var.* ***virginicus***
17 Spikes usually exserted; glumes (0.5-) 0.7-1.5 (-1.8) mm wide, moderately indurate and bowed out in the lowest 1-2 mm; plants usually glaucous, sometimes reddish-brown at maturity; nodes often exposed.
18 Culms usually 3-8 dm tall, with 4-6 nodes; blades 2-9 mm wide, becoming involute; spikes 3.5-11 cm long, strongly glaucous; glumes usually indurate in the lowest 1-2 mm ..... ***E. virginicus*** *var.* ***halophilus***
18 Culms usually 7-10 dm tall, with 6-8 nodes; blades 3-15 mm wide, flat; spikes 4-20 cm long, pale green or glaucous; glumes indurate only in the lowest 1 mm ..... ***E. virginicus*** *var.* ***jejunus***

Elymus canadensis Linnaeus *var.* ***canadensis***, Great Plains Wild-rye, Nodding Wild-rye. Mt (NC, VA), Pd (NC, VA), Cp? (SC?): moist forests; uncommon (rare in NC, VA, and SC?). July-August. NS, QC, and YT south to NC, SC (?), OK, NM, and AZ. [= FNA, Pa; < *E. canadensis* – RAB, C, F, G, GW, K, W, WV]

Elymus churchii J.J.N. Campbell, Church's Wild-rye. Calcareous bluffs and slopes. Interior Highlands; disjunct in n. AL. [= FNA] {not yet keyed}

Elymus curvatus Piper, Awnless Wild-rye. Ip (KY, TN): moist bottomlands and slopes; rare. NY and QC west to BC and WA, south to s. OH, KY, c. TN, OK, and n. TX. [= FNA; < *E. virginicus* Linnaeus – C, Pa; = *E. submuticus* (Hooker) Smyth & Smyth – K; = *E. virginicus* Linnaeus var. *submuticus* Hooker – F, G; < *E. virginicus* var. *virginicus* – S]

* *Elymus elymoides* (Rafinesque) Swezey ssp. *brevifolius* (J.G. Smith) Barkworth. Mt (KY): {habitat}; rare. [= FNA] {synonymy incomplete}

Elymus glabriflorus (Vasey) Scribner & Ball *var.* ***australis*** (Scribner & C.R. Ball) J.J.N. Campbell, Southeastern Wild-rye. Pd (DE), {Cp (FL, GA, NC, SC, VA), Pd, Mt (GA, NC, SC, VA): } {*glabriflorus* as a whole: ME, WV, IN, IL, and IA, south to n. FL, and c. TX} [< *E. glabriflorus* – FNA; < *E. virginicus* – RAB, C, GW, Pa, W, WV; < *E. virginicus* var. *glabriflorus* (Vasey) Bush – F, "forma *australis*"; < *E. virginicus* var. *virginicus* – G, K; = *E. virginicus* var. *australis* – S]

Elymus glabriflorus (Vasey) Scribner & Ball *var.* ***glabriflorus***, Southeastern Wild-rye. Cp (DE), Pd (DE), {Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): } {*glabriflorus* as a whole: ME, WV, IN, IL, and IA, south to n. FL, and c. TX} [< *E. glabriflorus* – FNA; < *E. virginicus* – RAB, C, GW, Pa, W, WV; < *E. virginicus* var. *glabriflorus* (Vasey) Bush – F, "forma *glabriflorus*"; < *E. virginicus* var. *virginicus* – G, K; = *E. virginicus* var. *glabriflorus* – S]

Elymus hystrix Linnaeus *var.* ***bigelovianus*** (Fernald) Bowden, Northern Bottlebrush Grass. Mt (NC): high elevation forests; rare. [< *Hystrix patula* Moench – RAB, G, WV; < *Elymus hystrix* – C, FNA, Pa; = *Hystrix patula* var. *bigeloviana* (Fernald) Deam – F; = *E. hystrix* var. *bigeloviana* – K, orthographic variant; < *Hystrix hystrix* (Linnaeus) Millspaugh – S]

Elymus hystrix Linnaeus *var.* ***hystrix***, Common Bottlebrush Grass. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (VA): moist forests, dry forests especially over more fertile soils; common (rare in DE). [= K; < *Hystrix patula* Moench – RAB, G, WV; < *Elymus hystrix* – C, FNA, Pa; = *Hystrix patula* var. *patula* – F; < *Hystrix hystrix* (Linnaeus) Millspaugh – S]

Elymus macgregorii R. Brooks & J.J.N. Campbell, Early Wild-rye. Rich mesic forests, especially bottomlands. ME west to SD, south to Panhandle FL and s. TX. See Campbell (2000). [= FNA; < *E. virginicus* – RAB, C, GW, Pa, W, WV; < *E. virginicus* var. *virginicus* – F, G, K, S]

* ***Elymus repens*** (Linnaeus) Gould, Quackgrass, Dog-grass, Witchgrass. Mt (NC, VA, WV), Pd (DE, NC, VA), Cp (DE, NC, VA): roadsides, disturbed areas, pastures; uncommon, probably introduced from Europe (sometimes considered to be partially native along the coast). June-August. [= FNA, K, Pa, X; = *Elytrigia repens* (Linnaeus) Nevski – C, Z; = *Agropyron repens* (Linnaeus) Palisot de Beauvois – RAB, G, HC, S, W, WV; > *Agropyron repens* var. *repens* – F; > *Agropyron repens* var. *subulatum* (Schreber) Roemer & J.A. Schultes – F]

Elymus riparius Wiegand, Eastern Riverbank Wild-rye. Mt (GA, NC,SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, SC?, VA): moist forests; common (uncommon in GA, SC, VA, rare in NC). July-September. ME, QC, ON, and MN south to GA and AR. [= RAB, C, F, FNA, G, GW, K, Pa, S, W, WV]

* *Elymus semicostatus* (Nees ex Steudel) Melderis. Reported for c. GA by Jones & Coile (1988), as *Agropyron semicostatum* Nees ex Steudel, but FNA states that known reports from North America are based on misidentifications. [= FNA, K; = *Agropyrum semicostatum* Nees ex Steudel]

Elymus svensonii G.L. Church, Svenson's Wild-rye. Ip (AL, KY, TN): limestone river bluffs; rare. Nc. KY south to c. TN and n. AL. [= FNA, K]

Elymus trachycaulus (Link) Gould ex Shinners *ssp.* ***subsecundus*** (Link) A. & D. Löve, Bearded Wheatgrass. Mt (WV): glades, barrens, open woodlands; rare. June-August. NL (Newfoundland) west to AK, south to MD, WV, KY, MO, NM, AZ, and CA. [= FNA, K; < *E. trachycaulus* – C, Pa; ? *Agropyron trachycaulum* (Link) Malte ex H.F. Lewis var. *glaucum* (Pease & Moore) Malte – F, G; = *Agropyron subsecundum* (Link) A.S. Hitchcock var. *subsecundum* – HC; < *Agropyrum subsecundum* (Link) A.S. Hitchcock – WV]

Elymus trachycaulus (Link) Gould ex Shinners *ssp.* ***trachycaulus***, Slender Wheatgrass. Mt (NC, VA, WV): glades and barrens, over serpentine, etc.; rare. August. Greenland, NL (Labrador), Keewatin, NU, YT, and AK, south to w. NC, OH, IN, IL, MO, TX, Mexico and CA. [= FNA, K; < *Agropyron trachycaulum* (Link) Malte ex H.F. Lewis – RAB, W, WV; < *Elymus trachycaulus* – C, Pa; > *Agropyron trachycaulum* var. *novae-angliae* (Scribner) Fernald – F; > *Agropyron trachycaulum* var. *ciliatum* (Scribner & J.G. Smith) Gleason – G; = *Agropyron trachycaulum* – HC]

Elymus wiegandii Fernald, Northern Riverbank Wild-rye. South to sc. PA and NJ; reported for nc. KY (Kartesz 2010). [= C, F, FNA, K; < *E. canadensis* – G; = *E. canadensis* var. *wiegandii* (Fernald) Bowden – Pa]

Elymus villosus Muhlenberg ex Willdenow, Downy Wild-rye. Mt (NC, SC, VA, WV), Pd (DE, NC, SC, VA), Cp (DE, NC, SC, VA), {GA}: moist forests; uncommon. QC, ON, MN, ND, and WY south to GA, AL, MS, and TX. [= RAB, C, F, FNA, G, GW, K, Pa, W, WV; = *E. striatus* Willdenow – S]

Elymus virginicus Linnaeus *var.* ***halophilus*** (Bicknell) Wiegand, Salt-marsh Wild-rye. Cp (DE, NC, VA): brackish marshes, maritime forests and hammocks; uncommon (rare in DE). Along the Atlantic Coast, from NS to NC. [= F, FNA, G, K; < *E. virginicus* – RAB, C, GW; < *E. virginicus* var. *virginicus* – S]

Elymus virginicus Linnaeus *var.* ***intermedius*** (Vasey) Bush. [= FNA, G; < *E. virginicus* – RAB, C, GW, W, WV; < *E. virginicus* var. *virginicus* – F, K; < *E. virginicus* var. *hirsutiglumis* (Scribner) A.S. Hitchcock – S]

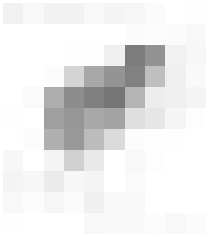
Elymus virginicus Linnaeus *var.* ***jejunus*** (Ramaley) Bush. [= F, FNA, G; < *E. virginicus* – RAB, C, GW, W, WV; < *E. virginicus* var. *virginicus* – K; < *E. virginicus* var. *virginicus* – S]

Elymus virginicus Linnaeus *var.* ***virginicus***, Common Eastern Wild-rye, Terrell Grass. Cp (DE, FL, GA, NC, SC, VA), Mt (DE, NC, SC, VA, WV), Pd, Cp (NC, SC, VA): moist forests; common. [= FNA; < *E. virginicus* – RAB, C, GW, W, WV; < *E. virginicus* var. *virginicus* – F, G, K; < *E. virginicus* var. *virginicus* – S; *? E. striatus* Willdenow – S]

Enteropogon Nees 1836

A genus of about 17 species, tropical. References: Barkworth in FNA (2007a).

* ***Enteropogon prieurii*** (Kunth) W.D. Clayton. On ballast at Wilmington, New Hanover County, NC and Mobile, AL, probably only a waif; native of Africa. Also reported from Mobile, Baldwin County, AL (Hitchcock & Chase 1950). [= FNA, K; = *Chloris prieurii* Kunth – S]



Eragrostis Wolf 1776 (Lovegrass)

A genus of about 350 species of temperate and tropical areas. References: Peterson in FNA (2003a); Koch (1978). Key adapted from FNA.

1 Plants cespitose or rhizomatous perennials, with innovations near the base, and with or without buds in the basal sheaths.
- 2 Plants with short, knotty, thick rhizomes; florets articulating whole ..... ***E. spectabilis***
- 2 Plants without short or thick rhizomes; florets usually disarticulating.
  - 3 Caryopsis with a deep to shallow groove along the adaxial surface.
    - 4 Caryopsis dorso-ventrally compressed, flattened parallel to the side of the embryo, translucent, light brownish ..... ***E. curvula***
    - 4 Caryopsis laterally compressed, flattened on the side perpendicular to the embryo, or cylindric, opaque (rarely translucent), usually reddish brown.
      - 5 Lateral veins of the lemmas conspicuous, often greenish, the lemmas strongly keeled ..... ***E. trichodes***
      - 5 Lateral veins of the lemmas inconspicuous and hardly evident, the lemmas sometimes weakly keeled.
        - 6 Lemmas 1.2-1.8 mm long; culms 30-70 cm tall ..... ***E. lugens***
        - 6 Lemmas 1.6-3.0 mm long; culms (30-) 40-110 (-120) cm tall.
          - 7 Spikelets 2-6-flowered, greenish with purple tinges; leaf blades 3-8 (-11) mm wide, 25-60 cm long; sheaths often densely papillose-hirsute ..... ***E. hirsuta***
          - 7 Spikelets (3-) 5-12-flowered, olive green to lead gray; leaf blades 1-3.8 mm wide, (4-) 10-35 cm long; sheaths never papillose-hirsute ..... ***E. intermedia***
  - 3 Caryopsis not grooved on the adaxial surface.
    - 8 Stamens 3.

9 Spikelets 4-8.2 (-10) mm long..... ***E. curvula***
9 Spikelets 2-4.5 (-5) mm long.
10 Leaf blades 25-60 cm long, 3-8 (-11) mm wide; lemmas 1.6-2.4 mm long; spikelets 1.0-1.7 mm wide..... ***E. hirsuta***
10 Leaf blades (4-) 8-22 cm long, 1-3.5 mm wide; lemmas 1.2-1.8 mm long; spikelets 0.5-1.0 (-1.3) mm wide..... ***E. lugens***
8 Stamens 2.
11 Panicle 15-45 cm wide, open, diffuse, broadly ovate to obovate in outline, the panicle branches capillary; pedicels 0.5-35 (-50) mm long, longer than or shorter than the spikelets.
12 Spikelets with widely spreading pedicels, the lower pedicels all generally longer than the spikelets; disarticulation of the lemmas only, the paleas persistent..... ***E. elliottii***
12 Spikelets with appressed pedicels, lower pedicels of each branch shorter than the spikelets; disarticulation usually of the whole floret..... ***E. refracta***
11 Panicle (1-) 2-17 (-20) cm wide, contracted to open, narrowly ovate to oblong in outline;, the panicle branches stiffly spreading; pedicels (0-) 0.3-6 mm long, always shorter than the spikelets.
13 Spikelets 0.7-2.4 mm wide; glumes 0.3-2.2 mm long; lemma 1.5-2.5 mm long, the apex acute (sometimes acuminate)..... ***E. bahiensis***
13 Spikelets 2.4-5 mm wide; glumes 1.4-4 mm long; lemma 2-6 mm long, the apex acuminate to attenuate..... ***E. secundiflora*** *ssp.* ***oxylepis***

1 Plants cespitose, geniculate or mat-forming annuals, lacking innovations or buds in the lower sheaths.
14 Paleas prominently ciliate-pectinate on the keels, the hairs 0.1-0.8 mm long.
15 Panicles contracted, narrow, spike-like, usually <1.5 cm wide..... ***E. ciliaris*** *var.* ***ciliaris***
15 Panicles open, cylindrical to narrowly ovate, usually 1-8 cm wide.
16 Spikelets (1.0-) 1.5-3.5 mm long, 0.9-1.4 mm wide, 4-12-flowered; lemmas 0.7-1.1 mm long, membranous, the apex truncate to obtuse..... ***E. amabilis***
16 Spikelets 5-12 (-18) mm long, 1.4-2.4 mm wide, 12-42-flowered; lemmas (1.3-) 1.5-2.0 mm long, chartaceous, the apex acute..... ***E. cumingii***
14 Paleas smooth to scaberulous on the keels, the hairs (if present) <0.1 mm long.
17 Plants extensively stoloniferous, creeping and forming flat mats; inflorescences 1-3.5 cm long; culms (2-) 5-12 (-20) cm tall on the erect portions..... ***E. hypnoides***
17 Plants not stoloniferous (sometimes creeping and forming flat mats); inflorescences 3-55 cm long; culms (2-) 6-130 cm tall.
18 Ligules membranous, glabrous..... ***E. japonica***
18 Ligules ciliate, with a row of tiny white hairs.
19 Caryopsis with a deep to shallow groove along the adaxial surface.
20 Spikelets (4-) 5-10 (-11) mm long, 5-11 (-15)-flowered; pedicels ascending, somewhat appressed along the branches.
21 Spikelets ovate to oblong in outline, >1.4 mm wide; lower glume 1.2-2.3 mm long..... ***E. mexicana*** *ssp.* ***mexicana***
21 Spikelets linear to linear-lanceolate, <1.5 mm wide; lower glume 0.7-1.7 mm long..... ***E. mexicana*** *ssp.* ***virescens***
20 Spikelets (1.4-) 2-5 mm long, 2-6 (-7)-flowered; pedicels erect, spreading along the branches.
22 Panicle 10-45 (-55) cm long, 2/3 or more the height of the plant; pedicels (4-) 5-25 mm long; glandular pits absent below the nodes, branches, and rachis..... ***E. capillaris***
22 Panicle 4-20 cm long, < ½ the height of the plant; pedicels 1.5-5 mm long; glandular pits often present below the nodes, branches, and rachis..... ***E. frankii***
19 Caryopsis not grooved on the adaxial surface.
23 Plants with glandular pits or bands on the culm below the nodes, on the veins of the sheath, on the margins and veins of the blade, on the rachis, on the inflorescence branches and pedicels, and/or on the midveins of the lemma and palea.
24 Spikelets (1.7-) 2-4 mm long, 3-6-flowered..... ***E. frankii***
24 Spikelets (2-) 3.5-20 mm long, (3-) 5-40-flowered.
25 Spikelets 0.6-1.3 mm wide; pedicels 1-10 mm long, flexuous and delicate, appressed or spreading..... ***E. pilosa***
25 Spikelets 1.1-4 mm wide; pedicels 0.2-4 mm long, straight and rigid, mostly spreading.
26 Spikelets 6-20 mm long, 2-4 mm wide, 10-40-flowered; lemmas 2-2.8 mm long, with 1-3 crateriform glands along the keel; disarticulation of the entire florets from the persistent rachilla; anthers yellow..... ***E. cilianensis***
26 Spikelets 4-7 (-11) mm long, 1.1-2.2 mm wide, 7-12 (-20)-flowered; lemmas 1.4-1.8 mm long, rarely with 1-2 crateriform glands along the keel; disarticulation of the lemmas only, the palea and rachilla usually persistent; anthers reddish-brown.
27 Inflorescence with glandular areas of spots or rings on the rachis below the panicle branch bases, the glands often shiny or yellowish; stamens 3; blade margins lacking crateriform glands..... ***E. barrelieri***
27 Inflorescence sometimes with glandular areas of spots or crateriform pits on the rachis below the panicle branch bases, the glands usually dull and greenish-gray to straw-colored; stamens 2; blade margins sometimes with crateriform glands..... ***E. minor***
23 Plants lacking glandular pits or bands on the culm below the nodes, on the veins of the sheath, on the margins and veins of the blade, on the rachis, on the inflorescence branches and pedicels, and/or on the midveins of the lemma and palea.
28 Spikelets (1.6-) 2-4 mm wide, 12-42-flowered; disarticulation of entire florets from a persistent rachilla..... ***[E. unioloides]***
28 Spikelets 0.6-2.5 mm wide, 3-22-flowered; disarticulation of the lemmas only, the paleas usually persistent (or deciduous), the rachilla persistent.
29 Spikelets 3-6-flowered..... ***E. frankii***
29 Spikelets (3-) 5-42-flowered.
30 Lemmas with conspicuous lateral veins, these usually greenish; grains 0.3-0.6 mm long, ovoid, subglobose, or obovoid.
31 Spikelets 5-12 (-18) mm long, with 12-42 florets; primary branches 6-10 per culm; lemmas 1.3-2.0 mm long; anthers 3..... ***E. cumingii***
31 Spikelets 2-4.6 mm long, with 5-15 florets; primary branches (12-) 15-20 per culm; lemmas 1.0-1.3 mm long; anthers 2..... ***E. gangetica***
30 Lemmas with inconspicuous or moderately conspicuous lateral veins, these usually not greenish; grains 0.5-1.1 mm long, pear-shaped, obovoid, or prism-shaped.
32 First glume 0.3-0.6 (-0.8) mm long, <0.5× as long as the lowest lemma; spikelets 0.6-1.3 mm wide; panicle branches usually whorled at the lowest 2 nodes..... ***E. pilosa***

32 First glume 0.5-1.5 mm long, >0.5× as long as the lowest lemma; spikelets 1.2-2.5 mm wide; panicle branches solitary or paired at the 2 lowest nodes.
33 Pedicels widely spreading.....***E. pectinacea*** *var*. ***miserrima***
33 Pedicels appressed or rarely diverging up to 20 degrees from the branches.....***E. pectinacea*** *var*. ***pectinacea***

* ***Eragrostis amabilis*** (Linnaeus) Wright & Arnott ex Nees, Japanese Lovegrass, Feather Lovegrass. Disturbed areas; native of Old World. June. [= RAB, FNA, HC, S; *? E. tenella* (Linnaeus) Palisot de Beauvois ex Roemer & J.A. Schultes – K]

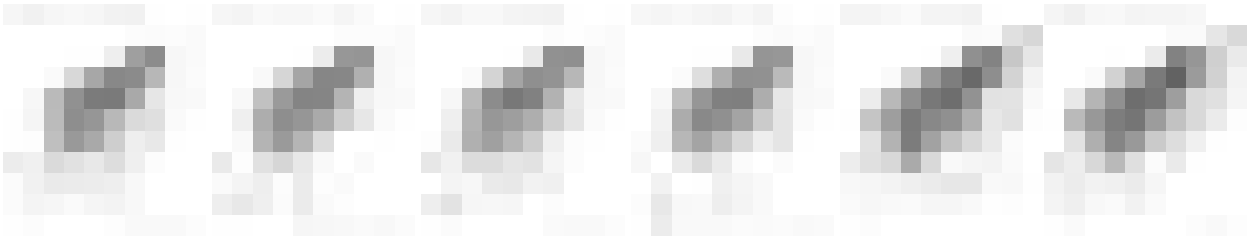
* ***Eragrostis atrovirens*** (Desvaux) Trinius ex Steudel, Thalia Lovegrass. Disturbed areas; native of Africa. [= FNA, K] {add to key; add to synonymy}

* ***Eragrostis bahiensis*** (Schrader ex J.A. Schultes) J.A. Schultes, Bahia Lovegrass. Disturbed areas; native of tropical America. Reported for SC (Kartesz 1999) and sw. GA (Jones & Coile 1988, GW, Kartesz 1999). [= FNA, GW, HC, K, S]

* ***Eragrostis barrelieri*** Daveau, Mediterranean Lovegrass. Waste areas near wool-combing mills, other disturbed areas; native of Mediterranean Europe. Also reported for e. TN (Chester et al. 1993). [= FNA, HC, K]

Eragrostis capillaris (Linnaeus) Nees, Lacegrass. Fields, roadsides, disturbed areas. July-October. ME and WI south to GA and TX. [= RAB, C, F, FNA, G, HC, K, Pa, S, W, WV]

* ***Eragrostis cilianensis*** (Allioni) Vignolo ex Janchen, Stinkgrass. Fields, disturbed areas; native of Europe. July-October. [= RAB, C, FNA, G, HC, K, Pa, S, W; ? *E. megastachya* (Koeler) Link – F, WV]



Eragrostis ciliaris (Linnaeus) R. Brown *var*. ***ciliaris***. Sandy shores. S. SC south to TX, Central America, West Indies, South America, Africa, and Asia. [= FNA, HC; < *E. ciliaris* – RAB, G, K, S]

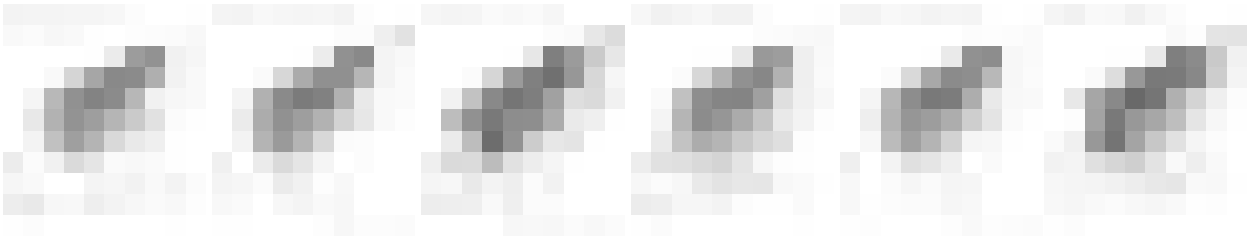
* ***Eragrostis cumingii*** Steudel, Fortyflower Lovegrass, Cuming's Lovegrass. Disturbed areas; native of e. Asia, se. Asia, south to Australia. Reported for NC (Kartesz 1999) and sw. GA (Jones & Coile 1988, HC). [= FNA, K; *? E. simplex* Scribner – HC]

* ***Eragrostis curvula*** (Schrader) Nees, Weeping Lovegrass. Roadsides; native of s. Africa. May-June. Very commonly planted as a roadbank stabilizer, *E. curvula* is fire resistant and shows some capability to spread into adjacent natural habitats. [= RAB, C, FNA, HC, K, Pa, WV; > *E. curvula* var. *conferta* Stapf]

Eragrostis elliottii S. Watson, Elliott's Lovegrass. Ultisol wet pine savannas, maritime wet grasslands, inland edges of brackish marshes, inland edges of freshwater tidal marshes, calcareously-influenced wet pine savannas. September-October. NC south to FL, west to TX. [= RAB, FNA, GW, HC, K, S]

* ***Eragrostis elongata*** (Willdenow) Jacquin f., Long Lovegrass. Waste areas near wool-combing mills; native of se. Asia and Australia. [= FNA, K] {not yet keyed}

Eragrostis frankii C.A. Meyer ex Steudel, Lacegrass. Disturbed areas. September. MA and MN south to FL and AR. [= RAB, C, FNA, G, GW, K, Pa, S, W, WV; > *E. frankii* var. *frankii* – F, HC]



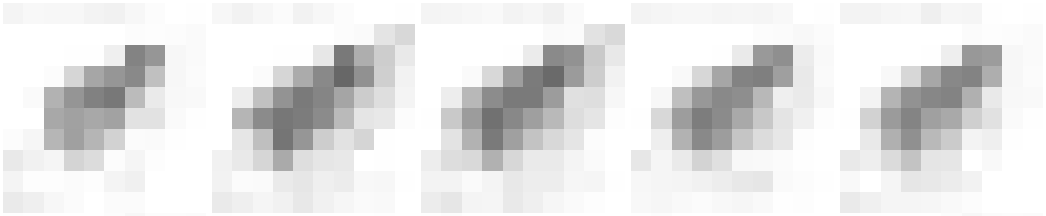
* ***Eragrostis gangetica*** (Roxburgh) Steudel, Slimflower Lovegrass. Ditches, roadsides, pond margins; native of s. Asia. [= FNA, K2[{add to synonymy}

Eragrostis hirsuta (Michaux) Nees, Bigtop Lovegrass. Fields, roadsides, disturbed areas. July-October. MD south to FL, west to TX, north in the interior to TN, AR, and MO; Central America. [= RAB, C, FNA, K, S, W, WV; > *E. hirsuta* var. *hirsuta* – F, G, HC; > *E. hirsuta* var. *laevivaginata* Fernald – F, G, HC]

Eragrostis hypnoides (Lamarck) Britton, Sterns, & Poggenburg, Creeping Lovegrass, Teal Lovegrass. Marshes, shores, riverbanks. Late June-September. Throughout most of North America, south to South America. [= RAB, C, F, FNA, G, GW, HC, K, Pa, S, W, WV]

Eragrostis intermedia A.S. Hitchcock, Plains Lovegrass. {habitat}. Reported for scattered locations as far east as NC and SC (Kartesz 1999), e. GA (Jones & Coile 1988), e. TN (Chester et al. 1993). [= C, F, FNA, G, HC, K]

*? ***Eragrostis japonica*** (Thunberg) Trinius, Pond Lovegrass. Moist or wet sandy areas. SC and TN south to Central America, South America, and West Indies; Old World tropics. Perhaps introduced from the Old World. Reported for SC by HC, G, and Small (1933), sw. GA by Jones & Coile (1988), and for w. TN by Chester et al. (1993). [= FNA, K; *? E. glomerata* (Walter) L.H. Dewey – G, GW, HC, S]



* ***Eragrostis leptostachya*** (R. Brown) Steudel, Australian Lovegrass. Reported for NC (Kartesz 1999, 2010); rejected by FNA as a component of the North American flora. [= FNA, K] {rejected; not mapped; not keyed}

Eragrostis lugens Nees, Mourning Lovegrass. Marshes, roadsides, low fields. June-October. Sw. and sc. United States south to Mexico. [= RAB, FNA, HC, K, S, W]

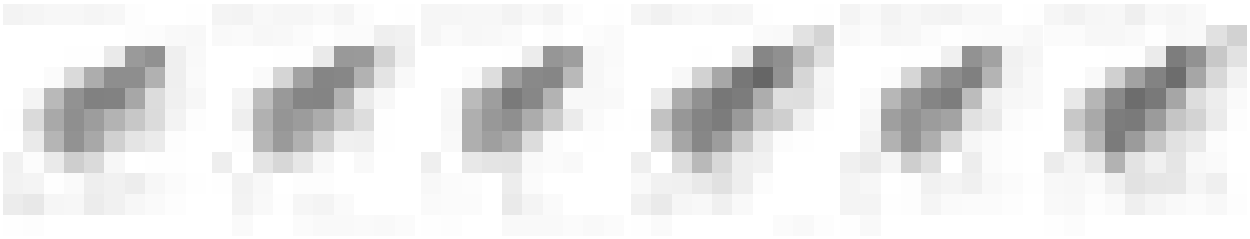
* ***Eragrostis mexicana*** (Hornemann) Link *ssp.* ***mexicana***, Mexican Lovegrass. Disturbed areas, waste areas near wool-combing mills; native of w. North America and Mexico. Reported to be naturalized as far east and north as SC, DE, and MD (Kartesz 1999). [= FNA, K; > *E. neomexicana* Vasey – C, F, G, HC; > *E. mexicana* – C, F, G, HC]

* ***Eragrostis mexicana*** (Hornemann) Link *ssp.* ***virescens*** (J. Presl) S.D. Koch & Sánchez. Disturbed areas; native of South America and w. North America. Reported as an introduction on ballast in MD and FL. [= FNA, K; = *E. virescens* J. Presl – HC]

* ***Eragrostis minor*** Host, Little Lovegrass. Disturbed areas, in cinders along railroads; native of Europe. Late June-September. [= C, FNA, K, Pa; ? *E. poaeoides* Palisot de Beauvois ex Roemer & J.A. Schultes – RAB, F, G, HC, W, WV; ? *E. eragrostis* (Linnaeus) Palisot de Beauvois – S]

Eragrostis pectinacea (Michaux) Nees ex Steudel *var.* ***miserrima*** (Fournier) J. Reeder. Disturbed habitats; rare. From FL and westward and southward. [= FNA, K; = *E. tephrosanthos* J.A. Schultes – HC, S; < *E. pectinacea* – GW]

Eragrostis pectinacea (Michaux) Nees ex Steudel *var.* ***pectinacea***, Carolina Lovegrass. Fields, roadsides, disturbed areas. July-September. ME and WA south to Central America and West Indies. [= FNA, K; < *E. pectinacea* – C, GW, Pa, W; = *E. pectinacea* – F, HC, S, WV; > *E. pectinacea* – G; > *E. diffusa* Buckley – G]



* ***Eragrostis pilosa*** (Linnaeus) Palisot de Beauvois *var.* ***pilosa***, India Lovegrass. Fields, roadsides, disturbed areas; native of tropical regions of the Old and New World. July-October. Var. *perplexa* (L.H. Harvey) S.D. Koch is also introduced but is not known from our area. [= FNA; = *E. pilosa* – RAB, S, W; > *E. multicaulis* Steudel – F, G, HC; > *E. pilosa* – F, G, HC; < *E. pilosa* – K, Pa, W]

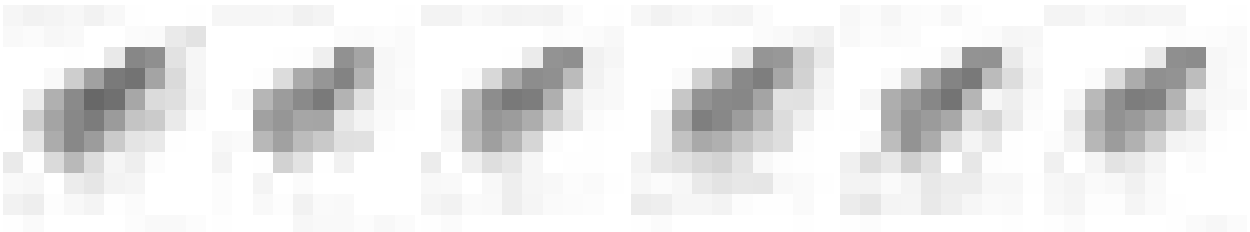
* ***Eragrostis plana*** Nees, South African Lovegrass. Waste areas near wool-combing mills; native of South Africa. [= FNA, K] {not yet keyed}

Eragrostis polytricha Nees, Hairysheath Lovegrass. Pinelands. From Alachua County, FL south to s. FL; s. Mexico, Central America, South America. [= FNA, K2] {not yet keyed; add to synonymy}

Eragrostis refracta (Muhlenberg) Scribner, Coastal Lovegrass. Pinelands, savannas, woodlands, marshes. July-October. DE south to FL, west to TX. [= RAB, C, F, FNA, G, GW, HC, K1, S; ? *E. virginica* (Zuccarini ex Roemer) Steudel – K2]

* ***Eragrostis secundiflora*** J. Presl *ssp.* ***oxylepis*** (Torrey) S.D. Koch, Red Lovegrass. Sandy roadsides, coastal dunes, and disturbed areas; native of sw. United States. First reported for SC by Nelson & Kelly (1997). [= FNA, K; = *E. oxylepis* (Torrey) Torrey – GW, HC; < *E. secundiflora* – S]

* ***Eragrostis setifolia*** Nees, Neverfail. Waste areas near wool-combing mills; native of Australia. [= FNA, K] {not yet keyed}

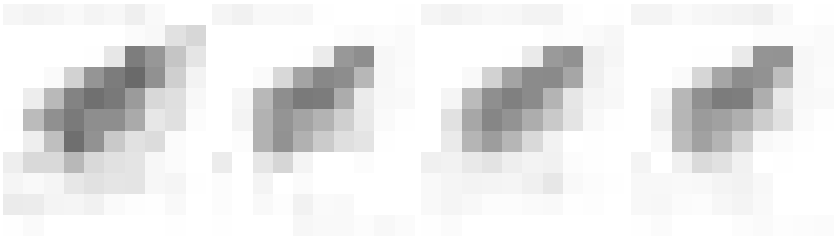


Eragrostis spectabilis (Pursh) Steudel, Purple Lovegrass, Tumblegrass. Sandy fields, roadsides, woodlands. August-October. ME west to ND, south to FL and TX. [= RAB, C, FNA, G, GW, HC, K, Pa, S, W, WV; > *E. spectabilis* var. *spectabilis* – F; > *E. spectabilis* var. *sparsihirsuta* Farwell – F; *E. pectinacea*, misapplied]

* ***Eragrostis tef*** (Zuccagni) Trotter, Teff. Waste areas near wool-combing mills; native of Africa. This is the grain used in making Ethiopian bread. [= FNA, HC, K] {not yet keyed}

* ***Eragrostis trichodes*** (Nuttall) Wood. Disturbed areas; native of w. North America. [= C, FNA, K; > *E. trichodes* var. *trichodes* – F, HC]

* ***Eragrostis unioloides*** (Retzius) Nees ex Steudel, Chinese Lovegrass. Disturbed areas; native of Asia. Reported for s. GA (Jones & Coile 1988, FNA, GW, HC). [= FNA, GW, HC, K, S]

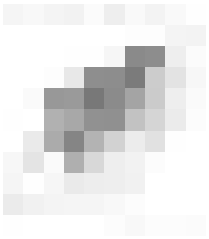


Eremochloa Büse 1852 (Centipede Grass)

A genus of about 11 species, native of Asia and Australia. References: Thieret in FNA (2003a).

Identification notes: In the autumn, the inflorescences make this grass readily recognizable at a distance: a short, tight lawn grass with a reddish aspect.

* ***Eremochloa ophiuroides*** (Munro) Hackel, Centipede Grass. Lawns, roadsides, sometimes weedy in more natural sites; native of se. Asia. Now very commonly planted as a lawn and roadside grass (especially in the Coastal Plain from se. NC southward). Stalter & Lamont (1996) report the VA occurrence of this species. [= RAB, FNA, HC, K1, K2]



Eriochloa Kunth 1816 (Cup Grass)

A genus of 320-30 species, of the tropical, subtropical, and warm temperate Old World and New World. References: Crins (1991)=Z; Shaw, Webster, & Bern in FNA (2003a); Shaw & Webster (1987)=Y.

1 Lemma of fertile floret with an awn >0.2 mm long; second glume awned; panicle compact, the raceme-like lateral branches close together and ascending-appressed, of irregular lengths; spikelets 8-16 on a typical, primary branch ..... ***E. contracta***
1 Lemma of fertile floret lacking an awn; second glume not awned; panicle open, the raceme-like lateral branches remote and divergent, the lowermost longest, the upper gradually reduced in length to the apex (*E. acuminata* var. *acuminata*, *E. michauxii* var. *michauxii*) **or** the panicle compact (*E. villosa*); spikelets 12-40 on a typical, primary branch.
2 Spikelets 2.0-2.5 mm wide ..... ***E. villosa***
2 Spikelets 1.1-1.8 mm wide.
3 Annual, 3-12 dm tall; spikelets 1.1-1.4 mm wide..... ***E. acuminata*** *var.* ***acuminata***
3 Perennial, 5-25 dm tall; spikelets 1.3-1.8 mm wide ..... ***E. michauxii*** *var.* ***michauxii***

* ***Eriochloa acuminata*** (J. Presl) Kunth *var.* ***acuminata***. Disturbed areas, waste areas near wool-combing mills; presumably native of farther south and west. Reported for scattered locations in GA (Jones & Coile 1988, as *E. gracilis*). Reported for NC (Kartesz 1999), but the specimen basis is of cultivated material. [= FNA, K, Y, Z; < *E. acuminata* – C; = *E. gracilis* (Fournier) A.S. Hitchcock var. *gracilis* – HC]

* ***Eriochloa aristata*** Vasey, Bearded Cupscale. Disturbed areas; native of Mexico to South America. [= FNA, K2] {not yet keyed; add to synonymy}

* ***Eriochloa contracta*** A.S. Hitchcock, Prairie Cupgrass. Disturbed areas, waste areas around wool-combing mills; native of midwestern United States. [= C, F, FNA, G, GW, HC, K, Y, Z]

* ***Eriochloa fatmensis*** (Hochst. & Steudel) Clayton. Disturbed areas, perhaps only a waif; native of the paleotropics. [= FNA, K2] {not yet keyed; add to synonymy}

Eriochloa michauxii (Poiret) A.S. Hitchcock *var.* ***michauxii***, Longleaf Cupgrass. Coastal freshwater and slightly brackish marshes, flatwoods, disturbed areas. Se. SC south to FL, west to AL, or possibly LA. Var. *simpsonii* A.S. Hitchcock is endemic to the sw. FL peninsula. [= FNA, HC, K, Y, Z; < *E. michauxii* – GW, S]

* ***Eriochloa polystachya*** Kunth, Caribbean Cupgrass. Disturbed areas; native of the West Indies, Central America, and South America. [= FNA, K2] {not yet keyed; add to synonymy}

Eriochloa punctata (Linnaeus) Desvaux ex Hamilton, Louisiana Cupgrass. Marshes, creek banks. MS west to TX, and south into the New World Tropics; reported for e. GA (FNA). [= FNA, HC, K] {not yet keyed; synonymy incomplete}

* ***Eriochloa villosa*** (Thunberg) Kunth, Chinese Cupgrass. Fields, meadows, other disturbed areas (open edge of railroad bed); native of e. Asia. See Belden et al. (2004) for additional information about the first occurrence in Virginia. [= C, FNA, HC, K, Pa, Y]

Eustachys Desvaux 1810 (Finger-grass)

A genus of ca. 12 species, of tropical and warm temperate regions. References: Aulbach in FNA (2003a). McKenzie, Urbatsch, & Aulbach-Smith (1987)=Z. Key based on FNA and Z.

1 Lateral nerves of the fertile lemma glabrous; culms stout, 7-15 dm tall; spikes 8-16 (-20), 7-12 cm long.....***E. glauca***
1 Lateral nerves of the fertile lemma pubescent; culms slender, 3-10 dm tall; spikes 1-20, 2.5-9 cm long.
  2 Keel of the fertile lemma glabrous; [aliens, in disturbed situations].
    3 Spikelets >2.4 mm long; sterile floret oblanceolate, acute.....***E. distichophylla***
    3 Spikelets <2.1 mm long; sterile floret widely cuneate, truncate.....***E. retusa***
  2 Keel of the fertile lemma pubescent; [natives and aliens].
    4 Spikelets 1.5-2.5 mm long; lowest lemma in each spikelet mucronate.
      5 Lowest lemma in each spikelet tawny to reddish-brown; lateral veins of the lowest lemma in each spikelet with spreading hairs > 0.5 mm long; [rare introduction] .....***E. caribaea***
      5 Lowest lemma in each spikelet dark brown; lateral veins of the lowest lemma in each spikelet with appressed hairs < 0.5 mm long; [common native from NC south to s. FL, west to LA and beyond our area].....***E. petraea***
    3 Spikelets 2.6-3.7 mm long; lowest lemma in each spikelet awnedm the awns 0.4-1.2 mm long.
      6 Panicle branches 1-3; awns of the lowest lemma in each spikelet 0.4-0.6 mm long; spikelets 3.0-3.7 mm long .....***E. floridana***
      6 Panicle branches (3-) 4-9; awns of the lowest lemma in each spikelet 0.7-1.2 mm long; spikelets 2.6-3.0 mm long .....***E. neglecta***

* ***Eustachys caribaea*** (Sprengel) Herter, Chickenfoot Grass. Disturbed areas; native of South America. [= FNA, K1; = *Chloris capensis* – HC, misapplied; = *E. paspaloides* (Vahl) Lanza & Mattei ssp. *caribaea* (Sprengel) Nowack – K2] {add to synonymy}

* ***Eustachys distichophylla*** (Lagasca y Segura) Nees, Weeping Finger-grass. Disturbed areas; native of South America. [= FNA, K, Z; = *Chloris distichophylla* Lagasca y Segura – HC]

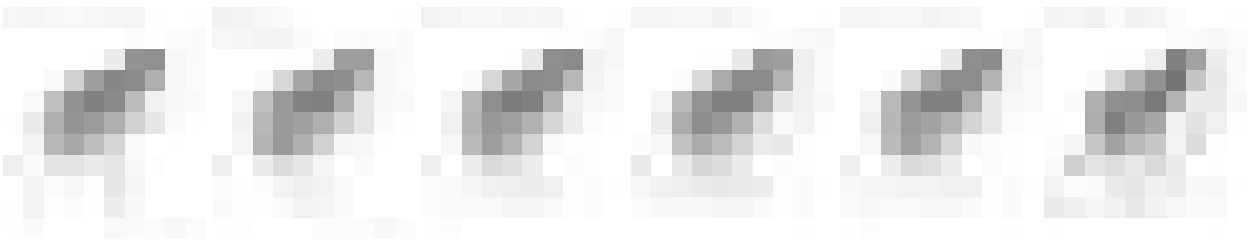
Eustachys floridana Chapman, Florida Finger-grass. Sandhills, pine flatwoods. E. GA south to c. peninsular FL, west to w. Panhandle FL and s. AL. [= FNA, K, Z; = *Chloris floridana* (Chapman) Wood – HC, S] {synonymy}

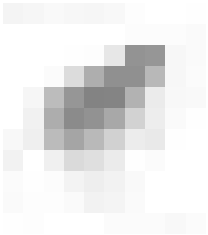
Eustachys glauca Chapman, Saltmarsh Finger-grass. Marshes and marsh edges. June-October. Se. NC south to FL and west to s. AL. [= FNA, K, Z; = *Chloris glauca* (Chapman) Wood – RAB, GW, HC, S]

Eustachys neglecta (Nash) Nash. Pinelands, sandy fields; uncommon. N. and peninsular FL, se. AL, and e. TX (where perhaps introduced). [= FNA, K; = *Chloris neglecta* Nash – HC, S] {synonymy incomplete}

Eustachys petraea (Swartz) Desvaux, Dune Finger-grass. Dune slacks and sand flats, sometimes in disturbed areas. (May-) June-October. NC (Dare County) south to FL and west to TX; Mexico to Panama. [= FNA, K, Z; = *Chloris petraea* Swartz – RAB, GW, HC, S]

* ***Eustachys retusa*** (Lagasca y Segura) Kunth, Argentine Finger-grass. Sandy fields, along railroads; native of Argentina. June. Reported for Bryan County, GA (Carter, Baker, & Morris 2009). [= FNA, K, Z; *? Chloris argentina* (Hackel) Lillo & Parodi – RAB, G, HC]





Festuca Linnaeus 1753 (Fescue)

A genus of about 500 species, nearly cosmopolitan in temperate regions. References: Darbyshire & Pavlick in FNA (2007a); Darbyshire (1993)=X; Aiken & Darbyshire (1990)=Y; Tucker (1996)=Z; Soreng & Terrell (1998). Key based in part on C and Y. [also see *Vulpia*]

1 Leaves 0.2-3 mm wide, often involute.
  2 Plant loosely tufted, often rhizomatous; basal sheaths disintegrating into fibers; spikelets 6-13 mm long ..... ***F. rubra*** *ssp.* ***rubra***
  2 Plant tufted, lacking rhizomes; basal sheaths persistent, remaining firm and entire; spikelets 3-9 mm long.
    3 Lemmas 2.3-4.0 (-4.4) mm long, awnless, or with a minute projection to 0.4 mm long; anther 1.5-2.2 (-2.5) mm long; spikelets 3.0-6.0 (-6.5) mm long ..... ***F. filiformis***
    3 Lemmas 3.8-5.5 mm long, with an awn 0.5-2.5 mm long; anther (2.3-) 2.5-3.0 mm long; spikelets 5.5-9.0 mm long ..... ***F. trachyphylla***
1 Leaves 3-12 mm wide, flat.
  4 Larger lemmas 5.5-10 mm long; leaf blades auriculate at the base; anthers 2-4 mm long ..... ***[****see* ***Schedonorus]***
  4 Larger lemmas 3.3-5.2 mm long; leaf blades not auriculate at the base; anthers 0.8-1.5 mm long; [subgenus *Subulatae*, section *Obtusae*].
    5 Ligules 2-9 mm long; [rare introduction] ..... ***F. thurberi***
    5 Ligules 0.1-1.5 (-2) mm long; [common natives].
      6 Principal lowermost panicle branches with 8-20 spikelets clustered at the end; spikelets broadly ovate, 4-6 mm wide ..... ***F. paradoxa***
      6 Principal lowermost panicle branches with 2-7 spikelets scattered along the outer half; spikelets narrowly ovate, 2-4 mm wide ..... ***F. subverticillata***

* ***Festuca filiformis*** Pourret, Hair Fescue, Fineleaf Sheep Fescue. Mt, Pd (NC, VA): lawns, disturbed areas; rare, native of Eurasia. May-June. [= C, FNA, K, Y, Z; ? *F. capillata* Lamarck – RAB, F, HC; ? *F. ovina* Linnaeus var. *capillata* (Lamarck) Alefeld – G; ? *F. tenuifolia* Sibthorp – W]

Festuca paradoxa Desvaux, Cluster Fescue. Bottomlands, uplands over mafic rock. May-July. PA west to WI and IA, south to SC, c. GA, and e. TX. [= RAB, C, F, FNA, G, GW, HC, K, Pa, W, Z; ? *F. shortii* Kunth ex Wood – S, misapplied]

Festuca rubra Linnaeus *ssp.* ***rubra***, Red Fescue. Mt (NC, SC, VA, WV), Pd (DE, GA, NC, VA), Cp (DE, GA, NC, VA): roadsides, fields, disturbed areas, pastures, grassy balds; common. April-July. In our area, this species is considered to be partly native and partly introduced. This species is circumboreal, extending south in North America to GA and MO. Many varieties or subspecies have been described in the *F. rubra* complex. [= FNA, K; < *F. rubra* – RAB, C, G, HC, Pa, S, WV, Y, Z; > *F. rubra* var. *rubra* – F; > *F. rubra* var. *commutata* Gaudin – F]

Festuca subverticillata (Persoon) Alexeev, Nodding Fescue. Moist to wet forests, woodlands, and disturbed areas. May-July. ME, QC, and MB south to FL and e. TX. [= C, FNA, K, Y, Z; ? *F. obtusa* Biehler – RAB, F, G, GW, HC, Pa, S, W, WV]

* ***Festuca thurberi*** Vasey. Waste areas near wool-combing mills, possibly only a waif; native of sw. United States (NM, CO, WY, and UT). [= FNA, K]

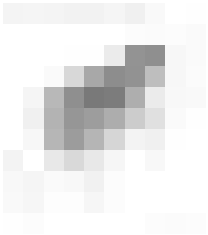
* ***Festuca trachyphylla*** (Hackel) Krajina, Hard Fescue. Pd (DE, GA, NC, VA), Mt (NC, VA, WV), Cp (NC, SC, VA): meadows, pastures, disturbed areas; uncommon (rare in DE), native of Eurasia. May-June. The nomenclatural debate about the application of the name *F. trachyphylla* is summarized in Darbyshire & Pavlick (1997). [= C, K, Pa, Y, Z; < *F. ovina* – RAB, S, W, WV, in a broad sense (misapplied as to our material); < *F. ovina* var. *ovina* – F, G, HC; < *F. ovina* var. *duriuscula* (Linnaeus) W.D.J. Kock – F, G, HC, misapplied as to our material]

Festuca versuta Beal, Texas Fescue. Native, east to TN according to K1, but not considered to be distributed east of the Mississippi River by FNA or K2. [= FNA, K] {rejected; not keyed; not mapped}

Gastridium Palisot de Beauvois 1812 (Nitgrass)

A genus of 2 species, annuals, of s. Europe, n. Africa, and w. Asia. References: Wipff in FNA (2007a).

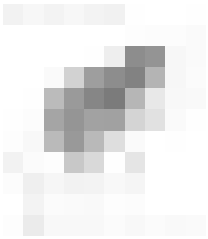
* ***Gastridium phleoides*** (Nees & Meyen) C.E. Hubbard, Nitgrass. Disturbed areas; native of sw. Asia. [= FNA, K] {synonymy incomplete}



Gaudinia Palisot de Beauvois 1812

A genus of about 4 species, annuals or perennials, native of the Mediterranean region. References: Daniel in FNA (2007a).

* ***Gaudinia fragilis*** (Linnaeus) Palisot de Beauvois, Oatgrass. Ballast, probably only a waif; native of Mediterranean Europe. Reported from Mobile, AL. [= FNA, K1, K2; = *Avena fragilis* Linnaeus]



Glyceria R. Brown 1810 (Mannagrass)

A genus of about 40 species, nearly cosmopolitan. References: Barkworth & Anderton in FNA (2007a); Tucker (1996)=Z. [also see *Torreyochloa*]

1 Spikelets 10-40 mm long, linear, 5-15× as long as wide, terete or nearly so in cross-section; [section *Glyceria*].
  2 Lemma (6-) 7-8.5 (-10) mm long, acute to acuminate; palea longer than the lemma, extending 1.5-3 mm beyond the lemma apex ..... ***G. acutiflora***
  2 Lemma 2.4-6.0 mm long, obtuse to notched; palea about as long as the lemma (ranging from shorter than the lemma and included, to projecting up to 1.5 mm beyond the lemma apex).
    3 Lemma (3.5-) 4.0-6.0 mm long, the apex with 1-2 strongly developed lobes, and also often toothed between the lobes; leaf blades 2-12 cm long; primary panicle branches 1.5-9.5 cm long..... ***G. declinata***
    3 Lemma 2.4-4.8 mm long, the apex rounded or with a few poorly developed rounded teeth; leaf blades 18-32 cm long; primary panicle branches 3-17 cm long.
      4 Culms 2.5-8 dm tall; pedicels 1-6 mm long..... ***G. notata***
      4 Culms 7-18 dm tall; pedicels 0.7-1.7 mm long.
        5 Lemmas hispidulous on the veins, the hairs ca. 0.1 mm long..... ***G. arkansana***
        5 Lemmas scabrous on the veins, the prickles ca. 0.05 mm long ..... ***G. septentrionalis***
1 Spikelets 2.5-8 mm long, ovate to oblong, 1.5-3× as long as wide, laterally compressed in cross-section.
  5 Upper glumes 2.5-5 mm long, longer than wide; [w. VA and possibly NC northward]; [section *Hydropoa*]..... ***G. grandis*** *var.* ***grandis***
  5 Upper glumes 0.6-3.7 mm long, if > 3 mm long, then shorter than wide; [collectively widespread]; [section *Striatae*].
    6 Inflorescence compact (at maturity), the branches stiffly ascending to appressed, the tips never nodding; ligule < 1 mm long.
      7 Inflorescence branches elongate, appressed; lower internodes of the inflorescence 2-8 cm long; spikelets with 3-4 flowers, 3.5-4 mm long; lemma 1.9-2.8 mm long; leaves 2-5 mm wide; [Mountains, rarely elsewhere]..... ***G. melicaria***
      7 Inflorescence branches short, stiffly ascending; lower internodes of the inflorescence 0.8-2.0 (-2.5) cm long; spikelets with 4-7 flowers, 4-8 mm long; lemma 3.0-3.7 mm long; leaves 3-10 mm wide; [Coastal Plain, rarely disjunct inland to the Mountains of VA] ..... ***G. obtusa***
    6 Inflorescence lax and diffuse (at maturity), the branches spreading to somewhat ascending, the tips often nodding or drooping; ligule 1-6 mm long.
      8 Glumes tapering from below midlength to the narrowly acute (< 45 degree) tips; lemmas > 2× as long as wide; [endemic to seepage at high elevations in the Great Smoky Mountains, NC and TN and nearby] ..... ***G. nubigena***
      8 Glumes narrowing from midlength or above to the acute or rounded (> 45 degree) tips; lemmas < 2× as long as wide; [collectively widespread].
        9 Lemma 1.4-2.1 mm long, the veins prominently raised.
          10 Leaf blades 6-15 mm wide; anthers 0.5-0.8 mm long; culms 2.5-8 mm thick; [rare introduction]..... ***G. elata***
          10 Leaf blades 2-6 mm wide; anthers 0.2-0.6 mm long; culms 1.5-3.5 mm thick; [common] ..... ***G. striata*** *var.* ***striata***
        9 Lemma 1.8-4.0 mm long, the veins visible, but not raised; ligule 2-6 mm long.
          11 Lemma 2.4-4.0 mm long, projecting conspicuously beyond the palea; spikelets 5-8 mm long, with (4-) 5-10 flowers..... ***G. canadensis***
          11 Lemma 1.8-2.5 mm long, more-or-less equal to the palea; spikelets 3-5 mm long, with 2-5 (-6) flowers ..... ***G. laxa***

Glyceria acutiflora Torrey. Shallow water and wet mucky soils in mountain ponds, wet pastures. June-July. ME west to MI, south to DE, VA, nw. GA (Jones & Coile 1988), e. TN, and MO; also in e. Asia. [= C, F, FNA, G, GW, HC, K, Pa, W, WV, Z; = *Panicularia acutiflora* (Torrey) Kuntze – S]

Glyceria arkansana Fernald, Arkansas Mannagrass. Swamps. IL south to LA and AR; disjunct in w. NY. The VA report is in error. The appropriate treatment of this taxon needs further investigation. [= F, HC, K, Z; < *G. septentrionalis* – C, G; = *G. septentrionalis* A.S. Hitchcock var. *arkansana* (Fernald) Steyermark & Kučera – FNA]

Glyceria canadensis (Michaux) Trinius, Rattlesnake Mannagrass. Bogs, seepages, and wet meadows. June-August. NL (Newfoundland) west to MN, south to NJ, VA, nw. NC, and IL. [= C, F, G, K, Pa, WV, Z; = *G. canadensis* var. *canadensis* – FNA, HC, W]

* ***Glyceria declinata*** de Brébisson. Disturbed moist areas; native of Europe. Documented for Alleghany County, NC (D. Poindexter, pers. comm. 2009) [= FNA] {check for additional synonymy}

* ***Glyceria elata*** (Nash) M.E. Jones. {habitat unknown}; native of w. North America. Reported for GA by FNA; presumably a chance introduction. [= FNA] {add synonymy}

Glyceria grandis S. Watson *var.* ***grandis***, American Mannagrass. Wet, mucky soils of open wetlands. July. NS west to AK, south to VA, IA, NM, and OR. Attributed to w. NC by Tucker (1996). [= FNA, K; < *G. grandis* – C, F, G, GW, HC, Pa, WV, Z; = *Panicularia grandis* (S. Watson) Nash – S; *? G. maxima* (Hartman) Holmberg ssp. *grandis* (S. Watson) Hultén]

Glyceria laxa (Scribner) Scribner, Lax Mannagrass. Bogs. June-August. PE south to NC, mostly Appalachian. Though often described as a hybrid of *G. canadensis* and either *G. striata* var. *striata* and/or *G. grandis* var. *grandis*, *G. laxa* ranges south of the distribution of both *G. canadensis* and *G. grandis* var. *grandis*. It is best considered as a species, perhaps of hybrid origin. [= F, G, K, WV; = *G. canadensis* (Michaux) Trinius var. *laxa* (Scribner) A.S. Hitchcock – RAB, FNA, HC; = *G.* ×*laxa* – C; < *G. canadensis* – GW; = *G. canadensis* × *grandis* – Pa]

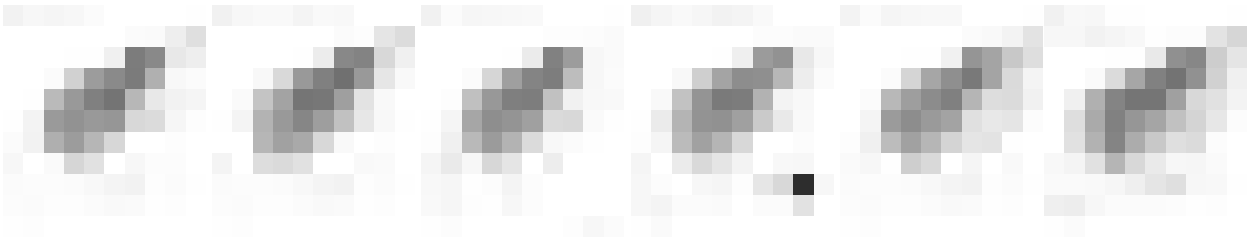
Glyceria melicaria (Michaux) F.T. Hubbard, Northeastern Mannagrass. Mountain swamp forests and seepages. June-August. NS west to QC, south to n. GA (Jones & Coile 1988) and KY. [= RAB, C, F, FNA, G, GW, HC, K, Pa, W, WV, Z; = *Panicularia melicaria* (Michaux) A.S. Hitchcock – S]

* ***Glyceria notata*** Chevallier, Marked Mannagrass. Reported for TN (FNA). [= FNA] {add synonymy}

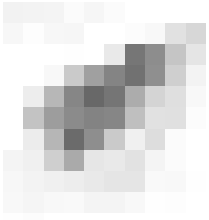
Glyceria nubigena W.A. Anderson, Smoky Mountain Mannagrass. Moderate to high elevation seepages in the Great Smoky Mountains, sometimes in areas appearing dry (such as heath balds), nearly endemic to Great Smoky Mountains National Park. June-July. Endemic to the Great Smoky Mountains of w. NC and e. TN. *G. nubigena* has nearly the same range as *Rugelia nudicaulis*, but is more restricted to seepage. The distinctions and relationship between this taxon and *G. grandis* need further investigation. [= RAB, FNA, HC, K, W, Z]

Glyceria obtusa (Muhlenberg) Trinius, Coastal Mannagrass. Blackwater swamp forests, wet meadows, freshwater marshes. June-September. NS south to SC, on or near the Coastal Plain; disjunct to w. VA in Shenandoah Valley sinkhole ponds. [= RAB, C, F, FNA, G, GW, HC, K, Pa, W, Z; = *Panicularia obtusa* (Muhlenberg) Kuntze – S]

Glyceria septentrionalis A.S. Hitchcock, Floating Mannagrass, Eastern Mannagrass. Shallow water, wet mucky soils, floodplain sloughs, cypress ponds. May-June. MA west to MN, south to SC, ne. GA, and TX. [= RAB, F, GW, HC, K, Pa, W, WV, Z; < *G. septentrionalis* – C, G (also see *G. arkansana*); = *G. septentrionalis* var. *septentrionalis* – FNA; = *Panicularia septentrionalis* (A.S. Hitchcock) Bicknell – S]



Glyceria striata (Lamarck) A.S. Hitchcock *var.* ***striata***, Fowl Mannagrass. Wet meadows, seepages, bogs, marshes, swamp forests. April-June. NL (Newfoundland) west to BC, south to FL and CA. Var. *stricta* (Scribner) Fernald is more northern. [= C, F, G, HC, Z; < *G. striata* – RAB, FNA, GW, K, Pa, W, WV; = *Panicularia striata* (Lamarck) A.S. Hitchcock – S; = *G. striata* ssp. *striata*]



Gymnopogon Palisot de Beauvois 1812 (Skeleton Grass, Beard Grass)

A genus of about 15 species, in temperate and tropical areas of the Americas. References: Cialdella & Zuloaga (2011)=Y; Smith in FNA (2007b); Smith (1971)=Z.

Identification notes: When sterile, *Gymnopogon* is sometimes confused with *Dichanthelium*. *Gymnopogon* differs in having the sheaths conspicuously overlapping (vs. not overlapping in *Dichanthelium*) and leaves that are definitely cordate-clasping and of stiff texture (only a few *Dichanthelium* have this combination).

1 Awn of the lemma 4.5-12 mm long; inflorescence branches with spikelets distributed from the tip nearly to the base; leaves 5-15 mm wide; [Coastal Plain, Piedmont, and Mountains]..... ***G. ambiguus***
1 Awn of the lemma 0.8-1.6 (-3.5) mm long; inflorescence branches with spikelets distributed from the tip nearly to the base (*G. chapmanianus*) or to roughly the midpoint, the basal portion naked (or some branches rarely with a few spikelets) (*G. brevifolius*); leaves 2-8 mm wide; [Coastal Plain and lower Piedmont].
2 Spikelets 1-flowered; first glume 2.3-3.7 mm long ..... ***G. brevifolius***
2 Spikelets 2-4-flowered; first glume 3.8-5 mm long..... ***G. chapmanianus***

Gymnopogon ambiguus (Michaux) Britton, Sterns, & Poggenburg, Eastern Skeleton Grass, Eastern Beard Grass. Prairies, glades, barrens, dry pinelands and woodlands, dry fields. August-October. S. NJ west to KY, OH, and MO, south to s. FL and TX. [= RAB, C, F, FNA, G, HC, K, Pa, S, W, WH, WV, Y, Z]

Gymnopogon brevifolius Trinius, Pineland Skeleton Grass, Pineland Beard Grass. Pine savannas, sandhills, dry woodlands, prairies, calcareous glades. August-October. S. NJ south to s. FL, west to LA and AR; disjunct in the Highland Rim of KY and TN. [= RAB, C, F, FNA, G, HC, K, S, WH, Y, Z]

Gymnopogon chapmanianus A.S.Hitchcock, Chapman's Skeleton Grass, Chapman's Beard Grass. Sandhills and other xeric, sandy habitats. Se. GA south to s. FL. There remains some question as to whether *G. floridanus* should indeed be lumped into *G. chapmanianus*; additional study is warranted. [= FNA, K, S, WH, Y; > *G. chapmanianus* – HC, Z; > *G. floridanus* Swallen – HC, Z]

Hackelochloa Kuntze 1891 (Pitscale Grass

A genus… References: Thieret in FNA (2003a).

* ***Hackelochloa granularis*** (Linnaeus) Kuntze, Pitscale Grass. Disturbed areas; native of the Old World. Reported for sw. GA and other Gulf Coast states (Thieret in FNA 2003a, Jones & Coile 1988, Kartesz 1999). [= FNA, HC, K; = *Rytilix granularis* (Linnaeus) Skeels – S; = *Mnesithea granularis* (Linnaeus) Koning & Sosef]

Hainardia W. Greuter 1967 (Thintail)

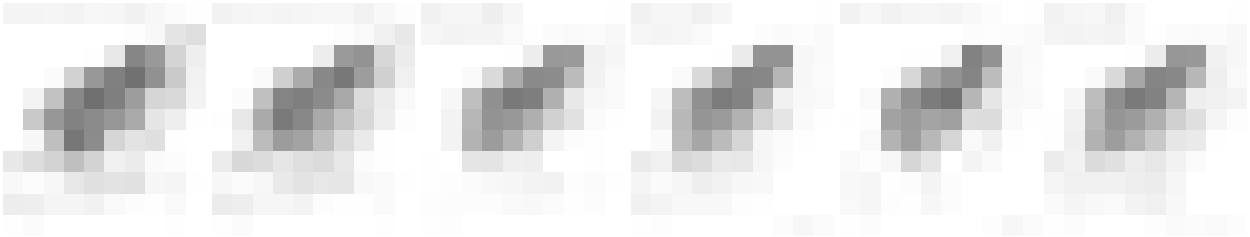
A genus of 1 species, an annual, native of Europe. References: Smith in FNA (2007a); Tucker (1996)=Z.

* ***Hainardia cylindrica*** (Willdenow) W. Greuter, Thintail. Waste areas around wool-combing mills; native of the Old World. April-June. [= FNA, K, Z; = *Lepturus cylindricus* (Willdenow) Trinius – RAB; = *Monerma cylindrica* (Willdenow) Cosson & Durieu – HC]

Heteropogon Persoon 1806 (Tanglehead)

A genus of about 10 species, pantropical and extending into subtropical and warm temperate areas. References: Barkworth in FNA (2003a).

* ***Heteropogon melanocarpus*** (Elliott) Elliott ex Bentham, Sweet Tanglehead. Sandy roadsides, disturbed areas; probably naturalized from farther south (or even from the Old World). September-October. The species is widespread in the Old World and New World tropics, north in North America to se. NC. [= RAB, FNA, HC, K, S]



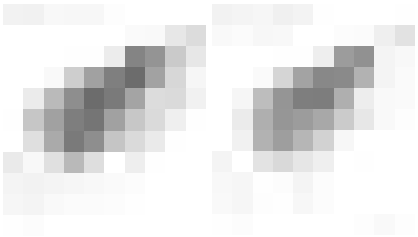
Holcus Linnaeus 1753 (Velvet Grass, Soft Grass)

A genus of 8 species, usually perennial, native of Europe, n. Africa, and w. Asia. References: Standley in FNA (2007a); Tucker (1996)=Z.

1 Plant not rhizomatous; upper culm internodes velvety-villous; lemma awn 1-2 mm long, recurved as a hook..... ***H. lanatus***
1 Plant strongly rhizomatous; upper culm internodes glabrous; lemma awn 3-5 mm long, straight or geniculate ..... ***H. mollis ssp. mollis***

* ***Holcus lanatus*** Linnaeus, Velvet Grass, Soft Grass, Yorkshire-fog. Pastures, disturbed areas, roadsides, hedge-rows; native of Europe. May-October. [= RAB, C, F, FNA, G, HC, K, Pa, W, WV, Z; = *Notholcus lanatus* (Linnaeus) Nash – S]

* ***Holcus mollis*** Linnaeus *ssp.* ***mollis***, Creeping Soft Grass. Lawns; native of Europe. September. This European species is known from scattered sites in e. North America. The species was documented for our area by Clay (1995). [= FNA; < *H. mollis* – C, F, G, HC, K, Z]



Hordeum Linnaeus 1753 (Barley)

A genus of about 40 species, north temperate and in South America. Many recent authors place most of our species (other than *H. vulgare)* in *Critesion* Rafinesque. References: von Bothmer, Baden, & Jacobsen in FNA (2007a); Tucker (1996)=Z; Petersen & Seberg (2003); Blattner (2004).

1 Rachis remaining intact at maturity; leaves 5-12 mm wide, with well-developed auricles; [section *Hordeum*]..... ***H. vulgare***
1 Rachis disarticulating at maturity; leaves 1-5 mm wide, not auriculate (except in *H. murinum* ssp. *leporinum*).
  2 Perennial; glumes 25-150 mm long; [intersectional hybrid derivative of section *Sibirica* and section *Critesion*] .... ***H. jubatum ssp. jubatum***
  2 Annual; glumes 7-22 (-28) mm long.
    3 Leaves auriculate; glumes of the central spikelet (in the triad) with ciliate margins; [section *Hordeum*]..... ***H. murinum ssp. leporinum***
    3 Leaves not auriculate; glumes of the central spikelet (in the triad) with scabrous margins; [section *Critesion*]..... ***H. pusillum***

* ***Hordeum brachyantherum*** Nevski *ssp.* ***brachyantherum***. Disturbed areas, perhaps only a waif; native of w. North America and ne. Asia. Reported for se. PA (Rhoads & Klein 1993) and also is apparently known from specimens from GA (Sorrie, pers. comm.), and scattered sites elsewhere in our area. A tetraploid taxon. [= FNA, K; ? *Critesion brachyantherum* (Nevski) Barkworth & D.R. Dewey] {not yet keyed; add synonymy HC}

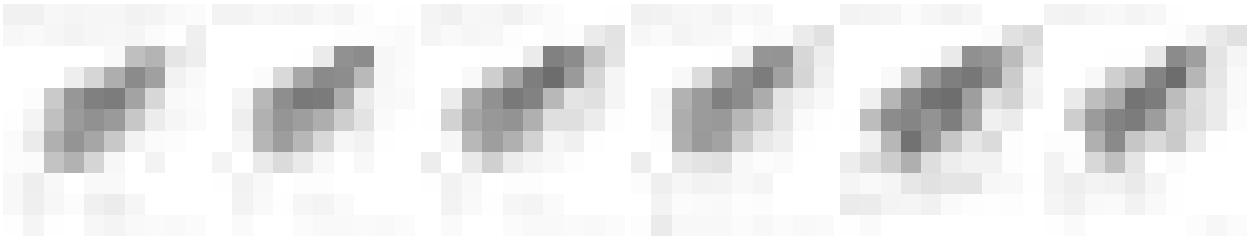
* ***Hordeum depressum*** (Scribner & J.G. Smith) Rydberg, Low Barley. Waste areas around wool-combing mills; native of w. North America, probably only a waif. A tetraploid taxon. [= FNA, HC, K; = *Critesion depressum* (Scribner & J.G. Smith) Á. Löve] {not yet keyed}

* ***Hordeum jubatum*** Linnaeus *ssp.* ***jubatum***, Foxtail Barley, Squirreltail Barley. Disturbed areas; native of w. North America, apparently introduced in our area. May-August. A tetraploid taxon. [= FNA, K; < *H. jubatum* – RAB, C, F, G, HC, Pa, W, WV, Z; = *Critesion jubatum* (Linnaeus) Nevski]

* ***Hordeum murinum*** Linnaeus *ssp.* ***leporinum*** (Link) Arcangeli. Disturbed areas; native of Mediterranean Europe. May. A tetraploid taxon. [= FNA, K, Z; = *H. leporinum* Link – RAB, C, HC; < *Hordeum murinum* Linnaeus – G, Pa, S; = *Critesion murinum* (Linnaeus) Á. Löve ssp. *leporinum* (Link) Á. Löve]

Hordeum pusillum Nuttall, Little Barley. Roadsides, ditches, disturbed areas; common (rare in VA Mountains). April-June. Se. NY west to MN, south to n. FL, s. TX, and s. AZ. A diploid taxon. [= RAB, C, F, FNA, G, HC, K, Pa, S, W, Z; = *Critesion pusillum* (Nuttall) Á. Löve]

* ***Hordeum vulgare*** Linnaeus, Barley. Cultivated fields, commonly cultivated, rare as a waif; native of Eurasia. May-July. A diploid taxon. The original wild form is often treated as *H. vulgare* ssp. *spontaneum* and the cultivated, non-shattering derivative as ssp. *vulgare* (Hancock 2004). The wild form was used as a food source since at least 19,000 years ago, and "ssp. *vulgare*" developed by 8,500 years ago. [= RAB, C, F, K, Pa, Z; > *H. aegiceras* Nees ex Royle – G; > *H. vulgare* var. *vulgare* – G, HC; > *H. vulgare* var. *trifurcatum* (Schlechtendal) Alefeld – G, HC; > *H. vulgare* ssp. *vulgare* – FNA; > *H. vulgare* ssp. *spontaneum* (K. Koch) Thellung]

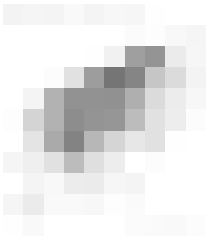


Imperata Cirillo 1792 (Cogongrass, Satintail)

A genus of about 8-9 species, of tropical, subtropical, and warm temperate areas of both hemispheres. References: Gabel in FNA (2003a); Ward (2004c)=Z; Hall (1998)=Y.

* ***Imperata cylindrica*** (Linnaeus) Palisot de Beauvois, Cogongrass, Brazilian Satintail. Grassy roadside; introduced from the tropics. See Nelson (1993) for first report from SC. An extremely aggressive and dangerous weed, now well-established and

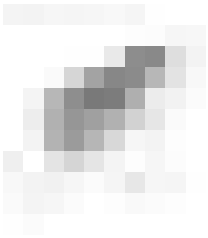
rapidly invading fire-maintained Coastal Plain areas (such as longleaf pine and slash pine flatwoods and longleaf pine clayhills) on the Gulf Coastal Plain of FL, AL, and MS. Hall (1998) argues that *I. cylindrica* and *I. brasiliensis* are not distinct. The only character considered to separate them is that *I. brasiliensis* has 1 anther and *I. cylindrica* has 2. Ward (2004c) treats the 2 taxa at varietal level. Both putative taxa are present in the Gulf Coast area of FL, GA, AL, and LA. [= Y; > *I. cylindrica* – FNA, HC, K; > *I. brasiliensis* Trinius – FNA, HC, K, S; > *I. cylindrica* var. *cylindrica* – Z; > *I. cylindrica* var. *mexicana* (Ruprecht) D.B. Ward – Z]



Koeleria Persoon 1805 (Junegrass, Koeleria)

A genus of about 60 species, north and south temperate. References: Standley in FNA (2007a). [also see *Rostraria*]

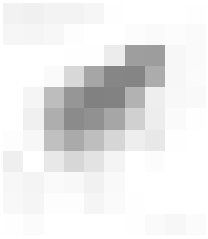
Koeleria macrantha (Ledebour) J.A. Schultes, Junegrass. {habitats}. South to DE, MD, PA, KY, AL, LA, TX, and Mexico. [= FNA, K, Pa; < *K. pyramidata* (Lamarck) Palisot de Beavois – C]



Lachnagrostis Trinius 1820

A genus of about 20 species, annuals and perennials, of the Southern Hemisphere. References: Harvey in FNA (2007a); Soreng et al. (2003).

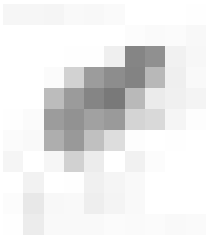
* ***Lachnagrostis filiformis*** (G. Forster) Trinius, Pacific Bentgrass. Waste areas around wool-combing mill, perhaps only a waif; native of Australia. [= FNA; = *Agrostis avenacea* J.F. Gmelin – K] {not keyed}



Lagurus Linnaeus 1753 (Hare's-tail Grass)

A monotypic genus, an annual, of the Mediterranean region. References: Tucker in FNA (2007a); Tucker (1996)=Z.

* ***Lagurus ovatus*** Linnaeus, Hare's-tail Grass. On ballast, other disturbed areas; native of Mediterranean Europe. April-June. [= RAB, FNA, HC, K, Z]



Leersia Swartz 1788 (Cutgrass)

A genus of about 17-18 species, tropical and warm temperate. References: Pyrah in FNA (2007a); Tucker (1988)=Z.

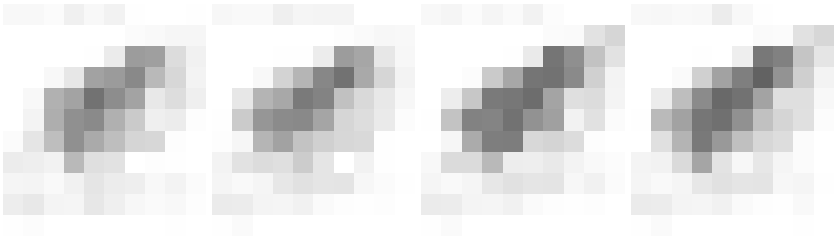
1 Lower panicle branches whorled or closely approximate; spikelets 4.0-5.5 mm long, 1.5-2.0 mm broad; stamens 3.....***L. oryzoides***
1 Lower panicle branches alternate (rarely opposite); spikelets 2.2-5.0 mm long, 0.8-4.0 mm broad; stamens 2 or 6.
2 Spikelets suborbicular-falcate, 3.0-4.0 mm broad, < 2× as long as broad; principal leaf-blades 10-15 mm wide; stamens 2.....***L. lenticularis***
2 Spikelets narrowly elliptic-falcate, 1.0-2.0 mm broad, > 2× as long as wide; principal leaf-blades usually < 7 mm wide; stamens 2 or 6.
3 Spikelets 3.8-4.7 mm long, 1.5-2.0 mm broad; panicle branches short, bearing spikelets nearly to their bases; stamens 6..... ***L. hexandra***
3 Spikelets 2.2-3.5 mm long, 0.8-1.2 mm broad; panicle branches long, filiform, the longer ones bearing spikelets only in their upper half; stamens 2 ..... ***L. virginica***

Leersia hexandra Swartz, Southern Cutgrass. Clay-based Carolina bays, limesink ponds, lakes, pools, usually in places where periodically or seasonally inundated. June-August. Pantropical, ranging north in North America to MD, TN, and TX. This species is considered a serious weed in the Old World and New World tropics; in our area, however, it is uncommon and not weedy. [= RAB, C, F, FNA, G, GW, HC, K, Z; = *Homalocenchrus hexandrus* (Swartz) Kuntze – S]

Leersia lenticularis Michaux, Catchfly Cutgrass. Floodplain forests and swamps. September-October. Se. VA south to ne. FL and Panhandle FL, west to e. TX, north in the interior to IN and MN. [= RAB, C, F, FNA, G, GW, HC, K, Z; = *Homalocenchrus lenticularis* (Michaux) Kuntze – S]

Leersia oryzoides (Linnaeus) Swartz, Rice Cutgrass. Marshes, riverbanks, pond-shores. August-October. NS west to BC, south to Panhandle FL and CA; also in Europe and e. Asia. [= RAB, C, F, FNA, G, GW, HC, K, Pa, WV, Z; = *Homalocenchrus oryzoides* (Linnaeus) Pollich – S]

Leersia virginica Willdenow, White Grass, White Cutgrass. Floodplain forests, swamps, streambanks. August-October. QC west to MN and SD, south to c. peninsular FL and TX. [= RAB, C, FNA, G, GW, HC, K, Pa, WV, Z; > *L. virginica* var. *virginica* – F; > *L. virginica* var. *ovata* (Poiret) Fernald – F; = *Homalocenchrus virginicus* (Willdenow) Britton – S]

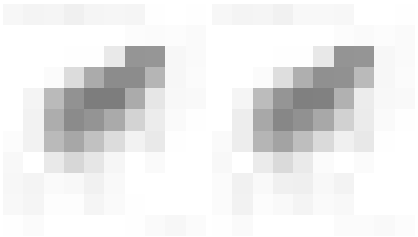


Leptochloa Palisot de Beauvois 1812 (Sprangletop, Feathergrass)

A genus of about 30 species, pantropical and extending into warm temperate areas. The circumscription of *Leptochloa* has been controversial; many earlier authors have preferred to separate *Diplachne* as a separate genus. Peterson et al. (2012, in press) present a comprehensive restructuring of the genera in this group, with (for our area) an expanded *Dinebra*, a much shrunk *Leptochloa*, recognition of a recircumscribed *Diplachne*, and recognition of *Disakisperma*. References: Peterson et al. (2012, in press)= Z; Snow in FNA (2003a); Snow (1998); Weakley et al. (2011); Cronquist (1991).

* ***Leptochloa digitata*** (R. Brown) Domin, Finger Sprangletop, Umbrella Canegrass. Waif at wool-combing mill, probably not established; native of Australia. [= K2] {not keyed}

* ***Leptochloa virgata*** (Linnaeus) Palisot de Beauvois, Tropical Sprangletop. Waif at wool-combing mill and on ballast at old seaports, probably not established; native of South America. [= FNA, HC, K2] {not keyed}



Limnodea L.H. Dewey 1894

A monotypic genus, and annual, of sc. United States and adjacent Mexico. References: Snow in FNA (2007a); Brandenburg & Thieret (2000)=Z; Tucker (1996)=Y.

Limnodea arkansana (Nuttall) L.H. Dewey. Hammocks, moist forests (Panhandle FL westward), waste at wool-combing mill, probably not established (SC). W. FL, c. and s. AL, west through MS, LA, and AR to OK, TX, and adjacent Mexico. [= FNA, HC, K, S, Z; = *Cinna arkansana* (Nuttall) G. Tucker – Y]

Lolium Linnaeus 1753 (Rye-grass, Darnel, Fescue)

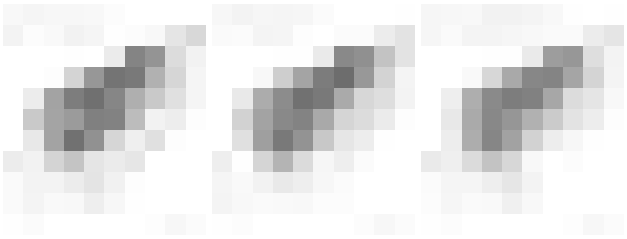
A genus of about 5 species, annuals and perennials, native to Europe, n. Africa, and temperate Asia. Probably best included in an expanded *Festuca*. References: Terrell in FNA (2007a); Smith & Aikin (2012)=U; Darbyshire (1993)=Y; Aiken & Darbyshire (1990)=X; Tucker (1996)=Z. Key based in part on C and X. [also see *Schedonorus*]

1 Inflorescence paniculate (spikelets borne on branches off the central axis) ..... ***[see Schedonorus]***
1 Inflorescence spikelike (spikelets sessile on the central axis).
  2 Glumes (12-) 15-25 mm long, subcoriaceous, equaling or surpassing the uppermost lemma (therefore the length of the spikelet); florets 4-9 per spikelet; annual ..... ***L. temulentum***
  2 Glumes 4-12 mm long, herbaceous, shorter than the lemmas (therefore shorter than the spikelet); florets (2-) 5-22 per spikelet; annual or perennial.
    3 Lemmas (at least the upper) awned, the awns to 15 mm long; florets 11-22 per spikelet; annual or perennial ... ***L. perenne*** *var.* ***aristatum***
    3 Lemmas awnless; florets (2-) 5-10 per spikelet; perennial ..... ***L. perenne*** *var.* ***perenne***

* ***Lolium perenne*** Linnaeus *var.* ***aristatum*** Willdenow, Italian Rye-grass, Annual Rye-grass. Fields, roadsides, pastures, disturbed areas; native of Eurasia. April-July. [= C, Z; = *Lolium multiflorum* Lamarck – RAB, F, FNA, G, HC, Pa, S, WV; = *Lolium perenne* ssp. *multiflorum* (Lamarck) Husnot – K; < *Lolium perenne* – W; < ***Festuca perennis*** (Linnaeus) Columbus & J.P. Smith, Jr. – U]

* ***Lolium perenne*** Linnaeus *var.* ***perenne***, English Rye-grass, Perennial Rye-grass. Fields, roadsides, pastures, disturbed areas; native of Eurasia. April-July. [= C, Z; = *Lolium perenne* – RAB, F, FNA, G, HC, Pa, S, WV; = *Lolium perenne* ssp. *perenne* – K; < *Lolium perenne* – W; < ***Festuca perennis*** (Linnaeus) Columbus & J.P. Smith, Jr. – U]

* ***Lolium temulentum*** Linnaeus *ssp.* ***temulentum***, Darnel. Fields, roadsides, pastures, disturbed areas; native of Eurasia. May-June. [= FNA; < *Lolium temulentum* – RAB, C, F, HC, Pa, S, Z; > *Lolium temulentum* var. *leptochaetum* A. Braun – G; > *Lolium temulentum* var. *macrochaeton* A. Braun – G; > *Lolium temulentum* ssp. *temulentum* – K; = ***Festuca temulentum*** (Linnaeus) Columbus & J.P. Smith, Jr. – U]



Luziola Antoine Laurent de Jussieu 1789 (Southern Water Grass)

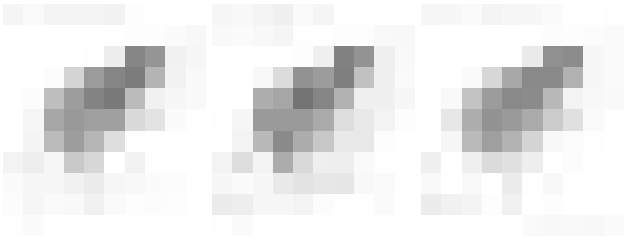
A genus of about 12 species, from s. North America south to tropical South America. References: Martínez-y-Pérez, Mejía-Saulés, & Sosa (2008)=X; Terrell in FNA (2007a); Tucker (1988)=Z; Judziewicz et al. (2000)=Y. Key based on Terrell in FNA (2007a).

1 Culms prostrate; leaves conspicuously clustered toward the apex of the culms, floating, 1-5 (-8) cm long; pistillate inflorescence an inconspicuous axillary raceme, 1.1-3.5 cm long, with 2-5 florets ..... ***L. fluitans*** *var.* ***fluitans***
1 Culms suberect to erect; leaves scattered along the culm, not floating, > 6 cm long; pistillate inflorescence an axillary panicle, 2-21.5 (-58) cm long, with 18-250 (-350) florets.
  2 Pistillate florets 3-5 mm long; achenes striate ..... ***L. bahiensis***
  2 Pistillate florets 2-2.5 mm long; achenes smooth ..... ***L. peruviana***

*? ***Luziola bahiensis*** (Steudel) Hitchcock. Streams and riverbanks. Apparently native (Anderson & Hall 1993), but considered native of South America by some authors. [= FNA, HC, K, X]

Luziola fluitans (Michaux) Terrell & H. Robinson *var.* ***fluitans***, Southern Water Grass. Aquatic in water of natural lakes, slow-moving blackwater rivers, and other stagnant waters). August-October. Var. *fluitans* ranges from ne. NC to c. FL and west to e. TX; var. *oconnerii* (Guzman M.) G. Tucker occurs in the highlands of w. Mexico (Tucker 1988). A very unusual grass, truly aquatic, with flexuous stems and unwettable, floating leaves. In addition to floating leaves (helpful in the field but not in the herbarium!), other useful characters include two secondary blade nerves on either side of the midnerve and virtually as prominent as the midnerve, and which extend onto the sheath where they occur with another 5 or so strong nerves; often with cilia 0.5-1 mm long at the summit of the ventral face of the sheath (an unusual place); and a hyaline ligule about 1 mm long on the same plane as the sheath (i.e., free from the base of diverging blades). [= FNA, Y, Z; < *L. fluitans* – K, X; < *Hydrochloa carolinensis* Palisot de Beauvois – RAB, GW, HC, S]

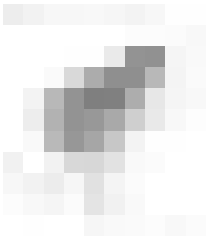
* ***Luziola peruviana*** Gmelin, Peruvian Water Grass. Disturbed wet areas; native of South America. FL Panhandle. Apparently an introduction, occurring in disturbed situations. See Anderson & Hall (1993). [= FNA, HC, K, X]



Megathyrsus (Pilger) B.K. Simon & S.W.L. Jacobs 2003 (Guinea Grass)

A genus of 3 species. References: Wipff & Thompson in FNA (2003a), amended in FNA (2007a).

* ***Megathyrsus maximus*** (Jacquin) B.K. Simon & S.W.L. Jacobs, Guinea Grass. Disturbed areas, pine plantations; native of Africa. Introduced in the Gulf states (GA, AL, FL) (FNA; Carter, Baker, & Morris 2009). [= FNA (2007a); = *Urochloa maxima* – FNA (2003a), K; = *Panicum maximum* Jacquin – HC, S]



Melica Linnaeus 1753 (Melic)

A genus of about 80 species, north temperate, s. Africa and s. South America. References: Barkworth in FNA (2007a); Tucker (1996)=Z.

1 First glume oblong, 6.5-10 mm long, 2-4× as long as wide, acute to obtuse at the apex, about the same length and width as the second glume; inflorescence with (0-) 1-5 branches from the lower nodes only; fertile lemmas 2; leaves 1-6 mm wide; [common, widespread in our area] ....***M. mutica***

1 First glume broadly ovate, 5-8 mm long, 1.5-2× as long as wide, obtuse to rounded at the apex, shorter and broader than the second glume; inflorescence with 2-10 (or more) branches from most nodes; fertile lemmas (2-) 3; leaves 3-12 mm wide; [rare, Mountains of NC and VA, northward and westward].....***M. nitens***

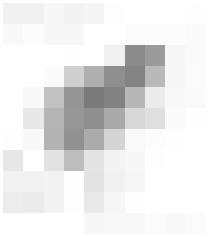
Melica mutica Walter, Two-flower Melic. Forests and woodlands, including coastal fringe and maritime forests. April-May. MD west to IN and IL, south to FL and TX. [= RAB, C, F, FNA, G, HC, K, S, W, WV, Z]

Melica nitens (Scribner) Nuttall ex Piper, Three-flower Melic. Rocky upland woodlands, barrens, and glades, over calcareous rocks (such as limestone, calcareous shale). May-June. PA west to s. MN and NE, south to nw. GA and TX. [= RAB, C, F, FNA, G, HC, K, Pa, W, WV, Z]

Melinis Palisot de Beauvois 1812 (Natalgrass)

A genus of ca. 22 species, native to Africa and w. Asia. References: Wipff in FNA (2003a).

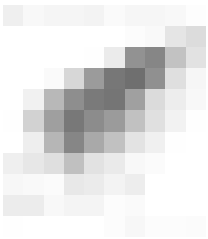
* ***Melinis repens*** (Willdenow) Zizka *ssp*. ***repens***, Rose Natalgrass. Disturbed areas, roadsides, railroad embankments, other disturbed areas; native of Africa. Reported for several s. GA counties (Carter, Baker, & Morris 2009); the report for NC by Kartesz (1999) is an error. [= FNA; < *M. repens* – K; *? Rhynchelytrum roseum* (Nees) Stapf & C.E. Hubbard ex Bews – HC; < *Rhynchelytum repens* (Willdenow) C.E. Hubbard]



Microstegium Nees in Lindley 1836 (Sasa-grass, Japanese-grass)

A genus of about 15 species, of subtropical Asia and Africa. References: Barden (1987); Fairbrothers & Gray (1972); Winter, Schmitt, & Edwards (1982); Koyama (1987); Thieret in FNA (2003a).

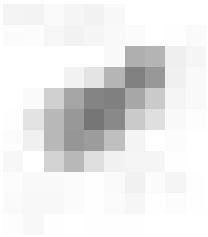
* ***Microstegium vimineum*** (Trinius) A. Camus, Japanese Stilt-grass, Flexible Sasa-grass, Japanese-grass. Disturbed areas, colonizing moist, rich soil, especially in floodplains; native of tropical se. Asia. The following chronological synopsis of flora accounts of *Microstegium* is perhaps instructive: not treated by Small (1933), "local" (Fernald 1950), "rarely introduced and possibly not established" (Gleason & Cronquist 1952), "sporadically naturalized" (Godfrey & Wooten 1979), "a rapidly spreading pernicious invader on moist ground, too common" (Wofford 1989). RAB report it from fewer than 1/3 of the counties of the Carolinas (in 1968); it is now undoubtedly in every county, an abundant weed in most of them. This species has become a very serious pest, now ranking as one of the most destructive introduced plants in our area, forming extensive and dense patches, sprawling over and eliminating nearly all other herbaceous plants. Eradication is very difficult, and considering its obvious colonizing abilities, only temporary. Hunt & Zaremba (1992) document the continuing northern expansion of *Microstegium* into NY and CT. Redman (1995) discusses its habitat preferences in MD and DC. Koyama (1987) reports it as "common as undergrowth of forests" in Japan, part of its native distribution. [= RAB, C, FNA, GW, K, Pa, W; = *Eulalia viminea* (Trinius) Kuntze – G; > *Eulalia viminea* var. *viminea* – F; > *Eulalia viminea* var. *variabilis* Kuntze – F; > *M. vimineum* var. *vimineum* – HC; > *M. vimineum* var. *imberbe* (Nees) Honda – HC]



Milium Linnaeus 1753 (Wood-millet, Millet-grass)

A genus of 4 species, north temperate. References: Crins in FNA (2007a); Haines (2010)=X; Tucker (1996)=Z; Fernald (1950b)=Y.

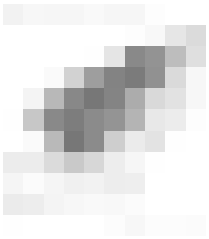
Milium effusum Linnaeus *var*. ***cisatlanticum*** Fernald, American Wood-millet, Millet-grass. Forests at high (or rarely moderate) elevations. Mate May-July. A circumboreal species, ranging in North America south to w. NC (Swain County), e. TN (Sevier County), w. VA, WV, OH, IN, IL, and MN. The American plants are sometimes segregated as var. *cisatlanticum* Fernald (Fernald 1950b). Though considered "probably accidentally introduced and established" in NC by Radford, Ahles, & Bell (1968), the native occurrence of this northern species is more plausible; the only known occurrence in NC (not recently seen) is in the Great Smoky Mountains National Park. [= FNA, K, Pa, Y; < *M. effusum* – RAB, C, F, G, HC, W, WV, Z; = *M. effusum* ssp. *cisatlanticum* (Fernald (A. Haines – X]



Miscanthus Andersson 1855 (Eulalia)

A genus of ca. 14 species, perennials, of Eurasia and s. Africa. References: Barkworth in FNA (2003a).

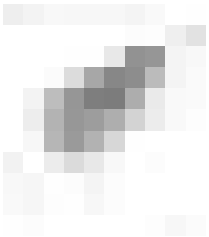
* ***Miscanthus sinensis*** Andersson, Eulalia, Chinese Silver Grass. Roadsides, powerline rights-of-way; native of e. Asia. September-November. This species is becoming aggressively weedy. Forms with leaves cross-variegated or linear-variegated with yellow are cultivated and sometimes escape or persist (in addition to the much more common green-leaved form). [= RAB, C, FNA, G, K, Pa, S, W, WV; > *M. sinensis* var. *variegatus* Beal – F, HC; > *M. sinensis* var. *zebrinus* Beal – F, HC]



Molinia Schrank 1789 (Moorgrass)

A genus of 2-5 species, perennials, of temperate Eurasia. References: Barkworth in (FNA 2003a).

Molinia caerulea (Linnaeus) Moench, Purple Moorgrass. Disturbed areas; native of Eurasia. Reported for the Coastal Plain of NJ (Kartesz 2010). [= FNA, K2] {not keyed; doubtfully naturalized}



Muhlenbergia Schreber 1789 (Muhly)

A genus of about 176 species, perennials and annuals, of North America south to Andean South America, and e. and se. Asia. *Muhlenbergia* is a large and diverse genus, recently reclassified by Peterson, Romaschenko, & Johnson (2010b); the subgenera used here follow that classification. References: Peterson, Romaschenko, & Johnson (2010b); Pohl (1969); Gustafson & Peterson (2007)=Y; Morden & Hatch (1989)=Z; Peterson in FNA (2003a).

1 Panicle open and diffuse, > 4 cm broad, the spikelets borne on slender or capillary pedicels longer than the lemmas.
- 2 Plant with rhizomes, the rhizomes prominent, creeping, and covered with imbricate scales; culms and sheaths strongly compressed at base, the leaves distichous; spikelets 1.5-2 mm long; [subgenus “incertae sedis”]..... ***M. torreyana***
- 2 Plant without rhizomes, tufted with erect culms (a "bunchgrass"); culm and sheaths terete, the leaves not distichous; spikelets 1.5-5 mm long (excluding awns, if present).
  - 3 Spikelets 1.5-2 mm long, awnless; [subgenus *Pseudosporobolus*]..... ***M. uniflora***
  - 3 Spikelets 2.5-5 mm long (excluding awns), awned or awnless; [subgenus *Trichochloa*].
    - 4 Lemma awn 0-1.5 (-4) mm long; glume bodies (1.1-) 2.0-3.3 (-3.6) mm long, < ½ as long as the lemma bodies, acuminate, not awned (rarely the second with a short awn < 0.6 mm long); spikelets usually brown or bronze (when fresh); basal sheaths usually very fibrous ..... ***M. expansa***
    - 4 Lemma awn (2-) 3-35 mm long; glume bodies (0.3-) 0.7-1.7 (-2.4) mm long, > ½ as long as the lemma body, one or both glumes sometimes awned; spikelets usually purple (when fresh); basal sheaths rarely strongly fibrous.
      - 5 Lemma awn (2-) 3-13 (-18) mm long, first glume awnless (or rarely with an awn to 3.2 mm long), second glume awnless (or rarely with an awn up to 5.0 mm long), palea awnless; lemma lacking setaceous teeth flanking the awn; flowering late August-October; [widespread in our area, particularly in rocky, clayey, or sandy glades, barrens, and woodlands with prairie affinities] ..... ***M. capillaris***
      - 5 Lemma awn (8-) 12-26 (-35) mm long, first glume awn (0.5-) 1-7 (-10) mm long, second glume awn (1-) 5-19 (-25) mm long, palea awn-tipped; lemma with two setaceous teeth flanking the awn, the teeth 0.5-2.5 (-4.7) mm long; flowering October-November; [sandy maritime situations on barrier islands of the outer Coastal Plain] ..... ***M. sericea***

1 Panicle slender, dense, < 2.5 cm broad, the spikelets sessile or on non-capillary pedicels shorter than the lemmas; [subgenus *Muhlenbergia*].
- 5 Glumes minute, 0-0.5 mm long; plant lacking rhizomes; culms weak, decumbent and cespitosely branching in their lower portions, rooting at the nodes, the upper portions erect and sparsely branched..... ***M. schreberi***
- 5 Glumes well-developed, 1-7 mm long; plant with scaly rhizomes (except for *M. cuspidata*); culms firm (rarely sprawling), few or solitary (rarely forming dense colonies).
  - 6 Glumes 5-7 mm long (tapered to arched or straight awns), about double the length of the lemma (excluding its awn); panicle dense and spike-like, 2-6 cm long and 3-10 mm broad..... ***M. glomerata***
  - 6 Glumes 1.2-3 mm long, shorter than to barely exceeding the lemma; panicle usually slender, arching, generally less dense and not spike-like, often with some elongated (though appressed) branches, 4-50 cm long, 2-15 mm broad.
    - 7 Callus glabrous; plant lacking scaly rhizomes (with slender stolons and a hard, knotty crown); leaves 0.5-2 mm wide; [calcareous cliffs]..... ***M. cuspidata***
    - 7 Callus bearded (sometimes only slightly so) (glabrous in *M. glabriflora*); plant with scaly rhizomes; leaves (1-) 2-14 mm wide; [various habitats].
      - 8 Panicle linear, loosely flowered, much exceeding the leaves; culm erect, simple or sparingly branched; glumes relatively broad, the body ovate, 1.2-2.5 mm long, abruptly narrowed to the acuminate tip; ligule obsolete or shorter than the elongate cartilaginous summit of the leaf sheath.
        - 9 Lemmas awnless or awn < 0.5 mm long; spikelets 1.5-2.5 mm long; leaf blades usually (1-) 2-6 mm wide..... ***M. sobolifera***
        - 9 Lemma awn 1-11 mm long (rarely awnless); spikelets 3-5 mm long; leaf blades (2) 6-10 (-13) mm wide (often > 8 mm wide)...

.....***M. tenuiflora***

8 Panicle lanceolate, densely (rarely loosely) flowered, leaves often extending conspicuously into the inflorescence; culm geniculate, freely branched; glumes relatively narrow, the body lanceolate, 2-3 mm long, tapering from base to apex; ligule usually obvious above the short cartilaginous summit of the leaf sheath.

10 Culm glabrous throughout (including below the nodes).

11 Glumes 1.4-2.0 mm long; ligule 0.2-0.5 mm long.....***M. bushii***

11 Glumes 2-4 (-5) mm long; ligule 0.8-1.5 mm long.....***M. frondosa***

10 Culm pubescent, at least below the nodes.

12 Lemma awn 7-12 mm long; spikelets loosely clustered, on pedicels 2-4 mm long .....***M. sylvatica***

12 Lemma awnless or with a short awn tip (rarely to 9 mm long); spikelets densely clustered, on pedicels < 1 mm long.

13 Lemma glabrous below, or with short basal bearding; ligule 0.5-1.5 mm long.....***M. glabrifloris***

13 Lemma pilose basally; ligule 0.5-1 mm long .....***M. mexicana***

Muhlenbergia asperifolia (Nees & Meyen ex Trinius) Parodi, Alkali Muhly, Scratchgrass. Alkaline soils, wetlands, lawns. Reported east and south to MD, PA, n. KY, and OH (Kartesz 1999, 2010). [= C, F, FNA, G, HC, K, Pa] {not yet keyed}

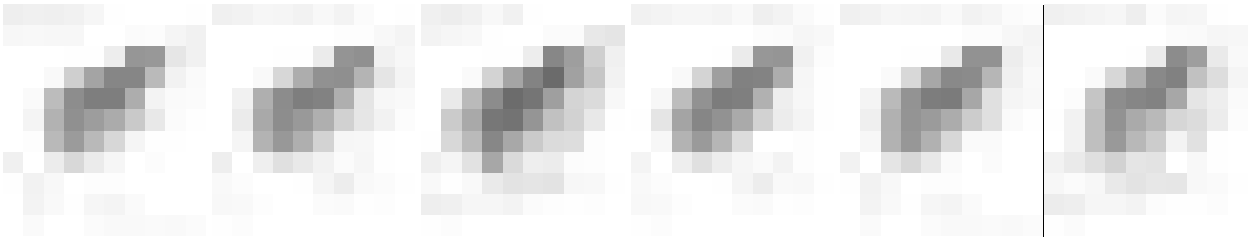
Muhlenbergia bushii Pohl, Bush's Muhly. Wet oak flatwoods, bottomlands, and other moist forests. IN west IA, south to NE and TX; apparently disjunct eastward in scattered localities, including in n. GA (Jones & Coile 1988) and VA. The habitat is variously given in floras as "dry woods" or "moist woods." [= C, FNA, K; = *M. brachyphylla* Bush – F, G, HC]

Muhlenbergia capillaris (Lamarck) Trinius, Hairgrass. In the Piedmont and Interior Low Plateau primarily in clayey or thin rocky soils (especially in areas which formerly burned and were prairie-like) and in open woodlands, in the Coastal Plain in savannas, dry woodlands, and coastal grasslands (where sometimes in close proximity with *M. sericea*), in the Mountains around calcareous rock outcrops. Late August-October. MA, NY, s. OH, s. IN, s. IL, MO, and e. KS south to s. FL, LA, and s. TX. *M. capillaris* and its relatives, *M. expansa* and *M. sericea*, have been the subject of an herbarium morphological study by Morden & Hatch (1989), who conclude that the three taxa are not sharply separable and should be recognized only at the varietal level. If one considers behavior in the field, ecology, and geography in conjunction with morphologic characters, however, there is little doubt that the three taxa are biological species. Distribution and typical habitat are different for the three species, but *M. capillaris* can be found growing with or in proximity to each of the other two (I have not seen *M. sericea* and *M. expansa* together). In such situations, the two taxa present are readily distinguishable at a glance, and there is no evidence of intermediates or hybrids. Gustafson & Peterson (2007) also concluded that the three taxa are separable as species. [= F, FNA, G, Pa, W, Y; < *M. capillaris* – RAB, GW (also see *M. sericea*); = *M. capillaris* var. *capillaris* – C, HC, K, S, Z]

Muhlenbergia cuspidata (Torrey ex Hooker) Rydberg, Plains Muhly. Dolomite and limestone palisade cliffs. MI, MN, MB, SK, and AB, south to nw. AR, OK, and NM; scattered eastward as disjuncts in TN, KY, OH, IN, PA, and VA. The VA occurrences are on dolomite and limestone palisade cliffs along the New, Roanoke, and Shenandoah rivers. [= C, F, FNA, G, HC, K, Pa]

* *Muhlenbergia emersleyi* Vasey, Bull Muhly. Reported as introduced in NC (Kartesz 1999) from its native range in TX, NM, AZ, and Mexico, based on a specimen at the UNC Herbarium. However, the specimen makes clear that it was cultivated at a Soil Conservation Service test nursery; there is no evidence that the species is established in our area. [= FNA, HC, K] {rejected; not keyed}

Muhlenbergia expansa (Poiret) Trinius, Savanna Hairgrass. Pine savannas, pine flatwoods, mesic areas in sandhill-pocosin ecotones. September-October. Se. VA south to FL, west to e. TX (nearly exactly the range of *Pinus palustris*). An important part of the grassy component of many longleaf pine savannas, *M. expansa*'s flowering is stimulated by fire, and, lacking fire, it may be found in large populations in solely vegetative condition. It can be distinguished in sterile condition from other savanna bunchgrasses (*Sporobolus teretifolius, S. pinetorum, S. floridanus, S. curtissii, Aristida stricta*, and *A. beyrichiana*) by the following characteristics: old leaf bases fibrous and curly (rather than hardened and cartilaginous) and ligules 1-3 mm long (rather than 0.2 to 0.5 mm long). The open panicle somewhat resembles that of several species of similar habitat which often co-occur with *M. expansa – Sporobolus teretifolius, S. pinetorum, S. curtissii, S. floridanus*, and *Calamovilfa brevipilis*, but the panicle of *M. expansa* is capillary, flexuous, and fragile, tending to break up over the winter (vs. fine-textured but not capillary, the branches rigid and ascending, more likely to persist over the winter in relatively intact condition). The vegetative characters listed above and under *Calamovilfa brevipilis* are also useful. See *M. capillaris* for a discussion of recent studies on the *M. capillaris* complex. [= RAB, F, FNA, GW, HC, S, Y; = *M. capillaris* var. *trichopodes* (Elliott) Vasey – C, K, Z]



Muhlenbergia frondosa (Poiret) Fernald, Smooth Wirestem Muhly. Moist forests and disturbed areas. Late August-October. This species is widespread in e. North America, south to ne. GA and west into the Plains. [= RAB, C, F, FNA, G, GW, HC, K, Pa, W, WV; = *M. mexicana* – S, misapplied]

Muhlenbergia glabriflora Scribner, Clay-pan Muhly. Open oak flatwoods, other open habitats, in clayey soils. October-November. VA and NC west to IA, MO, AL, and TX, local and apparently rare in all of that range. In NC, only known from one collection, that from Durham County in 1936, with vague habitat data. F describes the habitat as "dry exsiccated or baked soils, prairies, gravels or rocky slopes," Pohl (1969) as "mostly on low ground, in shade on heavy clay soils." [= C, F, G, HC, K; = *M. glabrifloris* – FNA, orthographic variant]

Muhlenbergia glomerata (Willdenow) Trinius, Spiked Muhly. Fens and seeps over mafic (amphibolite) or ultramafic (olivine) rocks; rare. August-October. This species is widespread in n. North America, from NL (Newfoundland west to TT, south to w. NC, OH, IL, IA, NE, n. NM, NV, and OR. [= RAB, C, F, FNA, GW, HC, K, Pa, W; < *M. racemosa* (Michaux) Britton, Sterns, & Poggenburg – G, S]

Muhlenbergia mexicana (Linnaeus) Trinius, Hairy Wirestem Muhly. Forest edges. September-October. The epithet is a misnomer; the species is largely northern, occurring from NS, ON, MB, SK, and YT, south to NC, TN, AR, TX, NM, AZ, and CA. [= RAB, C, F, G, HC, K, Pa, W, WV; > *M. mexicana* var. *filiformis* (Torrey) Scribner – FNA; > *M. mexicana* var. *mexicana* – FNA; = *M. foliosa* (Roemer & J.A. Schultes) Trinius – S]

Muhlenbergia schreberi J.F. Gmelin, Nimblewill, Dropseed. Bottomland and other moist forests, dry forests, disturbed areas. August-October. ME, NY, ON, MI, WI, MN, and SD, south to c. peninsular FL, LA, and c. TX. [= RAB, C, F, FNA, GW, HC, K, Pa, S, W, WV; > *M. schreberi* var. *schreberi* – G; > *M. schreberi* var. *palustris* (Scribner) Scribner – G; > *M. palustris* Scribner]

Muhlenbergia sericea (Michaux) P.M. Peterson, Dune Hairgrass, Sweet Grass. Maritime dry grasslands, maritime wet grasslands, interdune swales, low dunes, sometimes edges of freshwater or brackish marshes, apparently limited to the barrier islands (sometimes in close proximity with *M. capillaris*), sometimes locally abundant. October-November. NC (slightly north of Oregon Inlet, Dare County, south of Nags Head) south to s. FL and west to s. TX, primarily on barrier islands. This species is a very conspicuous part of the Outer Banks flora in the autumn, especially showy and abundant between Rodanthe (Chicamacomico) and Avon (Kinnakeet), Dare County, NC, and also abundant on Ocracoke Island, Hyde County, NC. The capillary pedicels and awns of its purple inflorescences are so light as to be moved by the slightest breeze. By December or January they fade to tan, but remain showy. This grass is a major component of baskets made in the Low Country of SC by the Gullah, who call it "sweet grass." I agree with Curtis (1843), Blomquist (1948), Pinson & Batson (1971), Gould (1975), and others who consider *M. sericea* (as *M. filipes*) a species distinct from *M. capillaris*. In addition to a discussion of its relationship to *M. capillaris*, Pinson and Batson (1971) and Morden & Hatch (1989) provide descriptions, not elsewhere available. See *M. capillaris* for a discussion of recent studies on this complex. [= FNA, Y; < *M. capillaris* – RAB, GW; = *M. capillaris* var. *filipes* (M.A. Curtis) Chapman ex Beal – HC, K, S, Z; = *M. filipes* M.A. Curtis]

Muhlenbergia sobolifera (Muhlenberg ex Willdenow) Trinius, Rock Muhly. Dry wooded limestone slopes, rock outcrops and rocky forests; uncommon (rare in DE, GA, and NC, rare in VA Coastal Plain). July-early October. ME, WI, and KS south to n. GA, n. AL, n. MS, and c. TX. [= RAB, C, F, FNA, G, HC, K, Pa, S, W, WV]

Muhlenbergia sylvatica Torrey ex A. Gray, Woodland Muhly. Bbottomland and other moist forests, calcareous or mafic streambanks. August-September. ME and MN south to SC, ne. GA, AL, and TX. [= RAB, C, FNA, K, Pa, W, WV; > *M. sylvatica* var. *sylvatica* – F, G, GW, HC; = *M. umbrosa* Scribner – S]

Muhlenbergia tenuiflora (Willdenow) Britton, Sterns, & Poggenburg, Slender Muhly. Moist forests and disturbed areas, up to at least 1400 meters. August-October. NH, WI, and NE south to GA, AL, MS, and OK. Two varieties are sometimes recognized: var. *tenuiflora*, with lemma awn 4-11 mm long and the sheaths and stems retrorsely hirsute, especially around the nodes, and var. *variabilis* (endemic to the Southern Appalachians), with lemma awn 1-4 mm long or absent, and the sheaths and stems glabrous or nearly so. The validity of the varieties needs further assessment. [= RAB, F, FNA, G, HC, K, Pa, S, W, WV; > *M. tenuiflora* var. *tenuiflora* – C; > *M. tenuiflora* var. *variabilis* (Scribner) Pohl – C]

Muhlenbergia torreyana (J.A. Schultes) A.S. Hitchcock, Pinebarren Smokegrass. In the Coastal Plain in moist soils of depression meadows and clay-based Carolina bays, often under or near *Taxodium ascendens*, in the Interior Low Plateau and Cumberland Plateau in moist grassy oak savannas. August-November. NJ to GA in the Coastal Plain, and disjunct in KY (?)and TN; currently known to be extant only in NJ, NC, and TN. It was first discovered in NC in 1987. Although it rarely flowers except following fire, it can be recognized in sterile condition by its forming clonal patches with evenly spaced, upright, blue-green tufts, each tuft a flattened stem with 5-10 ascending-erect, rather stiff, usually conduplicate leaves, the summit of each sheath with a pronounced cartilaginous thickening, easily felt by running the flattened stem from base to apex between thumb and forefinger. [= C, F, FNA, G, HC, K; = *Sporobolus torreyanus* (J.A. Schultes) Nash – S]

Muhlenbergia uniflora (Muhlenberg) Fernald. Bogs, wet meadows. August-September. NL and ON south to s. NJ, MD, and se. PA (Rhoads & Block 2007). [= C, FNA, G, HC, K, Pa; > *M. uniflora* var. *uniflora* – F]

Nassella (Trinius) Desvaux 1846

A genus of ca. 116 species, mainly perennials, mainly of South America. References: Barkworth in FNA (2007a). Key based on Barkworth in FNA (2007a).

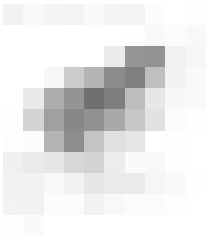
1 Florets 1.5-2.5 mm long; leaves 0.2-0.6 mm wide, stiff and tightly convolute ..... ***N. trichotoma***
1 Florets 3.4-13 mm long; leaves 1-8 mm wide, flat or convolute.
2 Crown (surrounding the base of the awn) as wide or wider than long, the rim with hairs <0.5 mm long; floret widest just below the crown.. ..... ***[N. neesiana]***
2 Crown longer than wide, the rim with hairs 1-2 mm long; floret widest near or only slightly above the middle.
3 Florets 6.5-13 mm long; crown usually flaring at the tip; awns 40-90 mm long ..... ***N. leucotricha***
3 Florets 6-8 mm long; crown parallel-sided; awns 30-50 mm long ..... ***[N. manicata]***

* ***Nassella leucotricha*** (Trinius & Ruprecht) Pohl, Texas Needlegrass. Waste areas near wool-combing mill; native of sc. United States and Mexico. [= FNA, K; = *Stipa leucotricha* Trinius & Ruprecht – HC]
* *Nassella manicata* (É. Desvaux) Barkworth, Andean Tussockgrass. Disturbed areas; native of South America. Reported from MS; perhaps only a waif. [= FNA; = *Stipa manicata* É. Desvaux]
* *Nassella neesiana* (Trinius & Ruprecht) Barkworth, Uruguayan Tussockgrass. Disturbed areas; native of South America. Known only from old collections on ballast from Mobile, AL. [= FNA; = *Stipa neesiana* Trinius & Ruprecht]
* ***Nassella trichotoma*** (Nees) Hackel ex Arechavaleta, Serrated Tussockgrass. Fields; native of South America, perhaps successfully extirpated as a noxious weed. [= FNA; = *Stipa trichotoma* Nees]

Neeragrostis Bush 1903

A monotypic genus of warm temperate North America and tropical Central America and n. South America. References: Peterson & Harvey (in prep.)=Z.

Neeragrostis reptans (Michaux) Nicora. Shores and wet flats. April-November. WV, IL, IA, and SD south to sw. GA, Panhandle FL, AL, MS, LA, TX and n. Mexico. [= K, Z; = *Eragrostis reptans* (Michaux) Nees – C, F, FNA, G, GW, HC]



Oplismenus Palisot de Beauvois 1807 (Woods-grass, Basket-grass)

A genus of about 5 species, widespread in the New World and Old World tropics, subtropics, and warm temperate areas. References: Wipff in FNA (2003a); Crins (1991)=Z; Scholz (1981)=Y; Peterson et al. (1999).

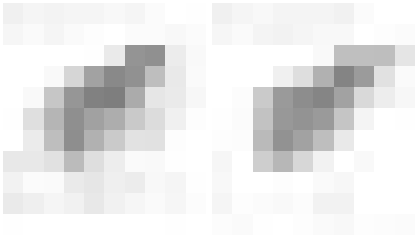
Identification notes: Superficially, *Oplismenus* resembles *Arthraxon*, but has the leaves only slightly cordate at the base (vs. strongly cordate-clasping).

1 Leaf sheaths and culm axis glabrate to pilose (usually sparsely, but dense at sheath summit) with hairs <1.5 mm long; hairs on leaf surfaces similarly long; leaves 1.5-6 cm long; longest leaves with acute to acuminate tip (but not long-acuminate); lemma (7-) 9-11-veined..... ..... ***O. hirtellus*** *ssp.* ***setarius***
1 Leaf sheaths and culm axis pilose with hairs 3-5 mm long; hairs on leaf surfaces similarly long; leaves 2.5-10 cm long; longest leaves with long-acuminate tip; lemma 7-veined..... ***O. hirtellus*** *ssp.* ***undulatifolius***

* *Oplismenus burmannii* (Retzius) Palisot de Beauvois, Zacatillo, Burmann's Basket-grass. Disturbed areas; native of New World and Old World tropics. Collected in peninsular FL just south of our area (Alachua Co.) and may eventually appear farther north (Davis, Judd, & Perkins 2006). {not keyed}
Oplismenus hirtellus (Linnaeus) Palisot de Beauvois *ssp.* ***setarius*** (Lamarck) Mez, Woods-grass. Hammocks, maritime forests, shell middens, moist forests. August-October. *O. hirtellus* is widespread in tropical and subtropical areas of the New and Old World; ssp. *setarius* ranges from e. NC south to FL, west to AR and TX, and south through the Caribbean and Central America to central South America. Scholz (1981) recognizes many other subspecies. This variety is undoubtedly native in our

area, occurring in undisturbed habitats in natural communities entirely devoid of alien species; the basis of Gould's (1975) assertion that *Oplismenus* is "introduced or adventive in the United States" is unknown. Crins (1991) favors treating *O. setarius* as a taxonomically unrecognized component within a polymorphic *O. hirtellus*. [= FNA, K, Y; = *O. setarius* (Lamarck) Roemer & J.A. Schultes – RAB, HC, S; < *O. hirtellus* (Linnaeus) Palisot de Beauvois – Z]

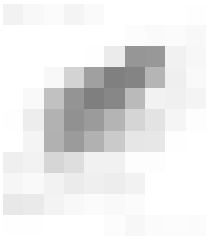
* ***Oplismenus hirtellus*** (Linnaeus) Palisot de Beauvois *ssp.* ***undulatifolius*** (Arduino) U. Scholz. Moist forests; native of the Eastern Hemisphere (Asia and perhaps also native in s. Europe). It has been reported as an introduction in Baltimore Co., MD (Peterson et al. 1999). It is considered a noxious invasive and can be expected to seriously spread. [= FNA, K, Y; < *O. hirtellus* (Linnaeus) Palisot de Beauvois – Z]



Oryza Linnaeus 1753 (Rice)

A genus of about 20 species, native of tropical and warm temperate portions of the Old World. References: Barkworth & Terrell in FNA (2007a); Tucker (1988)=Z; Judziewicz et al. (2000)=Y; Nanda & Sharma (2003)=X.

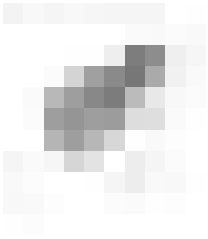
* ***Oryza sativa*** Linnaeus, Rice. Marshes, impoundments, of only sporadic occurrence outside of cultivation; native of Asia. October. Perhaps the single most important food crop in the world, developed as a crop in Asia and cultivated at least since 10,000 years BP (Hancock 2004). Rice was an important crop before the Civil War in SC, GA, and extreme se. NC. Most rice planted today in our area is in waterfowl impoundments. [= RAB, C, FNA, G, GW, HC, K, S, X, Y, Z]



Oryzopsis Michaux 1803 (Ricegrass)

A monospecific genus, a perennial, of ne. North America. References: Barkworth in FNA (2007a). [also see *Piptatherum*]

Oryzopsis asperifolia Michaux, Rough-leaved Ricegrass, Whiteseed Mountain-ricegrass, Spreading Ricegrass. High elevation pine-oak/heath barrens and woodlands. NL (Newfoundland) west to BC, south to w. VA (Rockingham County), WV, n. IN, SD, NM, and UT. This grass forms large cespitose clumps, the leaves evergreen and somewhat bicolored (green on the upper surface, bluish on the lower). [= C, F, FNA, G, HC, K, Pa, WV]



Panicum Linnaeus 1753 (Panic Grass)
(contributed by Richard J. LeBlond)

{INTRODUCTION: Describe differences between *Panicum*, *Dichanthelium*, *Urochloa* (=*Brachiaria*), and *Paspalidium* (now in *Setaria*), all of which are treated as *Panicum* in RAB. Describe collection methods and character analysis.} [also see *Dichanthelium, Megathyrsus, Phanopyrum, Setaria, Steinchisma*, and *Urochloa*]

There has been considerable controversy over the generic limits of *Panicum*. In its broader recent conceptions, it has been considered to include (in our area) taxa sometimes and variously segregated as *Brachiaria, Dichanthelium, Eriochloa, Paspalidium, Phanopyrum, Steinchisma*, and *Urochloa*. All were originally recognized based on morphological characteristics, to which have recently been added anatomical, chemical, and other evidence. Crins (1991) recognizes *Eriochloa, Urochloa*

(including *Brachiaria*), *Paspalidium*, and *Panicum* as genera, with *Panicum* subdivided into subgenera *Panicum*, *Agrostoides*, *Dichanthelium*, *Phanopyrum*, and *Steinchisma*. We prefer to recognize most of the segregates as genera, pending further analyses, since there is little evidence that these groups are more closely related to one another than they are to other genera recognized in the Paniceae. *Phanopyrum* and *Dichanthelium* are the only segregate groups with C_3 photosynthesis. *Eriochloa* and *Urochloa* (including *Brachiaria*) have C_4 photosynthesis, with PEP-ck decarboxylation. *Panicum* and *Setaria* (*Paspalidium)* have C_4 photosynthesis, with NAD-me or NADP-me decarboxylation. *Steinchisma*, in addition to its unusual expansion of the palea, apparently has a peculiar photosynthetic pathway, described by Crins (1991) as "intermediate between" C_3 and C_4 photosynthesis; "the leaves have Kranz anatomy, but there are fewer organelles than usual in the outer sheath."

We agree with Hansen & Wunderlin (1988) that "*Dichanthelium* is as 'good' a grass genus as many others (e.g. *Brachiaria*, *Sacciolepis*, and many more in other tribes)." Despite arguments to the contrary, there is little doubt that *Dichanthelium* is a natural group. Zuloaga, Ellis, and Morrone (1993) argue against the recognition of *Dichanthelium* as a genus, preferring to treat it as a subgenus under *Panicum*. They state, however, "within *Panicum*, *Dichanthelium* can be distinguished at the subgeneric level by the following set of characters: lax inflorescences; ellipsoid to obovoid spikelets; upper glume and lower lemma usually 7-11 nerved; upper anthecium apiculate or shortly crested, and simple papillae on the lemma and palea. Anatomically, all species are non-Kranz or C_3, with the outer parenchymatous sheath lacking specialized chloroplasts", etc. The argument that *Phanopyrum* also has C_3 photosynthesis does not materially affect the issue of the taxonomic rank at which to recognize the groups.

We also agree with Hansen & Wunderlin (1988) that "the acceptance of *Dichanthelium* provides a more consistent generic classification." It offers conveniences, as well, in our area, where *Dichanthelium* and *Panicum* are readily distinguishable from each other, and the combined genus would be very large, indeed. References: Lelong (1986)=Z; Zuloaga & Morrone (1996)=Y; Freckmann & Lelong in FNA (2003a); Haines (2010)=X.

1 Spikelets tuberculate.
  2 Lower lemmas tuberculate-hispid; spikelets 3.2-4.0 mm long; [of dry to mesic prairies and pinelands] ..... ***P. brachyanthum***
  2 Lower lemmas warty; spikelets 1.7-2.2 mm long; [of wetlands] ..... ***P. verrucosum***
1 Spikelets smooth, not tuberculate.
  3 Panicle < 2 cm wide at maturity.
    4 Spikelets > 4.5 mm long; first glume > 2.4 mm long; ligule 4-6 mm long; [of coastal dunes]; [subgenus *Panicum*, section *Repentia*] ..... ***P. amarum*** *var.* ***amarum***
    4 Spikelets < 4 mm long; first glume < 2.1 mm long; ligule < 2 mm long; [not of coastal dunes].
      5 Blades involute, 1.5-4 mm wide; culms wiry ..... [see ***Coleataenia***]
      5 Blades flat, the larger 6-20 mm wide; culms stout.
        6 Panicles constricted, 0.3-1.6 cm wide; spikelets subsessile to short-pediceled; summit of fertile palea not enclosed by fertile lemma ..... ***P. hemitomon***
        6 Panicles > 1 cm wide; spikelets short to long-pediceled; summit of fertile palea enclosed by fertile lemma ..... [see ***Coleataenia***]
  3 Panicle > 2 cm wide at maturity.
    7 Lower primary panicle branches in whorls of 4-7 at the nodes, stiffly spreading, naked on the proximal ½, the axils strongly pilose; lower culm internodes appressed papillose-pubescent; first glume acuminate, ½ as long as spikelet; fertile lemma chestnut brown at maturity ..... ***P. bergii***
    7 Plants without the above combination of characters.
      8 Plants from a cluster of fibrous roots, without rhizomes or hard knotty crowns, annual.
        9 First glume 1/5 to 1/3 length of spikelet, blunt to broadly rounded to truncate; sheaths usually glabrous; nodes glabrous.
          10 Spikelets oblong-lanceolate, (2.0-) 2.4-3.6 mm long, widest below middle, tapering to acuminate tips, second glume and sterile lemma firm, subcoriaceous; most pedicels < 3 mm long and shorter than spikelets; culms to 20 dm long; leaf blades 4-20 mm wide ..... ***P. dichotomiflorum*** *var.* ***dichotomiflorum***
          10 Spikelets ovoid to slenderly ellipsoid, 1.6-2.3 mm long, widest at middle with acute tips, second glume and sterile lemma thin, submembraneous; some to many pedicels > 3 mm long and longer than spikelets; culms to 6 dm long; leaf blades 1-8 mm wide ..... ***P. dichotomiflorum*** *var.* ***puritanorum***
        9 First glume 1/3 to 1/2 length of spikelet, acute to subacute; sheaths villous or hispid (except in the locally introduced *P. bisulcatum*); nodes often bearded.
          11 Spikelets 4.5-6 mm long; panicle branches often nodding or drooping at maturity ..... ***P. miliaceum***
          11 Spikelets 1.8-3.6 mm long; panicle branches ascending-spreading at maturity.
            12 Spikelets long-acuminate, (2.6-) 3.0-3.6 mm long; mature panicle slender, usually 2-3× as long as wide ..... ***P. flexile***
            12 Spikelets short-pointed to acuminate, 1.8-2.5 (-2.8) mm long; mature panicle usually 0.7-2× as long as wide.
              13 Sheaths glabrous except for the short-ciliate margins; culm nodes and internodes glabrous ..... ***P. bisulcatum***
              13 Sheaths hispid to villous; culm nodes usually pubescent to bearded, internodes hispid to glabrous.
                14 Panicle usually equal to or longer than portion of culm below panicle, often basally included at maturity; pulvini usually pilose to villous, especially at lower primary branches (sometimes glabrous); culm usually not obviously zig-zag; larger blades usually 10-20 mm wide; spikelets 1.6-2.9 (-4) mm long, short- to long-acuminate, lanceolate, lance-ovoid, or lance-ellipsoid; first glume 0.6-1.5 (-2) mm long ..... ***P. capillare***
                14 Panicle usually not as long as portion of culm below panicle, usually exerted at maturity; pulvini glabrous to sparsely (-moderately) pilose; culm often zig-zag at least proximally; larger blades usually no more than 4-12 mm wide; spikelets 1.4-2.4 mm long, pointed to short-acuminate, lance-ellipsoid, ellipsoid, ovoid, or obovoid; first glume 0.4-0.9 (-1.2) mm long.
                  15 Herbage usually purple-tinged (-yellowish-green); internodes glabrous to sparsely hispid; blades 2-6 mm wide, ascending; pulvini glabrous to sparsely pilose; spikelets 1.8-2.2 mm long, > 2× as long as wide; mature fertile lemma blackish; [plants of granite outcrops of NC, SC, and GA] ..... ***P. philadelphicum*** *ssp.* ***lithophilum***

15 Herbage yellow-green to green or purple-tinged; internodes glabrate to densely hispid; blades 2-12 mm wide, spreading to ascending; pulvini glabrous to pilose; spikelets 1.4-2.4 mm long, < 2× as long as wide; mature fertile lemma stramineous to blackish; [plants of a variety of open or wooded, dry or wet, and often disturbed sites].
16 Culms to 1 m long; blades to 12 mm wide; blade of flag (inflorescence bract) usually > ½ as long as panicle; panicle ellipsoid to obovoid, moderately to densely flowered; pulvini glabrous to sparsely pilose; spikelets 1.7-2.4 mm long.....***P. philadelphicum*** *ssp.* ***gatteringeri***
16 Culms to 0.5 m long; blades to 6 mm wide; blade of flag (inflorescence bract) usually < ½ as long as panicle; panicle ovoid to deltoid, sparingly to moderately flowered; pulvini sparsely to moderately pilose; spikelets 1.4-2.2 (-2.4) mm long..... ***P. philadelphicum*** *ssp.* ***philadelphicum***

8 Plants with rhizomes or hard knotty crowns, perennial.
17 Plants with hard crowns, lacking rhizomes; fertile lemma 1.2-1.6 mm long..... [see ***Coleataenia***]
17 Plants with rhizomes; fertile lemma 1.6-4 mm long.
18 Rhizomes about 1 cm thick with pubescent scale-like leaves; lower portion of culm hard, nearly woody .....***P. antidotale***
18 Rhizomes less than 1 cm thick with glabrous scale-like leaves; culms not woody.
19 First glume truncate apically.....***P. repens***
19 First glume acute to obtuse.
20 Culms slightly compressed below; ligules 0.5 mm long or less; spikelets subsessile and subsecund, usually some obliquely bent above the first glume; fertile lemma 1.8-2.2 mm long..... [see ***Coleataenia***]
20 Culms terete; ligules 1-6 mm long; spikelets pediceled and not at all secund, essentially straight; fertile lemma 2-4 mm long.
21 Panicle narrow, the branches erect; sheaths longer than internodes; spikelets 4.3-7.7 mm long; fertile lemma 3-4 mm long.
22 Rhizomes usually elongate; culms solitary to loosely tufted, 0.2-1.5 m tall; leaves 0.7-3.6 dm long; panicles 2-6 cm wide, the primary branches usually 1-2 per node, loosely flowered; spikelets 4.7-7.7 mm long; first glumes 2.5-5.5 mm long, ⅔-¾ as long as the spikelet, 7-9 nerved, the nerves thickened and raised; fertile lemma 1.3-1.8 mm wide .. ..***P. amarum*** *var.* ***amarum***
22 Rhizomes usually short; culms usually tufted, 1-2 (-3) m tall; leaves 2-5 dm long; panicles 3-10 cm wide, the primary branches usually 2 or more per node, densely flowered; spikelets 4.0-5.9 mm llong; first glumes 2-3.5 mm long, ½-⅔ as long as the spikelet, 3-5 (-7) nerved, the nerves thin and wiry; fertile lemma 1.0-1.5 mm wide..... .....***P. amarum*** *var.* ***amarulum***
21 Panicle with divergent to spreading-ascending branches; upper sheaths shorter than internodes; spikelets 2.8-5 mm long; fertile lemma 2-2.6 mm long.
23 Spikelets 2.8-3.5 mm long; first glume ½ length of spikelet, blunt to acute.....***P. virgatum*** *var.* ***cubense***
23 Spikelets 3.2-5 mm long; first glume b length of spikelet, acuminate.
24 Rhizomes short, densely interlocking, culms subascending at base, densely clumped ....***[P. virgatum*** *var.* ***spissum]***
24 Rhizomes elongate, or if short, then culms horizontally divergent at base, loosely clumped..... .....***P. virgatum*** *var.* ***virgatum***

Panicum amarum Elliott *var.* ***amarulum*** (A.S. Hitchcock & Chase) P.G. Palmer, Southern Seabeach Grass. Cp (DE, FL, GA, NC, SC, VA), Mt* (WV*): coastal dunes and shores, sandflats, and sandhills; common (uncommon in WV, rare in FL, GA, NC, SC, VA). July-November. NJ s. to FL and West Indies, w. to TX and Mexico; restricted to the Coastal Plain except for WV (where apparently introduced). Although well-marked individuals of var. *amarulum* and var. *amarum* are quite distinctive, only the number and structure of first glume nerves appears to be a constant over the range of the two taxa (Palmer 1975). Primarily a coastal plant, var. *amarulum* has been found in the Sandhills of NC (Richmond Co.). Blomquist 1948 says this taxon "does not seem to grow naturally in North Carolina." [= K, Pa, Z; = *P. amarulum* A.S. Hitchcock & Chase – RAB, C, F, G, HC, S, WV; = *P. amarum* ssp. *amarulum* (A.S. Hitchcock & Chase) Freckmann & Lelong – FNA; not ***Panicum***]

Panicum amarum Elliott *var.* ***amarum***, Bitter Seabeach Grass. Cp (DE, FL, GA, NC, SC, VA): coastal dunes and shores; common. August-November. CT s. to FL, w. to TX; restricted to the coast. See note under var. *amarulum*. [= K, Pa, Z; = *P. amarum* – RAB, C, F, G, HC, S; = *P. amarum* ssp. *amarum* – FNA; not ***Panicum***]

* ***Panicum antidotale*** Retzius, Blue Panic Grass. Cp (NC?, SC): open, disturbed areas and fields; rare, native of India and c. Asia. Reported for NC and SC (FNA, Kartesz 1999). Established in NC, SC; AL; TX west to CA. [= FNA, HC, K; not ***Panicum***]

* ***Panicum bergii*** Arechavaleta, Berg's Panic Grass. Cp (GA): ditches and shallow, sporadically flooded depressions in grasslands; rare, native of South America. Reported for sc. GA (HC), AL (Kartesz 1999), and se. TX. [= FNA, HC, K, S; > *P. pilcomayense* Hackel; ***Panicum*** s.s.]

* ***Panicum bisulcatum*** Thunberg, Blackseed Panic Grass. Cp (GA, SC): wet, disturbed, open areas; rare, native of Asia. Reported introduction in SC, GA, and PA (Kartesz 1999), and as a ballast plant for se. PA (Philadelphia) (Rhoads & Klein 1993, as *P. acroanthum* Steudel). [= FNA, K; > *P. acroanthum* Steudel]

Panicum brachyanthum Steudel, Prairie Panic Grass. Cp (GA): prairies and pinelands; rare. W. LA, AR, OK, and e. TX; disjunct eastward in sc. MS and sw. GA. [= FNA, HC, K]

Panicum capillare Linnaeus, Old-witch Grass, Tumbleweed, Tickle Grass. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, FL, VA): open sandy or stony soil, fields, roadsides, waste places, often weedy in cultivated soil; common (rare in SC). August-November. E. to c. Canada, s. to FL and TX; Bermuda. Plants formerly known as *P. capillare* var. *occidentale* Rydberg, ranging from Canada south to NJ, WV, KY, TX, and CA, are distinguished by long-acuminate spikelets 2.5-4 mm long that are mostly subsessile or short-pedicelled. In our region, *P. capillare* has short-acuminate spikelets 1.8-2.9 mm long, mostly on longer pedicels. [= RAB, K, Pa, S, WV, Z; < *P. capillare* – C, Y (also see *P. gattingeri*); > *P. capillare* var. *capillare* – F, HC, W; = *P. capillare* ssp. *capillare* – FNA; = *P. capillare* var. *agreste* Gattinger – G; ***Panicum*** s.s.]

Panicum dichotomiflorum Michaux *var.* ***dichotomiflorum***, Spreading Panic Grass, Fall Panic Grass. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, FL, GA, NC, SC, VA): marshy shores, exposed wet soils, alluvial deposits in floodplain forests, spoil banks, ditches; common. July-October. E. Canada west to BC, south to FL and TX; also in the Bahamas

(Sorrie & LeBlond 1997). Plants with geniculate bases, enlarged lower nodes and sheaths, and panicles with included peduncles and divergent branches have been recognized as var. *geniculatum* (A. Wood) Fernald. [= K; < *P. dichotomiflorum* – RAB, C, GW, Pa, S, WV, Z; > *P. dichotomiflorum* var. *geniculatum* (Wood) Fernald – F, G, W; > *P. dichotomiflorum* var. *dichotomiflorum* – F, G, W; = *P. dichotomiflorum* ssp. *dichotomiflorum* – FNA; < *P. dichotomiflorum* var. *dichotomiflorum* – HC; ***Panicum*** s.s.]

Panicum dichotomiflorum Michaux *var*. ***puritanorum*** Svenson, Puritan Panic Grass. Wet sands and peats of seasonally exposed pond and lake shores. July-October. NS, NH, and NY south to DE (Sorrie & LeBlond 2008), VA, and NC; disjunct in IN and IL. Plants from DE northward typically have slender culms 0.3-6 dm long and leaves 1-8 mm wide. Plants with floral characters of var. *puritanorum* but with nominate-like stout culms 0.8-2 m long and leaves 7-25 mm wide occur in bottomlands in se. VA, and have been recognized as *P. dichotomiflorum* var. *imperiorum* Fernald. For the time being they are placed here based on floral characters (they will key here), but need further study. [= F, G, K; < *P. dichotomiflorum* – C, Pa; > *P. dichotomiflorum* var. *imperiorum* Fernald – F; = *P. dichotomiflorum* ssp. *puritanorum* (Svenson) Freckmann & Lelong – FNA; > *P. dichotomiflorum* var. *puritanorum* – HC; ***Panicum*** s.s.]

Panicum flexile (Gattinger) Scribner, Wiry Panic Grass. Pd (GA, NC, SC, VA), Mt (GA, NC, VA, WV), Cp (FL): glades and openings over mafic rocks, damp sandy meadows, open woods; rare. July-October. NY, sw. QC, S. ON, and ND south to FL and TX. First reported for SC by Nelson & Kelly (1997). [= RAB, C, F, FNA, G, HC, K, Pa, S, W, WV, Y, Z; ***Panicum*** s.s.]

Panicum hemitomon J.A. Schultes, Maidencane. Cp (DE, FL, GA, NC, SC, VA), Mt (VA): lake, pond, and river shores, swamp borders, marshes, ditches, often in shallow water; common (rare in VA). June-July. Coastal Plain from s. NJ south to FL, west to TX; also TN; South America. Often forming dense colonies in the low margin and shallow waters of limesink ponds. [= RAB, C, F, FNA, G, GW, HC, K, S, W, Z; not ***Panicum***]

* ***Panicum miliaceum*** Linnaeus *ssp*. ***miliaceum***, Broomcorn Millet, Proso Millet, Hog Millet. Cp (FL, NC), Mt (VA), Pd (DE, VA): planted in wildlife food plots, sometimes persistent or self-sowing; uncommon (rare in FL, NC, and VA), introduced, native of Eurasia. July-October. [= C, FNA, K; < *P. miliaceum* – F, G, HC, Pa, S, Y; ***Panicum*** s.s.]

* *Panicum miliaceum* Linnaeus ssp. *ruderale* (Kitagawa) Tzvelev, Panic Millet. [= FNA, K; = *P. miliaceum* ssp. *spontaneum* (Kit.) Tzvelev – C; < *P. miliaceum* – F, G, HC; ***Panicum*** s.s.] {not yet keyed}

Panicum philadelphicum Bernhardi ex Trinius *ssp*. ***gattingeri*** (Nash) Freckmann & Lelong, Gattinger's Panic Grass. Mt (NC, VA, WV), Pd (NC, VA), {GA}: damp or dry, usually calcareous sandy soils of fields, roadsides, shores, and cultivated ground; common in Mountains, uncommon in Piedmont (rare in VA). August-October. NY, sw. QC, and MN south to NC, TN, GA, AL, and AR. [=FNA; = *P. gattingeri* Nash – RAB, F, HC, K, S, WV; < *P. capillare* Linnaeus – C, Y; = *P. capillare* var. *campestre* Gattinger – G, W; = *P. philadelphicum* var. *camprestre* (Gattinger) A. Haines – X; ***Panicum*** *s.s.*]

Panicum philadelphicum Bernhardi ex Trinius *ssp*. ***lithophilum*** (Swallen) Freckmann & Lelong, Flatrock Panic Grass. Pd (GA, NC, SC), Mt (NC): soil islands on granitic flatrocks and domes; rare. August-October. Restricted to granite outcrops in NC, SC, and ec. GA. Zuloaga & Morrone (1996) did not consider ssp. *lithophilum* separable from ssp. *philadelphicum*. [= FNA; = RAB, HC, K; < *P. capillare* Linneaus var. *sylvaticum* Torrey – W; < *P. philadelphicum* Bernhardi ex Trinius – Y; ***Panicum*** *s.s.*]

Panicum philadelphicum Bernhardi ex Trinius *ssp*. ***philadelphicum***, Woodland Panic Grass. Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV), Cp (DE, VA): glades, barrens, desiccated pondshores, riversides, and other rocky or dry sandy soil of open woods and roadsides; common (uncommon in WV, rare in DE and SC). NS west to WI, south to GA and e. TX. Plants formerly known as *P. tuckermanii* Fernald, ranging from se. Canada south to n. VA and OH, are distinguished by included or short-exerted peduncles less than one-third as long as the panicles (the peduncle measured from the summit of the flag sheath). [= FNA; = RAB, C, G, K, S, WV; > *P. philadelphicum* – F, HC; > *P. tuckermanii* Fernald – F, HC; < *P. capillare* Linneaus var. *sylvaticum* Torrey – W; < *P. philadelphicum* – Y; = *P. philadelphicum* var. *philadelphicum* – X; ***Panicum*** *s.s.*]

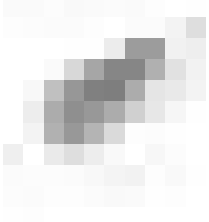
* ***Panicum repens*** Linnaeus, Torpedo Grass. Cp (FL, GA, NC, SC): ditches, roadbanks, disturbed coastal sands, in areas where ship's ballast was deposited; common (uncommon in GA, rare north of GA), native of Europe. First reported for NC by Leonard (1971b); reported for numerous counties in the GA Coastal Plain (Carter, Baker, & Morris 2009). [= FNA, GW, HC, K, S; ***Panicum*** s.s.]

Panicum verrucosum Muhlenberg, Warty Panic Grass. Cp (DE, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): wet pinelands, marshes, shores, ditches; common (uncommon in Piedmont, rare in Mountains). August-October. MA and PA west to MI and IN, south to FL and se. TX. Spikelets deep green, the warty surface unique among *Panicum* in our region. [= RAB, C, F, FNA, G, GW, HC, K, Pa, S, W, Z; not ***Panicum***]

Panicum virgatum Linnaeus *var*. ***cubense*** Grisebach, Blunt Panic Grass. Cp (DE, FL, GA, NC, SC, VA?): wet to dry sandy pinelands; uncommon. June-October. Coastal Plain from MA to FL, west to MS; also in MI; West Indies. [= F, HC, S; < *P. virgatum* – RAB, C, FNA, G, GW, Pa, W, Z; < *P. virgatum* var. *virgatum* – K]

Panicum virgatum Linnaeus *var*. ***spissum*** Linder, Tufted Switchgrass. Cp (DE): gravelly or sandy fresh to brackish shores and swamps; rare. E. Canada south to PA, MD, and DE (Kartesz 1999). [= F, HC, K; < *P. virgatum* – C, FNA, G, Pa; not ***Panicum***]

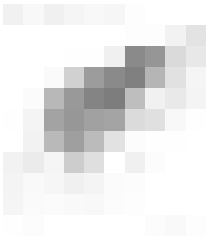
Panicum virgatum Linnaeus *var*. ***virgatum***, Switchgrass. Cp (DE, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): dry or wet sandy soils of pinelands, fresh and brackish marshes, shores; common (uncommon in Mountains). June-October. Sw. QC and ND south to FL and TX, west to NV; Bermuda; Central and South America. [= F, HC, S; < *P. virgatum* – RAB, C, FNA, G, GW, Pa, W, WV, Z; < *P. virgatum* var. *virgatum* – K; not ***Panicum***]



Parapholis C.E. Hubbard 1946 (Sickle Grass)

A genus of 6 species, annuals, of Eurasia. References: Worley in FNA (2007a); Tucker (1996)=Z.

* ***Parapholis incurva*** (Linnaeus) C.E. Hubbard, Sickle Grass, Hard Grass, Thin-tail. Sandy and muddy flats, brackish or salt marshes; native of Europe. [= RAB, C, FNA, HC, K, Z; = *Pholiurus incurvus* (Linnaeus) Schinzius & Thellung – F, G; ? *Lepturus filiformis* (Roth) Trinius]



Pascopyrum A. Löve 1980 (Wheatgrass)

A monotypic genus, perennial, of c. and w. North America. *Pascopyrum* is octoploid, derived from *Elymus* and *Leymus*. References: Barkworth in FNA (2007a).

* ***Pascopyrum smithii*** (Rydberg) A. Löve, Western Wheatgrass. Mt (GA): disturbed areas; rare. Reported for ne. GA (Rabun County) by Jones & Coile (1988), as *Agropyron smithii* Rydberg. It is also reported for TN and KY (Kartesz 1999). [= FNA, K; = *Elytrigia smithii* (Rydberg) Nevski – C; = *Agropyrum smithii* Rydberg – F, G, W]

Paspalum Linnaeus 1759 (Paspalum, Crown Grass, Beadgrass)
(by Alan S. Weakley & Richard J. LeBlond)

A genus of 300-400 species, of tropical and warm temperate regions. References: Allen & Hall in FNA (2003a); Banks (1966)=Z; Silveus (1942)=Y. Key based closely on FNA and on Banks (1966).

1 Spikelets solitary, not associated with rudimentary spikelets or naked pedicels.
  2 Panicles usually composed of a terminal pair of branches, sometimes with 1 (-5) additional branches below the terminal pair.
    3 Upper glumes pubescent on the back or margins.
      4 Spikelets 1.3-1.9 mm long; upper glumes pilose along the margins ..... ***[P. conjugatum]***
      4 Spikelets 2.4-3.2 mm long; upper glumes sparsely pubescent on the back ..... ***P. distichum***
    3 Upper glumes glabrous.
      5 Spikelets elliptic, acute or acuminate at the tip ..... ***P. vaginatum***
      5 Spikelets ovate to broadly elliptic, obtuse to broadly acute at the tip.
        6 Spikelets 1.9-2.3 mm long; leaf blades flat ..... ***P. minus***
        6 Spikelets 2.5-4.0 mm long; leaf blades flat or longitudinally folded ..... ***P. notatum***
  2 Panicles with 1-70 branches, if > 1, the branches arranged racemosely.
    7 Panicle branches 7-70, the axes extending beyond the outermost spikelets; panicle branches disarticulating at maturity..... ***P. fluitans***
    7 Panicle branches 1-6, terminating in a spikelet; panicle branches persistent.
      8 Upper florets olive to dark brown ..... ***P. scrobiculatum***
      8 Upper florets pale to tan.
        9 Axes of panicle branches not broadly winged, 0.6-1.3 mm wide.
          10 Spikelets orbicular, 2.8-3.2 mm wide ..... ***P. laeve*** *var.* ***circulare***
          10 Spikelets slightly longer than broad, 2.0-2.5 mm wide ..... ***P. laeve*** *var.* ***laeve***
        9 Axes of panicle branches broadly winged, 1.8-3.3 mm wide.
          11 Spikelets 3.2-4.0 mm long; upper lemmas with a few short hairs at their tips ..... ***P. acuminatum***
          11 Spikelets 1.7-2.1 mm long; upper lemmas glabrous ..... ***P. dissectum***
1 Spikelets paired, or at least the second nonfunctional spikelet represented by a naked pedicel.
  12 Spikelets 1.0-1.3 mm long ..... ***[P. paniculatum]***
  12 Spikelets 1.3-4.1 mm long
    13 Margins of upper glumes and lower lemmas pilose.
      14 Panicle branches 2-7; spikelets 2.3-4.0 mm long ..... ***P. dilatatum*** *ssp.* ***dilatatum***
      14 Panicle branches (4-) 10-30; spikelets 1.8-2.8 mm long ..... ***P. urvillei***
    13 Margins of upper glumes and lower lemmas neither ciliate-lacerate, winged, nor pilose (if pubescent, the hairs not pilose).
      15 Upper florets olive to dark brown.
        16 Panicle branches 10-28 (or more).
          17 Plants annual; axes of panicle branches broadly winged, the wings about as wide as the central portion; [common native] ..... ***P. boscianum***
          17 Plants perennial; axes of panicle branches narrowly winged, the wings narrower than the central portion; [rare exotics].
            18 Axes of panicle branches 0.5-1.2 mm wide; spikelets 1.1-1.8 mm wide ..... ***P. conspersum***
            18 Axes of the panicle branches 1.0-1.7 mm wide; spikelets 1.8-2.4 mm wide ..... ***P. virgatum***
        16 Panicle branches 1-10 (or to 28 in *P. boscianum*, keyed under both leads).
          19 Plants annual.

20 Spikelets 1.3-1.8 mm wide, broadly elliptic to orbicular, glabrous; panicles with 1-10 (-28) branches, the axes 0.7-2.3 mm wide ..... ***P. boscianum***
20 Spikelets 1.7-2.4 mm wide, broadly obovate, shortly pubescent; panicles with 1-5 branches, the axes 0.8-1.3 mm wide..... ..... ***[P. convexum]***
19 Plants perennial.
21 Plants cespitose, rhizomes poorly developed; culms 10-20 dm tall; panicle branches ascending, divaricate, or reflexed.
22 Leaves 7-18 mm wide..... ***P. conspersum***
22 Leaves 2.5-4 mm wide..... ***P. plicatulum***
21 Plants not cespitose, rhizomatous; culms 1-15 dm tall; panicle branches ascending.
23 Rhizomes long, evident..... ***P. nicorae***
23 Rhizomes short, indistinct..... ***P. plicatulum***
15 Upper florets white, stramineous, or golden brown.
24 Lower lemmas with well-developed cross-ribs over the veins; upper glumes absent..... ***P. malacophyllum***
24 Lower lemmas not ribbed over the veins; upper glumes present.
25 Panicles with 15-100 branches.
26 Plants annual; upper glumes and lower lemmas rugose..... ***[P. racemosum]***
26 Plant perennial; upad\weakleyper glumes and lower lemmas smooth.
27 Plant rhizomatous; panicle branch axes 0.9-1.2 mm wide; panicle branches often arcing ..... ***P. intermedium***
27 Plant cespitose; panicle branch axes 0.3-0.6 mm wide; panicle branches straight.
28 Panicle branches spreading to reflexed (rarely ascending); leaf blades 10-23 mm wide; axes of panicle branches 0.3-0.4 mm wide..... ***P. coryphaeum***
28 Panicle branches erect to ascending; leaf blades 4.9-6.1 mm wide; axes of panicle branches 0.5-0.6 mm wide..... ..... ***[P. quadrifarium]***
25 Panicles with 1-15 branches.
29 Spikelets 1.3-2.5 mm long.
30 Upper glumes (and usually also the lower lemmas) shortly pubescent.
31 Lower glumes present ..... ***[P. langei]***
31 Lower glumes absent.
32 Panicles both terminal and axillary, the axillary panicles partially or completely enclosed by the subtending leaf sheath..... **[see Key A]**
32 Panicles all terminal..... ***P. caespitosum***
30 Upper glumes and lower lemmas glabrous.
33 Panicles both terminal and axillary, the axillary panicles partially or completely enclosed by the subtending leaf sheath ..... **[see Key A]**
33 Panicles all terminal.
34 Upper panicle branches erect ..... ***P. monostachyum***
34 Upper panicle branches spreading to ascending.
35 Upper glumes and lower lemmas 5-veined..... ***P. caespitosum***
35 Upper glumes and lower lemmas 3-veined.
36 Lower sheaths villous or hirsute..... ***P. praecox*** *var.* ***curtisianum***
36 Lower sheaths glabrous or sparsely papillose pubescent..... ***P. praecox*** *var.* ***praecox***
29 Spikelets 2.5-4.1 mm long.
37 Spikelet pairs barely if at all imbricate; lower glumes usually present..... ***P. bifidum***
37 Spikelet pairs imbricate; lower glumes absent or present.
38 Upper glumes pubescent; lower lemmas usually pubescent.
39 Lower glumes present..... ***[P. langei]***
39 Lower glumes absent ..... ***P. pubiflorum***
38 Upper glumes glabrous; lower lemmas usually glabrous.
40 Upper florets golden brown ..... ***P. floridanum***
40 Upper florets pale to tan.
41 Terminal panicle branches erect ..... ***P. monostachyum***
41 Terminal panicle branches spreading to ascending.
42 Plants decumbent, rooting at the lower nodes; spikelets obovate to elliptic ..... ***P. pubiflorum***
42 Plants rhizomatous; spikelets orbicular to elliptic.
43 Spikelets 2.9-4.1 mm long; 1.9-3.1 mm wide, suborbicular to elliptic; upper glumes 5-veined; leaf blades flat ..... ***P. floridanum***
43 Spikelets 2.1-3.1 mm long, 2.0-2.8 mm wide, orbicular or nearly so; upper glumes 3-veined; leaf blades laterally folded.
44 Lower sheaths villous or hirsute..... ***P. praecox*** *var.* ***curtisianum***
44 Lower sheaths glabrous or sparsely papillose pubescent..... ***P. praecox*** *var.* ***praecox***

Key A: *Paspalum setaceum* complex
(by Richard J. LeBlond)

1 Leaves glabrous to glabrate (if glabrate, also see var. *stramineum* in couplet 8).
2 Blades crowded toward the base, often recurved, 3-8 mm wide; spikelets 1.4-1.9 mm long, usually glabrous .... ***P. setaceum*** *var.* ***longepedunculatum***
2 Blades not especially crowded toward the base, erect, ascending or spreading, 2-20 mm wide; spikelets 1.6-2.6 mm long, pubescent or glabrous.
3 Blades 3-8 mm wide; spikelets 1.6-1.9 mm long, pubescent, subacute; [of GA and FL southward]..... ***P. propinquum***
3 Blades 2-20 mm wide; spikelets 1.7-2.6 mm long (if < 2.0 then larger leaves usually > 7 mm wide), glabrous or pubescent, rounded to blunt; [plants of FL northward and westward].
4 Plants erect to spreading; blades 3-20 mm wide; spikelets 1.7-2.6 mm long; [of NJ to TX] ..... ***P. setaceum*** *var.* ***ciliatifolium***

4 Plants stiffly erect; blades 2-6 mm wide; spikelets 2.0-2.6 mm long; [of GA and FL] ..... ***P. setaceum*** *var*. ***rigidifolium***

1 Leaves variously pubescent.

5 Leaves villous to villous-hirsute, 2-10 mm wide; spikelets 1.3-1.9 mm long.

6 Leaves villous, 2-7 mm wide, not especially crowded toward the base, erect to spreading; [widespread] ..... ***P. setaceum*** *var*. ***setaceum***

6 Leaves villous-hirsute, 3-10 mm wide, crowded toward the base, recurved; [of n. FL south to Cuba] ..... ***P. setaceum*** *var*. ***villosissimum***

5 Leaves puberulent, pilose, or hirsute, 3-15 mm wide; spikelets 1.6-2.5 mm long.

7 Leaves puberulent at least distally on the adaxial surface (and often also pilose in var. *stramineum*); spikelets 1.6-2.2 mm long.

8 Plants erect to spreading; leaves puberulent and often pilose to nearly glabrous except for the puberulent distal adaxial surface; spikelets glabrous to pubescent ..... ***P. setaceum*** *var*. ***stramineum***

8 Plants spreading to prostrate; leaves densely puberulent; spikelets pubescent ..... ***P. setaceum*** *var*. ***psammophilum***

7 Leaves pilose or hirsute but not puberulent; spikelets 1.8-2.5 mm long.

9 Plants mostly erect; leaves pilose; spikelets usually glabrous; sterile lemma midnerve usually present ..... ***P. setaceum*** *var*. ***muhlenbergii***

9 Plants mostly widely spreading; leaves hirsute; spikelets glabrous or pubescent; sterile lemma midnerve present or absent ..... ***P. setaceum*** *var*. ***supinum***

Paspalum acuminatum Raddi, Brook Paspalum, Canoe Grass. Pd (GA): wet areas, often disturbed; rare, possibly only adventive in our area. C. GA and ne. TX south to s. FL and s. TX, south through the New World tropics to s. South America. [= FNA, HC, K]

Paspalum bifidum (Bertoloni) Nash, Pitchfork Paspalum, Pitchfork Crown Grass. Cp (FL, GA, NC, SC, VA), Pd (GA, SC): mesic to wet longleaf pine savannas and mesic swales in sandhills; uncommon (rare north of SC). August-October. Se. VA south to s. FL, west to se. MO, se. OK, and e. TX. [= RAB, C, GW, HC, K, S, Y; > *P. bifidum* var. *bifidum* – F, G; > *P. bifidum* var. *projectum* Fernald – F, G]

Paspalum boscianum Flügge, Bull Paspalum. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, SC, VA): low fields, ditches; common (uncommon in VA). July-October. MD, KY, and TX south through tropical America. [= RAB, C, F, FNA, G, GW, HC, K, S, W, Y]

Paspalum caespitosum Flügge. Cp (AL, FL): pinelands, hammocks; rare. S. AL and n. FL south to s. FL; West Indies, Mexico and Central America. [= FNA, GW, HC, K, S]

Paspalum conjugatum Bergius, Sour Paspalum. Cp (AL, FL, LA, MS): disturbed areas, forest edges; uncommon. Ne. FL, FL Panhandle, and s. AL west to e. TX, south in the New World tropics; Old World tropics. [= FNA, HC, K, S] {synonymy incomplete}

* ***Paspalum conspersum*** Schrad., Scattered Paspalum. Cp (GA): roadsides, other disturbed areas; rare, native of Mexico south to South America. [= FNA] {synonymy incomplete}

* *Paspalum convexum* Flügge, Mexican Paspalum. Disturbed areas. MS, LA, and e. TX, native of tropical America. [= FNA, K] {synonymy incomplete}

* ***Paspalum coryphaeum*** Trinius, Emperor Crown-grass. Cp (FL), Pd (NC): disturbed areas; rare, native of South America. [= FNA, K] {synonymy incomplete}

Paspalum denticulatum Trinius. Cp (AL): wet disturbed areas; rare. FL, AL, LA, TX southward. {synonymy incomplete; not yet keyed}

* ***Paspalum dilatatum*** Poiret *ssp*. ***dilatatum***, Dallis Grass. Roadsides, fields, disturbed areas; native of tropical America. May-October. Other subspecies occur in the native range in South America. [< *P. dilatatum* – RAB, C, F, FNA, G, GW, HC, K, S, W, Y]

Paspalum dissectum (Linnaeus) Linnaeus, Mudbank Crown Grass, Walter Paspalum. Cp (DE, GA, NC, SC, VA), Pd (NC, SC), Mt (VA): mud flats, drawdown zones; uncommon (rare in NC, SC, and VA). September. NJ, IL, and KS south to s. FL and e. TX; Cuba. [= RAB, C, F, FNA, G, GW, HC, K, S, Y]

Paspalum distichum Linnaeus, Joint Paspalum, Knotgrass. Cp (GA, NC, SC, VA), Pd (GA, NC, SC), Mt (NC): brackish and freshwater marshes; uncommon (rare in VA). June-August. NJ, KS, and WA south to s. FL, s. TX, s. CA and through the New World and Old World tropics. [= RAB, C, F, FNA, G, HC, K, Pa, S, W, Y; < *P. distichum* – GW (also see *P. vaginatum*); = *P. paspaloides* (Michaux) Scribner]

Paspalum floridanum Michaux, Florida Paspalum. Cp (DE, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): wet forests, pine savannas; common (rare in Mountains). August-October. NJ, IL, and KS south to s. FL and e. TX. [= RAB, C, FNA, GW, K, Pa, W; > *P. floridanum* – G; > *P. difforme* Le Conte – G, HC, S, Y; > *P. floridanum* var. *floridanum* – F, HC, S, Y; > *P. floridanum* var. *glabratum* Engelmann ex Vasey – F, HC, S, Y; > *P. giganteum* Baldwin ex Vasey – HC, S, Y]

Paspalum fluitans (Elliott) Kunth, Water Paspalum, Horsetail Crown Grass. Cp (GA, NC, SC, VA), Pd (NC, VA), Mt (WV): mucky soils in swamp forests, moist riverbanks; uncommon (rare in WV). October. MD, IL, and KS south to s. FL and s. TX, and south through tropical America to c. South America. [= RAB, C, F, G, HC, K; = *P. repens* P.J. Bergius – FNA, GW, S, Y]

* ***Paspalum intermedium*** Munro ex Morong. Cp (GA): drainage canals; rare, native of South America. Escaped in sc. GA (Tift County, where growing along drainage canals in Tifton) (Jones & Coile 1988). [= FNA, HC, K]

Paspalum laeve Michaux *var*. ***circulare*** (Nash) Stone. Mt (WV), {FL?, GA, NC, VA}: {need additional herbarium work to fully determine range and abundance of varieties} June-August. [= F; < *P. laeve* – RAB, C, FNA, G, GW, K, Pa, W; = *P. circulare* Nash – HC, S, WV, Y]

Paspalum laeve Michaux *var*. ***laeve***. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): forest edges and disturbed areas; common. {need additional herbarium work to fully determine range and abundance of varieties} June-August. Overall distribution of *P. laeve* s.l.: MA, NY, MI, and KS south to s. FL and e. TX. [< *P. laeve* – RAB, C, FNA, G, GW, K, Pa, W; > *P. laeve* var. *laeve* – F; > *P. laeve* var. *pilosum* Scribner – F; > *P. laeve* – HC, S, WV, Y; > *P. longipilum* Nash – HC, S, WV, Y]

Paspalum langei (E. Fournier) Nash, Rustyseed Paspalum. Cp (FL, LA): calcareous hardwood hammocks; rare. N. peninsular FL (Alachua County) and Panhandle FL (Jackson County) west to se. TX, and south through the New World tropics to South America. [= FNA, K; ? *P. botteri* (E. Fournier) Chase] {synonymy incomplete}

* ***Paspalum malacophyllum*** Trinius, Ribbed Paspalum. Cp (GA): old fields, disturbed areas; rare, native of Mexico to South America. [= FNA, HC]

Paspalum minus E. Fournier, Matted Paspalum. Cp (AL, FL, LA, MS): disturbed areas; uncommon. FL Panhandle (Escambia County) and s. AL west to e. TX. [= FNA, K] {synonymy incomplete}

Paspalum monostachyum Vasey, Gulfdune Paspalum. Cp (MS): coastal dunes, wet prairies; rare. S. FL peninsula; s. MS; sw. LA west to TX and Tamaulipas. [= FNA, HC, K, S] {synonymy incomplete}

* ***Paspalum nicorae*** Parodi, Brunswickgrass. Cp (GA): disturbed areas; rare, native of Brazil. Also reported for peninsular FL (Wunderlin & Hansen 2006). [= FNA, HC, K]

* ***Paspalum notatum*** Flügge, Bahia Grass. Cp (FL, GA, NC, SC, VA), Pd (GA, SC, VA), Mt (GA): roadsides and disturbed areas, sometimes planted as a coarse turfgrass or a pasture grass; common (uncommon north of FL, rare in VA Piedmont, native of tropical America. June-October. [= FNA, G, GW, Y; > *P. notatum* var. *notatum* – HC, K; > *P. notatum* Flügge var. *saurae* Parodi – RAB, HC, K]

* *Paspalum paniculatum* Linnaeus, Arrocillo. Disturbed areas, native of tropical America. Ec. MS and sw. FL. [= FNA, K] {synonymy incomplete}

Paspalum plicatulum Michaux, Brownseed Paspalum. Cp (FL, GA, SC): pine savannas, fields; common (uncommon south of FL). May-July. Se. SC south to s. FL, west to s. TX, and south through tropical America to s. South America. [= RAB, FNA, GW, HC, K, S, Y]

Paspalum praecox Walter *var*. ***curtisianum*** (Steudel) Vasey, Curtis's Crown Grass. Cp (FL, GA, NC, SC, VA): pine savannas; rare (NC Watch List, VA Rare). June-October. NC south to s. FL, west to e. TX. The variety was named for the Rev. Moses Ashley Curtis (of Hillsborough, NC), not Allen Hiram Curtiss (of Jacksonville, FL); the correct spelling of the epithet is therefore "*curtisianum*." [= RAB, F, G; = *P. praecox* var. *curtissianum* – C, orthographic error; < *P. praecox* – FNA, GW, K; = *P. lentiferum* Lamarck – HC, S, Y]

Paspalum praecox Walter *var*. ***praecox***, Early Crown Grass. Cp (FL, GA, NC, SC): pine savannas; common (rare north of FL) (NC Watch List). May-July. [= RAB, C, F, G; < *P. praecox* – FNA, GW, K; = *P. praecox* – HC, S, Y]

Paspalum propinquum Nash. Cp (FL, GA): {habitat}; uncommon. June-September. GA and FL. [= HC, S; < *P. setaceum* – K]

Paspalum pubiflorum Ruprecht *var*. ***glabrum*** Vasey, Hairyseed Crown Grass. Mt (GA, NC, VA, WV), Pd (DE, GA, NC, VA), Cp (FL, SC, VA): disturbed areas; uncommon (rare in DE, FL, and WV). September-October. PA west to KS and CO, south to FL and s. TX and Mexico; Cuba. [= C, F, G, HC, S, Y; < *P. pubiflorum* – RAB, FNA, GW, K, W]

* *Paspalum quadrifarium* Lamarck, Tussock Paspalum. Disturbed areas. S. MS. Native of South America. [= FNA] {synonymy incomplete}

* *Paspalum racemosum* Lamarck, Peruvian Paspalum. Disturbed areas. MS and other widely scattered localities in North America, native of n. South America. [= FNA, K] {synonymy incomplete}

* ***Paspalum scrobiculatum*** Linnaeus, Indian Paspalum. Cp (GA): disturbed areas; rare, native of India. [= FNA, HC, K]

Paspalum setaceum Michaux *var*. ***ciliatifolium*** (Michaux) Vasey. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA): dry open areas and woodlands, disturbed areas; common. June-September. S. NJ south to s. FL, west to e. TX, interior to s. WV, se. KY, e. TN, n. AL, n. MS, c. AR, and e. OK. [= FNA, Z; < *P. setaceum* – RAB, GW, K, W; < *P. setaceum* var. *ciliatifolium* – C (also see var. *longepedunculatum*); = *P. ciliatifolium* Michaux var. *ciliatifolium* – F, G; = *P. ciliatifolium* Michaux – HC, S, WV, Y]

Paspalum setaceum Michaux *var*. ***longepedunculatum*** (LeConte) A. Wood. Cp (FL, GA, NC, SC): pine flatwoods and pine savannas; rare. June-September. Se. NC south to s. FL, west to s. MS. [= F, FNA, Z; < *P. setaceum* – RAB, GW, K, W; < *P. setaceum* var. *ciliatifolium* – C; = *P. longepedunculatum* LeConte – G, HC, S, Y]

Paspalum setaceum Michaux *var*. ***muhlenbergii*** (Nash) Fernald. Mt (GA, NC, SC, VA), Pd (GA, NC, SC, VA), Cp (DE, FL, GA, NC, SC, VA): dry or moist soils; common. June-September. NH west to MI, c. IL, s. IA, and c. KS, south to n. FL, s.AL, s. MS, s. LA, and c. TX. [= C, FNA, Pa, Z; < *P. setaceum* – RAB, GW, K, W; > *P. setaceum* var. *calvescens* Fernald – F; > *P. ciliatifolium* Michaux var. *muhlenbergii* (Nash) Fernald – F; = *P. ciliatifolium* Michaux var. *muhlenbergii* (Nash) Fernald – G; = *P. pubescens* Muhlenberg ex Willdenow – HC, S, WV, Y]

Paspalum setaceum Michaux *var*. ***psammophilum*** (Nash) D. Banks. Cp? (VA?): maritime grasslands, sandy disturbed areas; rare. June-September. MA south to DC (VA?) in the Coastal Plain. [= C, FNA, Pa, Z; < *P. setaceum* – K; = *P. psammophilum* Nash – F, G, HC, Y]

Paspalum setaceum Michaux *var*. ***rigidifolium*** (Nash) D. Banks. Cp (FL, GA, NC?, SC?): sandhills; rare. June-September. Ne. GA, immediately adjacent to SC (and reported for NC by HC) south to s. FL; Cuba. [= FNA, Z; < *P. setaceum* – RAB, GW, K, W; = *P. rigidifolium* Nash – HC, S, Y]

Paspalum setaceum Michaux *var*. ***setaceum***, Thin Paspalum. Cp (DE, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): sandhills, savannas, dry soils; common (uncommon in Piedmont and Mountains, uncommon in DE). June-September. MA and CT south to s. FL, west to e. TX, inland to w. VA, s. WV, s. MO and AR; Cuba. [= C, FNA, Pa, Z; < *P. setaceum* – RAB, GW, K, W; > *P. setaceum* – G, HC, S, WV, Y; > *P. debile* Michaux – F, HC, S, Y; > *P. setaceum* var. *setaceum* – F]

Paspalum setaceum Michaux *var*. ***stramineum*** (Nash) D. Banks, Yellow Sand Paspalum. Cp (FL, GA, NC): dry sandy soils; rare. June-September. MI west to MT, south to LA, and NM; scattered eastward, especially near the coast, perhaps at least in part as introductions. [= C, FNA, Z; < *P. setaceum* – RAB, GW, K, W; = *P. ciliatifolium* Michaux var. *stramineum* (Nash) Fernald – F, G; = *P. stramineum* Nash – HC, Y]

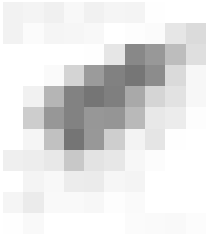
Paspalum setaceum Michaux *var*. ***supinum*** (Bosc ex Poiret) Trinius. Cp (FL, GA, NC, SC, VA?): sandy soils, old fields; uncommon. June-September. E. NC (e. VA?) south to s. FL, west to s. MS. Also reported for the Coastal Plain of Virginia by Tatnall (1946); needing confirmation of the specimen identification. [= F, FNA, Pa, Z; < *P. setaceum* – RAB, GW, K, W; = *P. supinum* Bosc ex Poiret – HC, S]

Paspalum setaceum Michaux *var*. ***villosissimum*** (Nash) D. Banks. Cp (FL): sandy pine flatwoods and fields; uncommon. N. FL (very near GA) south to s. FL; Cuba. [= FNA, Z; < *P. setaceum* – GW, K; < *P. debile* Michaux – HC; = *P. villosissimum* Nash – S]

* ***Paspalum urvillei*** Steudel, Vasey Grass. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA): roadsides, fields, and disturbed areas; common, native of South America. May-July. [= RAB, C, F, FNA, G, GW, HC, K, S, Y]

Paspalum vaginatum Swartz, Sand Knotgrass, Seashore Crown Grass. Cp (FL, GA, NC, SC), Pd (NC): brackish marshes, rarely inland in disturbed places; rare. July. NC south to s. FL, west to s. TX, southward through the New World tropics; Old World tropics. [= RAB, FNA, HC, K, S, Y; < *P. distichum* – GW]

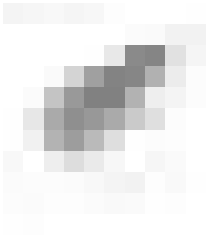
* ***Paspalum virgatum*** Linnaeus, Talquezal. Cp (GA): disturbed areas; rare, native of Mexico, Central America, and South America. [= FNA, K] {synonymy incomplete}



Patis Ohwi 1942

A genus of 3 species, perennial herbs, of e. Asia (2 species) and e. North America (1 species). References: Romaschenko et al. (2011)=Z; Barkworth in FNA (2007a).

Patis racemosa (Smith) Romaschenko, P.M. Peterson, & Soreng, Blackseed Ricegrass, Mountain Ricegrass. Calcareous woodlands and forests. Late June-August. QC and ON west to ND, south to w. VA, e. TN (FNA, Kartesz 2010), sc. KY, sc. MO, and e. NE. [= Z; = *Piptatherum racemosum* (Smith) Barkworth – FNA, K; = *Oryzopsis racemosa* (Smith) Ricker ex A.S. Hitchcock – C, F, G, HC, W, WV; = *Piptatherum racemosus* – Pa, orthographic variant]



Pennisetum L.C. Richard ex Persoon 1805

A genus of 80-130 species, perennials and annuals, mainly of the tropics and subtropics. References: Wipff in FNA (2003a). Key adapted from FNA.

1 Primary bristles (immediately subtending each spikelet) scabrous.
  2 Panicles with 9-16 fascicles per cm of length; plants 0.3-1.2 m tall ..... ***P. alopecuroides***
  2 Panicles with 30-40 fascicles per cm of length; plants 2-8 m tall ..... ***P. purpureum***
1 Primary bristles conspicuously long-ciliate.
  3 Spikelets 9-12 mm long..... ***P. villosum***
  3 Spikelets 2.5-7 mm long.
    4 Fascicles not disarticulating from the rachises; fascicles 33-160 per cm of inflorescence; panicles 4-200 cm long; leaves 7-70 mm wide. ..... ***P. glaucum***
    4 Fascicles disarticulating from the rachises at maturity; fascicles 8-37 per cm of inflorescence; panicles 2-32 cm long; leaves 2-13 mm wide.
      5 Spikelets 4.5-7 mm long; leaves 2-3.5 mm wide, folded or conduplicate and superficially appearing even narrower; rachis pubescent. ..... ***P. setaceum***
      5 Spikelets 2.5-5.6 mm long; leaves 2-13 mm wide, flat; rachis scabrous.
        6 Inner bristles fused for <¼ of their length; many outer bristles exceeding the spikelets; terminal bristles 10.5-23 mm long, noticeably longer than the other bristles in the fascicle ..... ***P. ciliare***
        6 Inner bristles fused for ⅓-½ of their length; outer bristles not exceeding the spikelets; terminal bristles 2.9-6.5 mm long, usually not noticeably exceeding the other bristles in the fascicle ..... ***P. setigerum***

* ***Pennisetum alopecuroides*** (Linnaeus) Sprengel, Chinese Fountaingrass. Cp (DE), Pd (DE, VA), Mt (VA): disturbed areas; rare, native of e. Asia. [= FNA, HC, K, Pa]

* ***Pennisetum ciliare*** (Linnaeus) Link, Buffelgrass. Cp (FL): disturbed areasl rare, native of Africa. Known in our area from ne. FL, s. AL, e. TN, and ec. MS. [= FNA, HC; = *P. ciliare* var. *ciliare* – K; = *Cenchrus ciliaris* Linnaeus]

* ***Pennisetum glaucum*** (Linnaeus) R. Brown, Pearl Millet. Cp (FL), Mt (VA, WV), Pd (VA), {GA, NC, SC}: disturbed areas; common, native of the Old World. [= RAB, FNA, HC, K, WH; ? *Chaetochloa lutescens* (Weigel) Stuntz – S; = *Setaria glauca* (Linnaeus) Palisot de Beauvois – WV]

* ***Pennisetum purpureum*** Schumacher, Elephant Grass, Napier Grass. Cp (AL, FL): swamps, wet grasslands, disturbed areas; uncommon, native of Africa. Naturalized in FL north to the FL-GA border, and in AL (Diamond & Woods 2009). [= FNA, HC, K]

* ***Pennisetum setaceum*** (Forskål) Chiovenda, Tender Fountaingrass Cp (FL): disturbed areas; rare, native of e. Mediterranean Europe. Reported as an introduction in FL, TN, and KY (Wipff in FNA 2003a). [= FNA, HC, K]

* ***Pennisetum setigerum*** (Vahl) Wipff. Cp (FL): disturbed areas; rare, native of Africa. Known in our area from ne. FL and ec. MS. [= FNA; = *P. ciliare* (Linnaeus) Link var. *setigerum* (Vahl) Leeke – K; = *Cenchrus setigerus* Vahl]

* ***Pennisetum villosum*** R. Brown ex Fresenius, Feathertop. Reported as an introduction in GA (Kartesz 1999). [= C, FNA, HC, K; ? *Cenchrus longisetus* M.C. Johnston]

Phalaris Linnaeus 1753 (Canary-grass)

A genus of about 16-22 species, north temperate and South American. References: Barkworth in FNA (2007a); Tucker (1996)=Z.

1 Perennial, with scaly rhizomes; inflorescence **either** obviously paniculate, 7-25 cm long, with ascending to appressed branches, the main branches of the inflorescence apparent, the inflorescence outline thus appearing lobed, **or** densely spikelike, 1.5-15 cm long.
  2 Glumes broadly winged; fertile lemmas ovate-lanceolate, densely pubescent.....***P. aquatica***
  2 Glumes not winged; fertile lemmas narrowly lanceolate, glabrous to sparsely pubescent.....***P. arundinacea***
1 Annual, without rhizomes; inflorescence densely spikelike or almost capitate, 1-9 cm long, the branches not apparent, the inflorescence outline a single ovoid, ellipsoid, or lanceolate form.
  3 Spikelets borne in clusters, the lower 4-7 spikelets in each cluster with a staminate terminal floret .....***P. paradoxa***
  3 Spikelets borne singly; all spikelets with a bisexual terminal floret.
    4 Keels of the glumes broadly winged (the wing ca. 1 mm wide); sterile florets 2.0-4.5 mm long.....***P. canariensis***
    4 Keels of the glume narrowly winged (the wing < 0.5 mm wide); sterile florets 0.5-2.5 mm long.
      5 Sterile floret 1.....***P. minor***
      5 Sterile florets 2.
        6 Nerves of the glumes scabrous; panicle cylindric in outline, 6-18 cm long; glumes 3.5-4.0 mm long; sterile florets 0.5-1.5 mm long.....***P. angusta***
        6 Nerves of the glumes not scabrous; panicle narrowly ovate in outline, usually 2-6 cm long; glumes 5-6 mm long; sterile florets 1.5-2.5 mm long.....***P. caroliniana***

* ***Phalaris angusta*** Nees ex Trinius. Cp (FL, GA, SC): waterfowl impoundments, marshes; uncommon, native of tropical America, perhaps native in LA and TX. [= GW, FNA, HC, K, Z]

* ***Phalaris aquatica*** Linnaeus, Bulbous Canary-grass. Cp (NC, SC, VA): disturbed areas; rare, native of Europe. [= K, Z; *? P. tuberosa* Linnaeus var. *stenoptera* (Hackel) Hitchcock – HC]

*? ***Phalaris arundinacea*** Linnaeus, Reed Canary-grass, Ribbon Grass. Mt (NC, VA, WV), Pd (DE, NC, VA), Cp (DE, VA): moist forests, moist disturbed areas, bogs; common (rare in VA Coastal Plain). June-early July. NL (Newfoundland) west to AK, south to NC, TN, AR, NM, CA; Mexico; Eurasia. A variegated form, *P. arundinacea* forma *variegata* (Parnell) Druce, is cultivated for ornament, as Ribbon Grass. [= RAB, C, F, FNA, GW, K, Pa, S, W, WV, Z; > *P. arundinacea* var. *arundinacea* – G, HC; > *P. arundinacea* var. *picta* Linnaeus – G, HC]

* ***Phalaris canariensis*** Linnaeus, Birdseed Grass, Canary-grass. Cp (FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (VA, WV): disturbed areas; rare, native of Mediterranean Europe. July-August. [= RAB, C, F, FNA, G, GW, HC, K, Pa, S, WV, Z]

Phalaris caroliniana Walter, Maygrass. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC): ditches, roadsides, disturbed areas; uncommon. May-June. NC west to OR, south into Mexico, the original distribution now obscured. [= RAB, C, F, FNA, G, GW, HC, K, S, Z]

* ***Phalaris minor*** Retzius, Lesser Canary Grass. Cp (SC): waste areas near wool-combing mills; rare, native of Mediterranean Europe. Also reported for other scattered states in e. North America, including peninsular FL (Kartesz 1999). [= FNA, HC, K] {synonymy incomplete}

* ***Phalaris paradoxa*** Linnaeus, Mediterranean Canary Grass. {NC}: {habitat}; rare. Reported for NC, MD, NJ, and PA (Barkworth in FNA 2007a; Kartesz 1999). [= FNA, K; > *P. paradoxa* var. *paradoxa* – HC; > *P. paradoxa* var. *praemorsa* (Lamarck) Coss. & Durieu – HC] {synonymy incomplete}

Phanopyrum (Rafinesque) Nash 1903 (Phanopyrum)

Circumscription of this genus is currently in flux. *Phanopyrum* is variously treated as a distinct genus or as a subgenus of *Panicum*. *Panicum verrucosum* perhaps belongs here as well. References: Crins (1991)=Z; Webster (1988)=Y; Freckmann & Lelong in FNA (2003a).

Phanopyrum gymnocarpon (Elliott) Nash, Swamp Phanopyrum, Savanna Phanopyrum. Cp (FL, GA, NC, SC, VA): swamps, seasonally flooded soils of cypress-gum sloughs, tidal (freshwater) cypress-gum swamps, disturbed wet soils, low woods, ditches, muddy banks of streams and lakes, sinks, floodplains, and marshes; uncommon (rare in NC and VA). August-October. Se. VA south to FL, west to TX and AR. [= K, Y; = *Panicum gymnocarpon* Elliott – RAB, FNA, GW, HC, S, Z]

Phleum Linnaeus 1753 (Timothy)

A genus of about 15 species, annuals and perennials, mainly native to Eurasia. References: Barkworth in FNA (2007a); Tucker (1996)=Z; Stace (2010)=Y. Key based on Stace (2010).

1 Spikelets 2.0-3.6 (-3.8) mm long, including the 0.2-1.0 (-1.2) mm long awns; panicle 3-6 (-6.7) mm wide; leaves 2-6 mm wide; ligule usually acute .....***P. pratense*** *ssp.* ***bertolonii***
1 Spikelets (3.5-) 4-5.5 mm long, including the (0.8-) 1.0-2.0 mm long awns; panicle 5-10 mm wide; leaves 3-9 mm wide; ligule usually obtuse ..... ***P. pratense*** *ssp.* ***pratense***

* ***Phleum pratense*** Linnaeus *ssp.* ***bertolonii*** (A.P. de Candolle) Bornm., Small Timothy. (NC) {included based on Fernald's report – corroboration and additional information needed} [= FNA; < *P. pratense* – RAB, C, G, HC, K, Pa, S, W, Z; = *P. pratense* var. *nodosum* (Linnaeus) Hudson – F; = *P. bertolonii* A.P. de Candolle – Y]

* ***Phleum pratense*** Linnaeus *ssp.* ***pratense***, Timothy. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, GA, NC, SC, VA): meadows, pastures, roadsides, disturbed areas; common, native of Europe. June-October. The American common name comes from the name of the man who is believed to have introduced it into the United States in 1720, Timothy Hanson; in England, *Phleum* is called "cat's-tail." [= FNA; < *P. pratense* – RAB, C, G, HC, K, Pa, S, W, WV, Z; = *P. pratense* var. *pratense* – F; = *P. pratense* – Y]

* *Phleum subulatum* (Savi) Ascherson & Graebner, Italian Timothy. Waif on ballast, reported for MD and Philadelphia, PA. [= FNA, K, Y] {not keyed}

Phragmites Adanson 1763 (Common Reed)

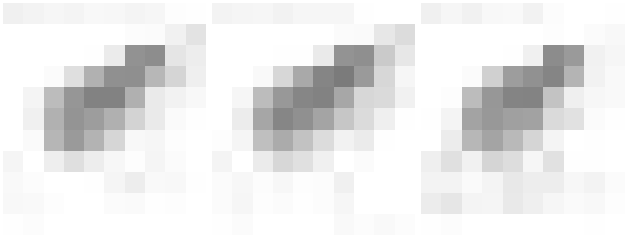
A genus with 3-5 species, nearly worldwide in distribution. References: Haines (2010)=V; Ward (2010)=X; Allred in FNA (2003a), revised in FNA (2007a); Saltonstall & Hauber (2007)=Y; Ward & Jacono (2009); Saltonstall, Peterson, & Soreng (2004)=Z; Saltonstall (2002). Key based on Z and Y.

1 Panicle diffuse and partially drooping, with lower lateral branches naked for 1-4 cm; leaf blades of lower stem leaves abscising from the sheaths by mid-season; leaves lightly scabrous on lower surface; culms stout, to 20 mm in diameter, smooth and glossy; [native on the Gulf Coast, from FL and GA westward, and southward into the tropics] .....***P. karka***
1 Panicle erect and relatively compact, with lower lateral branches spikelet-bearing to base
  2 Ligules 1.0-1.7 mm long; lower glumes 3.0-6.5 mm long; upper glumes 5.5-11.0 mm long; lemmas 8.0-13.5 mm long; leaf sheaths caducous with age; culms exposed in the winter, smooth and shiny; [native south to WV and VA].....***P. americanus***
  2 Ligules 0.4-0.9 mm long; lower glumes 2.5-5.0 mm long; upper glumes 4.5-7.5 mm long; lemmas 7.5-12.5 mm long; leaf sheaths not caducous with age; culms not exposed in the winter, minutely ridged and not shiny; [introduced and weedy].....***P. australis***

Phragmites americanus (Saltonstall, P.M. Peterson, & Soreng) A. Haines, American Reed. Freshwater marshes. New England westward. [= V; = *P. australis* ssp. *americanus* Saltonstall, P.M. Peterson, & Soreng – FNA, Pa, X, Y, Z; < *P. australis* – C, K; < *P. communis* Trinius – RAB, G, HC; < *P. communis* var. *berlandieri* (Fournier) Fernald – F]

* ***Phragmites australis*** (Cavanilles) Trinius ex Steudel, Common Reed. Brackish and freshwater Marshes, dredge-spoil deposit islands, ditches. August-October. Nearly worldwide in distribution. Fox, Godfrey, & Blomquist (1950) report its first collection in NC (in 1948). In most of our area, reed is of relatively recent introduction, reported from only nine counties in RAB, but now becoming a serious weed in coastal areas, where it aggressively colonizes freshwater and brackish marshes, excluding the native species. [= V; = *P. australis* ssp. *australis* – Pa, X, Y; = *Phragmites australis* (Cavanilles) Trinius ex Steudel var. *australis* – FNA, Z; < *P. australis* – C, GW, K; < *P. communis* Trinius – RAB, G, HC, WV; = *P. communis* var. *communis* – F; < *P. phragmites* (Linnaeus) Karsten – S]

Phragmites karka (Retzius) Trinius ex Steudel, Tropical Reed. Marshes. September-December. Ne. FL south to s. FL, west across the Gulf Coast to sw. United States, south into tropical America. September-October. Reported for Seminole County, GA (Carter, Baker, & Morris 2009). [= X; = *P. australis* (Cavanilles) Trinius ex Steudel ssp. *berlandieri* (E. Fournier) C.F. Reed – Y; = *P. australis* (Cavanilles) Trinius ex Steudel var. *berlandieri* (E. Fournier) C.F. Reed – FNA, Z; < *P. australis* – C, GW, K; < *P. communis* Trinius – RAB, G, HC; < *P. communis* var. *berlandieri* (Fournier) Fernald – F; < *P. phragmites* (Linnaeus) Karsten – S]



Phyllostachys Siebold & Zuccarini 1843 (Bamboo)

A genus of about 50 (or more) species, native of mainly temperate e. Asia. References: Stapleton & Barkworth in FNA (2007a); Duncan & Duncan [in prep.]=Z; Judziewicz et al. (2000)=Y. Key adapted from Z.

Identification notes: In addition to the species keyed below, a number of other species are sometimes cultivated in our area, and may be encountered. Bamboos are seriously under-represented in herbaria, since they rarely flower and are impractical to press. All of the species should be anticipated in other physiographic provinces and states than those listed.

1 Internodes at the base of principal culms dissimilar in length, the lowermost internode 1-12 cm long, the next 3 internodes distinctly longer, with nodal junctions mostly straight across .....***P. aurea***
1 Internodes at the base of principal culms all similar in length, mostly 4-8 cm, with nodal junctions oblique.

2 Groove on internode (above the branch) yellowish-green, the rest of the culm dull greenish ..... ***P. aureosulcata***
2 Groove on internode (above the branch) the same color as the rest of the culm.
3 Internodes of principal culms densely velvety; outer surface of culm sheaths with abundant erect brown hairs; lowest internode of principal culms ca. 5 cm long; culms pale green atfirst, becoming gray with accumulated waxy powder in age..... ***P. heterocycla***
3 Internodes of principal culms glabrous or slightly hairy; outer surface of culm sheaths lacking erect brown hairs; lowest internode of principal culms ca. 8.5-12 cm long; culms various (see below, but not as decribed in first lead).
4 Largest culms to 15 cm in diameter and 25 m tall; upper culm sheaths with auricles; outer surface of culm sheaths usually with a green streak down the middle, flanked by streaks of purple and buff; culms medium to dark glossy green at first (some cultivars golden yellow or yellow streaked), remaining so in age..... ***P. bambusoides***
4 Largest culms to 3.2 (-4) cm in diameter and 10 m tall (rarely taller); upper culm sheaths with or without auricles; outer surface of culm sheaths variously streaked, spotted, or mottled with brown or red (but not as above); culms pale green to green at first, usually becoming purple spotted, gray, or yellow in age.
5 Lowest internode of principal culms ca. 8.5 cm long; culm sheaths with auricles, usually sparsely pubescent with erect, pale hairs, usually pinkish-brown at maturity, marked with numerous brown spots near the tip; culms green at first, usually becoming speckled and then more-or-less completely darkened with purplish spots (remaining green in some cultivars) ..... ***P. nigra***
5 Lowest internode of principal culms ca. 12 cm long; culm sheaths lacking auricles, glabrous, usually green to buff at maturity, striped and marginally bordered with red; culms pale green at first, becoming gray to yellowish in age..... ***P. rubromarginata***

* ***Phyllostachys aurea*** Carrière ex A. & C. Rivière, Golden Bamboo, Fishpole Bamboo. Cp (DE, FL?, NC, SC, VA), Pd (DE, NC, SC, VA), Mt (VA): suburban woodlands; uncommon (rare in VA Mountains), native of China and Japan. Not known to flower in our area. This is the usual large bamboo cultivated and naturalizing in our area, forming dense stands, up to 15 m tall. [= RAB, FNA, HC, K, Y, Z]

* ***Phyllostachys aureosulcata*** McClure, Yellowgroove Bamboo. Cp (SC), Pd (VA), Mt (WV), {GA}: cultivated as an ornamental, persistent or spreading from plantings; rare, native of China. [= K, WV, Y, Z]

* ***Phyllostachys bambusoides*** Siebold & Zuccarini, Giant Timber Bamboo. Cp (NC, SC), Pd (NC, SC), Mt (NC, SC): cultivated as an ornamental, persistent or spreading from plantings; rare, native of China. [= FNA, HC, K, Y, Z]

* ***Phyllostachys heterocycla*** (Carrière) S. Matsum, Moso Bamboo. Cp (SC): cultivated as an ornamental, persistent or spreading from plantings; rare, native of China. [= Y; *? P. edulis* (Carrière) Houzeau de Lehaie – K; *? P. pubescens* Mazel ex Houzeau de Lehaie – Z]

* ***Phyllostachys meyeri*** McClure is reported as introduced in FL, NC, and SC (Kartesz 1999). {investigate} [= K] {not yet keyed}

* ***Phyllostachys nigra*** (Loddiges) Munro, Black Bamboo. Pd (SC), Cp (VA), Mt (WV): cultivated as an ornamental, persistent or spreading from plantings; rare, native of China and Japan. [= K, WV, Y, Z; > *P. nigra* var. *henonis* (Mitf.) Stapf – WV]

* ***Phyllostachys rubromarginata*** McClure. Pd (SC): cultivated as an ornamental, persistent or spreading from plantings; rare, native of China. [= K, Y, Z]

Piptatheropsis Romaschenko, P.M. Peterson, & Soreng 2011

A genus of 5 species, perennial herbs, of temperate and boreal ne. and nw. North America. References: Romaschenko et al. (2011)=Z; Barkworth in FNA (2007a).

1 Awns 5-15 mm long, persistent, 1-2× geniculate..... ***P. canadensis***
1 Awns absent (caduceus) or < 2 mm long, straight ..... ***P. pungens***

Piptatheropsis canadensis (Poiret) Romaschenko, P.M. Peterson, & Soreng, Mountain Ricegrass, Canada Piptatherum. Sandy barrens on quartzite. NL (Newfoundland) west to BC, south to n. NY, MI, and WI; disjunct at Panther Knob, Pendleton County, WV. [= Z; = *Piptatherum canadense* (Poiret) Dorn – FNA, K; = *Oryzopsis canadensis* (Poiret) Torrey – C, F, G, HC, WV]

Piptatheropsis pungens (Torrey) Romaschenko, P.M. Peterson, & Soreng, Sharp Piptatherum. {habitat}; {abundance}. NL (Labrador), NU, and YT south to NJ, WV, IN, IL, IA, SD, and CO. [= Z; = *Piptatherum pungens* (Torrey ex Sprengel) Dorn – FNA, K, Pa; = *Oryzopsis pungens* (Torrey ex Sprengel) A.S. Hitchcock – C, F, G, HC; =– Z]

Piptatherum Palisot de Beauvois 1812

A genus of ca. 22 species, perennial herbs, of temperate Eurasia. References: Romaschenko et al. (2011)=Z; Barkworth in FNA (2007a).

* *Piptatherum miliaceum* (Linnaeus) Cosson, Smilo Grass. Disturbed areas; native of Eurasia. Reported as an introduced waif in MD (FNA; Kartesz 1999, 2010), NJ, and PA (Kartesz 1999, 2010). [= K, Z; = *Piptatherum miliaceum* ssp. *miliaceum* – FNA; = *Oryzopsis miliacea* (Linnaeus) Bentham & Hooker – HC] {not yet keyed}

Piptochaetium J. Presl 1830 (Needlegrass)

A genus of about 27 species, of temperate North and South America, and montane tropical South America (Cialdella & Giussani 2002). References: Barkworth in FNA (2007a); Cialdella & Giussani (2002).

1 Florets 7-13 mm long; awns 40-75 mm long; [widespread in our area].....***P. avenaceum***
1 Florets 13.5-22 mm long; awns 62-120 mm long; [endemic to FL].....***P. avenacioides***

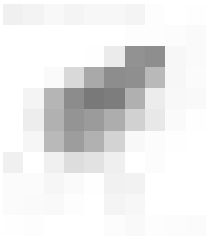
Piptochaetium avenaceum (Linnaeus) Parodi, Eastern Needlegrass, Black Oatgrass. Upland woodlands and forests, sometimes abundant or even dominant in xeric woodlands over granitic or mafic rocks in the Piedmont. April-June. MA, KY, s. IL, and c. OK, south to s. FL and s. TX; disjunct inland in n. IN and w. MI. [= C, FNA, K, Pa, WH; = *Stipa avenacea* Linnaeus – RAB, F, G, HC, S, W, WV]

Piptochaetium avenacioides (Nash) Valencia & Costas. Sandhills. Ne. FL (?) south to c. peninsular FL. [= FNA, K, WH; = *Stipa avenacioides* Nash – HC; = *Stipa avenaceoides* Nash – S, orthographic variant]

Pleioblastus Nakai 1925

A genus of about 20 species, shrubs, native of China and Japan.

* ***Pleioblastus simonii*** (Carrière) Nakai. Reported for GA (Kartesz 1999). {investigate} [= *Arundinaria simonii* (Carrière) A.& C. Rivière – K]



Poa Linnaeus 1753 (Bluegrass)

A genus of about 500 species, annuals and perennials, cosmopolitan. References: Soreng in FNA (2007a); Tucker (1996)=Z; Haines (2004)=Y; Soreng (1998).

1 Plants with well-developed rhizomes; perennial.
  2 Upper stems strongly flattened; [section *Tichopoa*].....***P. compressa***
  2 Upper stems terete or nearly so.
    3 Lower nodes of the panicle with 1-3 branches; [section *Madropoa*].....***P. cuspidata***
    3 Lower nodes of the panicle with 4 or more branches; [section *Poa*].....***P. pratensis***
1 Plants lacking rhizomes; perennial or annual.
  4 Plants dioecious, the florets unisexual; lemmas and glumes scarious and silvery; [rare introduction in our area]; [section *Dioicopoa*].....
  .....***P. arachnifera***
  4 Plants not dioecious, the florets bisexual; lemmas and glumes not notably scarious and silvery; [collectively common and widespread in our area].
    5 Lemmas not webbed at the base.
      6 Annual; culms decumbent to ascending and 1-3 dm long; inflorescence 2-8 cm long, the ascending branches bearing crowded spikelets above the middle; lemmas 2.4-3.4 mm long; [section *Micrantherae*].....***P. annua***
      6 Perennial; culms erect, 3-6 dm long; inflorescence 6-15 cm long, the widely spreading branches bearing a few spikelets near the end; lemmas 3.2-4.4 mm long; [section *Sylvestres*].....***P. autumnalis***
    5 Lemmas webbed at the base.
      7 Spikelets (most or all) modified into purplish bulblets; culm bulbous-thickened at ground level; [section *Arenariae*].....***P. bulbosa***
      7 Spikelets normal; culm not bulbous-thickened.
        8 Annual; [section *Homalopoa*].....***P. chapmaniana***
        8 Perennial.
          9 Marginal veins of the lemma glabrous.
            10 Nodes of the panicle mostly with 4-8 branches; lemmas pubescent or scabrous on the keel.
              11 Sheaths glabrous; ligule 0.7-2.2 (-3.0) mm long; [section *Sylvestres*].....***P. alsodes***
              11 Sheaths scabrous; ligule (2.5-) 3-7 mm long; [section *Pandemos*].....***P. trivialis***
            10 Nodes of the panicles mostly with 2 branches; lemmas glabrous on the keel; [section *Sylvestres*].

12 Anthers 0.6-0.9 (-1.0) mm long; lemmas broad-acute, obtuse or truncate at the apex, the keel and lateral margins of the lemma forming an apical angle of 42-82 degrees, firm at the tip, the scarious tip absent or up to 0.25 mm long .... ***P. languida***

12 Anthers 0.9-1.5 mm long; lemmas acute to acuminate at the apex, the keel and lateral margins of the lemma forming an apical angle of 10-47 degrees, pliable at the tip, the scarious tip prominent and 0.25-0.5 mm long..... ***P. saltuensis***

9 Marginal veins of the lemma pubescent, at least basally.

13 Lower nodes of the panicles mostly with (1-) 2-3 branches.

14 Ligule truncate, 0-1 mm long; first glume 1.7-2.2 mm long, second glume 2.0-2.8 mm long; anthers 0.5-0.7 mm long; [section *Oreinos*] ..... ***P. paludigena***

14 Ligule rounded-ovate, 1-2 mm long; first glume 2.5-3.5 mm long, second glume 3.0-3.8 mm long; anthers 1.1-1.4 mm long; [section *Sylvestres*] ..... ***P. wolfii***

13 Lower nodes of the panicles mostly with (4-) 5 or more branches.

15 Lemmas 5-veined (intermediate veins well-developed); ligule ca. 1 mm long; [section *Sylvestres*] ..... ***P. sylvestris***

15 Lemmas 3-veined (intermediate veins obscure); ligule either (2-) 3-5 mm long or 0.2-1 (-1.5) mm long.

16 Ligule 0.2-1 (-1.5) mm long, truncate; culms 4-8 dm tall; anthers 1.2-1.6 mm long; [section *Stenopoa*] ..... ***P. nemoralis***

16 Ligule (2-) 3-5 mm long, ovate-triangular; culms 5-15 dm tall; anthers 0.8-1.2 mm long; [section *Pandemos*] .... ***P. palustris***

Poa alsodes A. Gray, Woodland Bluegrass. Pd (DE, NC, VA), Mt (NC, VA, WV): rich forests; common (uncommon in NC, VA, and WV Mountains, rare in NC and VA Piedmont). May-June. NS west to SD, south to NC and IL; also in w. United States. [= RAB, C, F, FNA, G, HC, K, Pa, S, W, WV, Z]

* ***Poa annua*** Linnaeus, Speargrass, Six-weeks Grass, Annual Bluegrass. Cp (DE, FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): fields, roadsides, disturbed areas; common, native of Eurasia. April-May. [= RAB, C, F, FNA, G, GW, HC, K, Pa, S, W, WV, Z]

* ***Poa arachnifera*** Torrey, Texas Bluegrass. Pd (GA, NC, SC): disturbed areas; rare, native of sc. United States. April. [= RAB, FNA, HC, K, S]

Poa autumnalis Muhlenberg ex Elliott. Cp (DE, FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): moist or dry nutrient-rich forests; common (uncommon in VA Mountains, rare in DE, FL, and WV). April-May. NJ west to MI, south to FL and TX. [= RAB, C, F, FNA, G, GW, HC, K, Pa, S, W, Z]

* ***Poa bulbosa*** Linnaeus *ssp.* ***vivipara***, Bulbous Bluegrass. Cp (DE, NC, VA), Pd (GA, NC, VA), Mt (WV): lawns; rare, native of Europe. April-May. [= FNA; < *P. bulbosa* – RAB, C, F, G, HC, K, Pa, WV, Z]

Poa chapmaniana Scribner. Cp (DE, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (WV): low fields, roadsides, disturbed areas; common (rare in DE, FL, VA, and WV). April-May. DE west to IA, south to FL and LA. [= RAB, C, F, FNA, G, HC, K, S, W, WV, Z]

* ***Poa compressa*** Linnaeus, Canada Bluegrass. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, NC, SC, VA): fields, roadsides, disturbed areas; common, native of Europe. May-August. [= RAB, C, F, FNA, G, HC, K, Pa, S, W, WV, Z]

Poa cuspidata Nuttall. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (GA, NC, VA): moist forests; common (rare in DE). March-April. NJ west to s. IN, south to sw. GA and c. AL. [= RAB, C, F, FNA, G, HC, K, Pa, S, W, WV, Z]

* ***Poa infirma*** Kunth. Cp (SC): disturbed areas; rare, native of South America. {investigate} [= FNA, K] {not yet keyed; synonymy incomplete}

Poa languida Hitchcock, Drooping Bluegrass. Mt (VA): ultramafic outcrop woodlands, barrens, and glades; rare. April-May. VT and MA west to MN, south to PA, w. VA, KY, and IA. See comments under *P. saltuensis*. [= C, F, G, HC, Pa, W; = *P. saltuensis* Fernald & Wiegand ssp. *languida* (Hitchcock) A. Haines – FNA, Y; < *P. saltuensis* – K]

* ***Poa nemoralis*** Linnaeus, Wood Bluegrass. Pd (DE, VA), Mt (NC, VA): disturbed areas, sandy creek bottoms; uncommon (rare in VA), native of Europe. [= C, F, FNA, G, HC, Pa; ? *P. nemoralis* ssp. *nemoralis* – K]

Poa paludigena Fernald & Wiegand, Bog Bluegrass. Mt (NC, VA, WV), Pd (DE): bogs, especially in deep shade under shrubs; rare. April-June. NY west to MN, south to PA, w. NC, and IL. This species withers and disintegrates shortly after flowering; its ephemeral habit may be responsible for its being overlooked in our area for many years. [= C, F, FNA, G, HC, K, Pa]

Poa palustris Linnaeus, Fowl Bluegrass, Fowl Meadow-grass. Cp (DE), Mt (NC, SC, VA, WV), Pd (DE, VA): meadows, moist areas, bogs; common (rare in NC, SC, VA, and WV). June-July. Circumboreal, south in North America to VA, w. NC, MO, and NM. Some populations, especially southward, may represent introductions. [= RAB, C, F, FNA, G, HC, K, Pa, W, WV, Z]

* ***Poa pratensis*** Linnaeus *ssp.* ***pratensis***, Kentucky Bluegrass, Junegrass, Speargrass. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, FL, NC, SC, VA): lawns, roadsides, disturbed areas; common, native of Europe. April-August. [= FNA, K; < *P. pratensis* – RAB, C, F, G, HC, S, W, WV, Z]

Poa saltuensis Fernald & Wiegand, Old-pasture Bluegrass. Mt (NC, VA, WV): northern hardwood forests, ultramafic outcrop woodlands, barrens, and glades; rare. April-May. NL (Newfoundland) west to MN, south to PA, w. VA, and w. NC. The NC occurrences (on serpentinized olivine barrens) reported as *P. languida* are actually *P. saltuensis*. The taxonomic distinctions between *P. saltuensis* and *P. languida* have been controversial; Haines (2004) provides a detailed and valuable discussion. [= C, F, G, HC, Pa, W, WV; < *P. languida* – RAB, Z, misidentification; = *P. saltuensis* var. *saltuensis* – F; = *P. saltuensis* ssp. *saltuensis* – FNA, Y; < *P. saltuensis* – K (also see *P. languida*)]

Poa sylvestris A. Gray, Forest Bluegrass. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): moist forests; common (rare in FL). April-June. NY west to MN and SD, south to FL and TX. [= RAB, C, F, FNA, G, GW, HC, K, Pa, S, W, WV, Z]

* ***Poa trivialis*** Linnaeus *ssp.* ***trivialis***, Rough Bluegrass. Mt (NC, VA, WV), Pd (DE, NC, VA), Cp (DE, VA), {GA}: moist forests, disturbed areas, bottomlands; common (rare in VA Coastal Plain), native of Europe. April-June. [= FNA; < *P. trivialis* – RAB, C, F, G, GW, HC, K, Pa, S, W, WV, Z]

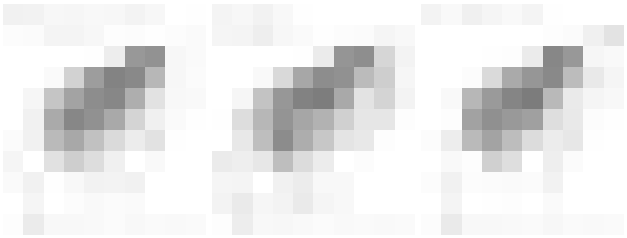
Poa wolfii Scribner. Mt (NC): moist rich forests; rare. OH west to MN, south to c. TN, n. AR, and NE; disjunct eastward w. NC. The NC occurrence is based on material from Great Smoky Mountains National Park (Haywood County) (K. Langdon, pers. comm.. 2006). The alleged VA occurrences are in error. [= C, F, G, HC, K, S, W, Z]

Polypogon Desfontaines 1798

A genus of about 18 species, annuals and perennials, of tropical and warm temperate regions. References: Barkworth in FNA (2007a); Tucker (1996)=Z.

1 Inflorescence verticillate, the rachis visible between the verticils; glumes 1.6-2.3 mm long, without awns; spikelets disarticulating near base of pedicel; stoloniferous perennial ..... ***P. viridis***
1 Inflorescence dense, cylindrical, and spikelike; glumes 2-3 mm long, with prominent awns 3.5-7 mm long; spikelets disarticulating near apex of pedicel; annual.
2 Glumes deeply lobed, the awn borne between the lobes; glume ciliate-fringed; lemma 0.4-0.7 mm long, awnless ..... ***P. maritimus*** *var*. ***maritimus***
2 Glumes slightly notched at the tip, the awn borne from near the tip; glume not ciliate-margined; lemma 0.7-1.1 mm long, awned ..... ***P. monspeliensis***

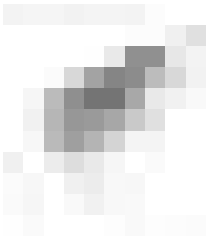
* ***Polypogon maritimus*** Willdenow *var*. ***maritimus***, Mediterranean Beardgrass. Brackish marshes; native of Mediterranean Europe. *P. maritimus* Willdenow is reported as introduced to GA (Small 1933). [= FNA; < *P. maritimus* – HC, K, S, Z]
* ***Polypogon monspeliensis*** (Linnaeus) Desfontaines, Rabbitfoot Grass, Beardgrass, Annual Beardgrass. Brackish marshes, disturbed areas; native of s. Europe to w. Asia. May-July. [= RAB, C, F, FNA, G, GW, HC, K, Pa, S, Z]
* ***Polypogon viridis*** (Gouan) Breistr., Water Bent-grass. Introduced on ballast around old ports, probably not persistent; native of the Old World. Distinguished from *Agrostis* in having the spikelet falling as a whole, disarticulating below the glumes. [= FNA, K, Z; = *Agrostis viridis* Gouan – C; > *Agrostis verticillata* Villars – F; > *Agrostis semiverticillata* (Forskål) C. Christensen – G, HC]



Pseudosasa Makino ex Nakai 1925 (Arrow Bamboo)

A genus of about 36 species, native of China, Japan, and Korea. References: Stapleton in FNA (2007a); Judziewicz et al. (2000)=Y.

* ***Pseudosasa japonica*** (Siebold & Zuccarini ex Steudel) Makino ex Nakai, Arrow Bamboo. Cultivated as an ornamental, persistent or spreading from plantings; native of Japan. [= FNA, HC, K, Pa, Y, Z; = *Sasa japonica* (Siebold & Zuccarini ex Steudel) Makino]



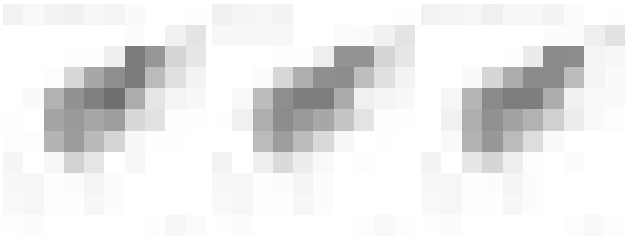
Puccinellia Parlatore 1848 (Alkali Grass, Goosegrass)

A genus of about 80-120 species, north temperate. References: Davis & Consaul in FNA (2007a).

1 Lemmas 3.0-4.5 mm long; spikelets 5-11-flowered ..... ***P. maritima***
1 Lemmas 1.5-2.5 mm long; spikelets 2-6-flowered.
2 Inflorescence diffuse, the lower branches with spikelets restricted to the distal portions; lower inflorescence branches spreading horizontal to deflexed at maturity; lemma 1.5-2.1 mm long, the midnerve not reaching the apex ..... ***P. distans***
2 Inflorescence compact, the lower branches bearing spikelets nearly to the base; lower inflorescence branches ascending at maturity; lemma 2.0-2.5 mm long, the midnerve reaching the apex, and often excurrent as a mucro ..... ***P. fasciculata***

* ***Puccinellia distans*** (Jacquin) Parlatore, European Alkali Grass, Goosegrass. Disturbed roadsides, coastal sands; native of Eurasia. Late May-early July. Confirmed for Watauga County, NC (Poindexter, pers. comm. 2009). [= C, FNA, G, HC, Pa; > *P. distans var. distans* – F; > *P. distans* ssp. *distans* – K]
* ***Puccinellia fasciculata*** (Torrey) Bicknell, Eastern Alkali Grass, Saltmarsh Goosegrass. Salt or brackish marshes. NS south to VA; Europe; and in sw. United States. The native or introduced status of this species in ne. North America is controversial. [= C, F, FNA, G, HC, K]

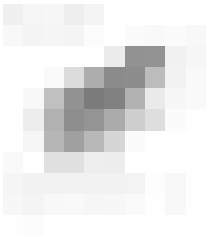
* ***Puccinellia maritima*** (Hudson) Parlatore, Seaside Alkali Grass, Seaside Speargrass. Salt marshes and ballast near ports. Introduced south to se. PA (Philadelphia), NJ (Camden), and DE, especially on ballast. [= C, F, FNA, G, HC; > *P. americana* Sorenson – K] {synonymy incomplete}



Reimarochloa A.S. Hitchcock 1909

A genus of about 4 species, of the New World tropics. References: Barkworth in FNA (2003a).

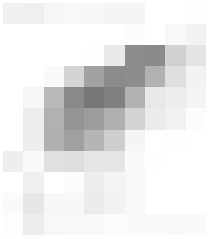
Reimarochloa oligostachya (Munro ex Bentham) A.S. Hitchcock. Moist hammocks, wet grasslands. Ne. FL (Duval County) and s. AL south to s. FL; Cuba. [= FNA, HC, K]



Ripidium Trinius 1820 (Ravenna-grass)

References: Hodkinson et al. (2002).

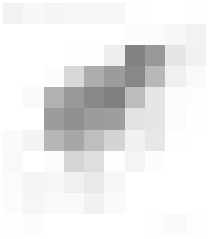
* ***Ripidium ravennae*** (Linnaeus) Trinius, Ravenna-grass, Plume-grass. Cultivated as an ornamental and rarely escaping or persisting; native of s. Europe. In sw. GA, TN, and MD (Kartesz 1999), DC (Steury 2004a), FL (Wunderlin & Hansen 2006). [= *Saccharum ravennae* (Linnaeus) Linnaeus – FNA, K; = *Erianthus ravennae* (Linnaeus) Palisot de Beauvois – F; > *Erianthus ravennae* var. *ravennae* – HC; > *Erianthus ravennae* var. *purpurascens* (Anderss.) Hackel – HC]



Rostraria Trinius 1820

A genus of about 10 species, native of the Mediterranean region and w. Asia. References: Standley in FNA (2007a).

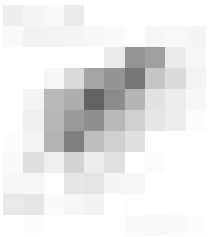
* ***Rostraria cristata*** (Linnaeus) Tzvelev. Waste areas near wool-combing mills, other disturbed areas, ballast, perhaps only a waif; native of Europe. It also occurs at scattered other sites in eastern United States, such as on ballast in se. PA (Rhoads & Klein 1993), and reported for MD, AL, and FL (Kartesz 1999). [= K; > *R. cristata* var. *cristata* – FNA; > *R. cristata* var. *glabriflora* (Trautvetter) Doğan – FNA; = *Lophochloa cristata* (Linnaeus) Hylander; = *Koeleria phleoides* (Villars) Persoon – HC; ? *Koeleria gerardii* (Villars) Shinners]



Rottboellia Linnaeus f. 1782 (Itch-grass)

A genus of about 5 species, native to tropical Asia and Africa. References: Wipff in FNA (2003a); Wipff & Rector (1993)=Z.

* ***Rottboellia cochinchinensis*** (Loureiro) W.D. Clayton, Itch-grass. Disturbed ground; native of tropical se. Asia. August-October. This grass, considered a noxious weed, was found in at least 13 GA counties by 1985 (Duncan 1985; Carter, Baker, & Morris 2009), on a farm in Robeson County, NC in 1984, and in cornfields in Westmoreland County, VA in 2007. [= FNA, K, Z; = *Rottboellia exaltata* Linnaeus f. – HC; = *Manisuris exaltata* (Linnaeus f.) Kuntze – S]



Saccharum Linnaeus 1753 (Plume Grass)

A genus of uncertain circumscription at this time. Clayton & Renvoize (1986) pointed out that the "traditional division [of *Saccharum*] into awned (*Erianthus*) and awnless species seems wholly artificial;" Hodkinson et al. (2002) developed molecular evidence which suggests that our species are not congeneric with *Saccharum*, however. Further study is needed, but likely our native southeastern species will be merged into *Miscanthidium* Stapf, while the introduced *S. ravennae* will be placed in the genus *Ripidium* Trinius (Hodkinson et al. 2002). Sugarcane (*Saccharum officinarum* Linnaeus, *S. sinense* Roxburgh, *S. barberi* Jeswiet, *S. spontaneum* Linnaeus, and cultivars and hybrids derived from those four species) is cultivated farther south, notably in FL and LA. References: Webster in FNA (2003a); Webster & Shaw (1995)=Z; Gandhi & Dutton (1993); Hodkinson et al. (2002). [also see *Ripidium*]

1 Lowermost inflorescence node densely hairy; callus hairs (ring of hairs beneath the spikelet) (7-) 9-25 mm long, equal to or longer than the spikelet; stem appressed-pubescent below the inflorescence, on the internodes as well as the nodes.
  2 Lemma awn flattened and spirally twisted at base; callus hairs 9-14 mm long, silvery or tinged with purple; leaves usually glabrous on the upper surface at maturity; [of moist to dry sites, rarely in wetlands] ..... ***S. alopecuroides***
  2 Lemma awn nearly terete, straight or slightly flexuous; callus hairs (7-) 15-20 (-25) mm long, tawny or brown; leaves usually pilose on the upper surface at maturity; [of moist to wet sites, rarely in uplands] ..... ***S. giganteum***
1 Lowermost inflorescence node glabrous; callus hairs (ring of hairs beneath the spikelet) 0-6.5 mm long, shorter than or equal to the spikelet (or absent in *S. brevibarbe*); stem glabrous below the inflorescence, except sometimes on the nodes.
  3 Callus hairs (ring of hairs beneath the spikelet) absent, or of few hairs 0-2 mm long (much shorter than the spikelet); panicle branches closely appressed, the panicle usually 1-3 cm broad; panicle branches glabrous ..... ***S. baldwinii***
  3 Callus hairs (ring of hairs beneath the spikelet) present, dense, 3-6.5 mm long (from about half as long to nearly as long as the spikelet); panicle branches ascending, the panicle usually 4-10 cm broad; panicle branches pubescent.
    4 Awn of the lemma of the upper floret terete at the base, and not spiraled; spikelets dark brown; spikelet pair dissimilar in size, the lemma of the upper floret 0.7-0.8× as long as the lemma of the lower floret; lemma of the lower floret typically 3-nerved ..... ***S. coarctatum***
    4 Awn of the lemma of the upper floret flattened at the base, either spiraled or not; spikelets straw-colored or purplish; spikelet pair homomorphic, the upper lemma 0.9-1.0× as long as the lower lemma; lemma of the lower floret not distinctly nerved.
      5 Awn of the lemma of the upper floret not basally spiraled, 10-18 mm long; lemma of the upper floret entire ..... ***S. brevibarbe*** *var.* ***brevibarbe***
      5 Awn of the lemma of the upper floret basally spiraled, 15-22 mm long; lemma of the upper floret bifid, the tooth on either side of the lemma 2.0-2.5 mm long ..... ***S. brevibarbe*** *var.* ***contortum***

Saccharum alopecuroides (Linnaeus) Nuttall, Silver Plume Grass. Fields, roadsides, woodland borders. October. NJ west to IN, IL, MO, and OK, south to FL and TX. [= FNA; = *Saccharum alopecuroideum* (Linnaeus) Nuttall – Z, orthographic variant; = *Erianthus alopecuroides* (Linnaeus) Elliott – RAB, C, F, G, GW, HC, W, WV; = *Saccharum alopecuroidum* – K, orthographic variant; = *Erianthus divaricatus* (Linnaeus) A.S. Hitchcock – S; **= *Miscanthidium species 1***]

Saccharum baldwinii Sprengel, Narrow Plume Grass. Marshes, clay-based Carolina bays, ditches. July-October. E. VA south to FL, west to TX, AR, scattered northward inland to TN and MO. [= FNA, K, Z; = *Erianthus strictus* Elliott – RAB, C, F, G, GW, HC, S; **= *Miscanthidium species 2***]

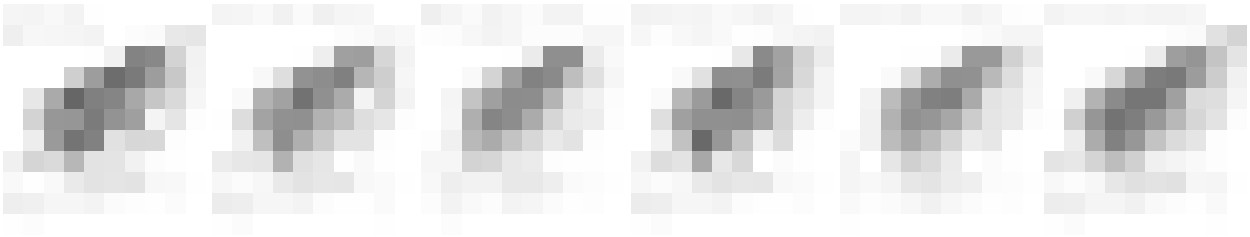
Saccharum brevibarbe (Michaux) Persoon *var.* ***brevibarbe***, Short-bearded Plume Grass. Marshes, ditches. September-October. MS, AL, and TN west to TX, AR, and OK; disjunct in e. NC. [= FNA, K, Z; < *Erianthus brevibarbis* Michaux – RAB, C, G, GW, S (also see *S. coarctatum*); = *E. brevibarbis* – F; >< *Erianthus coarctatus* Fernald var. *coarctatus* – HC; >< *Erianthus coarctatus* var. *elliottianus* Fernald – HC; **= *Miscanthidium species 3***]

Saccharum brevibarbe (Michaux) Persoon *var.* ***contortum*** (Elliott) R. Webster, Bent-awn Plume Grass. Open woodlands and forests, woodland borders. Late July-October. DE and MD south to Panhandle FL, west to TX and AR, with scattered occurrences north to TN. [= FNA, K, Z; = *Erianthus contortus* Elliott – RAB, C, F, G, GW, HC, S, W; = *Saccharum contortum* (Elliott) Nuttall; = *Erianthus brevibarbis* Michaux var. *contortus* (Elliott) D.B. Ward; **= *Miscanthidium species 4***]

Saccharum coarctatum (Fernald) R.D. Webster, Brown Plume Grass. Marshes, ditches, clay-based Carolina bays, swamps. September-October. DE and MD south to FL, west to TX (Brown & Marcus 1998). [= FNA, K, Z; < *Erianthus brevibarbis* Michaux

– RAB, C, G, GW, S; >< *Erianthus coarctatus* Fernald – F, HC; >< *Erianthus coarctatus* var. *coarctatus* – HC; >< *Erianthus coarctatus* var. *elliottianus* Fernald – HC; **= *Miscanthidium species 5***]

Saccharum giganteum (Walter) Persoon, Sugarcane Plume Grass, Giant Plume Grass. Marshes, ditches. September-October. NY south to FL, west to se. TX and AR; inland in TN and KY. [= FNA, K, Pa, Z; = *Erianthus giganteus* (Walter) Palisot de Beauvois – RAB, C, G, GW, HC, W; > *Erianthus giganteus* var. *giganteus* – F; > *Erianthus giganteus* var. *compactus* (Nash) Fernald – F; = *Erianthus saccharoides* Michaux – S; **= *Miscanthidium species 6***]



Sacciolepis Nash 1901 (Cupscale)

A genus of about 30 species, primarily in the tropics and subtropics. References: Wipff in FNA (2003a).

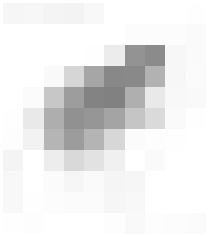
1 Annual, cespitose; spikelets 2.5-3.5 mm long; [rare alien] ..... ***S. indica***
1 Perennial, from creeping stolons; spikelets (3-) 4-5 mm long; [common native] ..... ***S. striata***

* ***Sacciolepis indica*** (Linnaeus) Chase, Indian Cupscale. Cp (FL, GA, NC, SC): low fields, ditches; uncommon (rare north of FL); native of India. October. [= RAB, FNA, GW, HC, K]

Sacciolepis striata (Linnaeus) Nash, American Cupscale. Cp (DE, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC): marshes, interdune swales, ditches, swamps; common (rare in Piedmont and Mountains, rare in DE). July-October. S. NJ south to FL, west to e. TX and OK, nearly limited to the Coastal Plain, but occasionally inland as in w. NC and TN; also native in the West Indies and n. South America. [= RAB, C, F, FNA, G, GW, HC, K, W]

Sasa Makino & Shibata 1901

* *Sasa palmata* E.G. Camus, Broadleaf Bamboo. Reported for TN (Kartesz 1999; USDA NRCS 2007). [= K]



Schedonorus Palisot de Beauvois 1812 (Meadow Fescue, Tall Fescue)

A genus of perennials, native of Eurasia. The correct generic placement of the introduced species *Schedonorus arundinaceus* (= *Festuca elatior; = Festuca arundinacea; = Lolium arundinaceum*) and *S. pratense* has been disputed. The traditional placement in *Festuca* has been defended by Aiken et al. (1997); Darbyshire (1993) transferred them to *Lolium;* and Soreng & Terrell (1998) place them in the genus *Schedonorus*. References: Darbyshire in FNA (2007a); Darbyshire (1993)=X; Aiken & Darbyshire (1990)=Y; Tucker (1996)=Z; Soreng & Terrell (1998)=V. Key based in part on C and Y.

1 Auricles ciliate (sometimes only very sparsely so – check several at 10-20× magnification); spikelets with 3-6 (-9) florets; old sheaths pale straw-colored, often remaining intact; internodes of the rachilla antrorsely scabrous ..... ***S. arundinaceus***
1 Auricles glabrous; spikelets with (2-) 4-10 (-12) florets; old sheaths brown, decaying to fibers; internodes of the rachilla glabrous (smooth) or nearly so ..... ***S. pratensis***

* ***Schedonorus arundinaceus*** (Schreber) Dumortier, Tall Fescue, Alta Fescue. Cp (FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): fields, roadsides, pastures, disturbed areas; common (uncommon in FL), native of Eurasia. May-July. [= FNA, Pa, V; < *Festuca elatior* Linnaeus – RAB, F, S, W, WV, misapplied; = ***Festuca arundinacea*** Schreber – HC, Y; = *Festuca elatior* Linnaeus – C, misapplied; = *Festuca elatior* var. *arundinacea* (Schreber) Wimmer – G; < *Festuca pratensis* Hudson – GW; = *Lolium arundinaceum* (Schreber) Darbyshire – K, X, Z; ? *Schedonorus phoenix* (Scopoli) Holub]

* ***Schedonorus pratensis*** (Hudson) Palisot de Beauvois, Meadow Fescue. Mt (VA, WV), Pd (DE), Cp (DE): fields, roadsides, pastures, disturbed areas; common (rare in VA), native of Eurasia. May-July. [= FNA, Pa, V; < *Festuca elatior* Linnaeus – F, S, W, WV, misapplied; = ***Festuca pratensis*** Hudson – C, Y; = *Festuca elatior* var. *pratensis* (Hudson) A. Gray – G; < *Festuca pratensis* Hudson – GW; = *Festuca elatior* – HC, misapplied; = *Lolium pratense* (Hudson) Darbyshire – K, X, Z]

Schizachne Hackel 1909 (False Melic)

A monotypic genus, circumboreal in Asia and North America. References: Cayouette & Darbyshire in FNA (2007a).

Schizachne purpurascens (Torrey) Swallen, Purple Oatgrass, False Melic. Moist, rocky northern hardwood and spruce forests. NL (Newfoundland) west to AK, south to MD, w. VA, WV, KY, IL, NM, and Mexico; also in ne. Asia. May-July. [= F, FNA, G, HC, K, Pa, WV; > *S. purpurascens* var. *purpurascens* – C]

Schizachyrium Nees 1829 (Little Bluestem)

A genus of about 60 species, widespread in tropical, subtropical, and warm temperate regions of the World. References: Wipff (1996a)=Z; Gandhi (1989)=Y; Wipff in FNA (2003a). Key based in part on Wipff in FNA (2003a).

1 Leaf blades 0.5-1.5 mm wide, with a lighter-colored zone in the center of the upper surface; sessile spikelet ca. 4 mm long.....***S. tenerum***
1 Leaf blades >1.5 mm wide, lacking a distinct lighter zone on the upper surface; sessile spikelet 5-11 mm long.
  2 First glume of sessile spikelet pubescent.....***S. sanguineum*** *var.* ***hirtiflorum***
  2 First glume of sessile spikelet glabrous.
    3 Plants rhizomatous, with internodes 6 mm long or longer; sessile spikelet 5-7 mm long..... ***S. scoparium*** *var.* ***stoloniferum***
    3 Plants tufted, rhizome internodes absent or < 3 mm long, the stem sometimes decumbent at the base and rooting at the lower nodes (appearing nearly rhizomatous); sessile spikelet 6-10 mm long.
      4 Leaf sheaths broad and strongly keeled, hairs of the raceme internodes 2.5-6 mm long; stems decumbent at base, rooting at the lower nodes
        5 Ligules 1.5-2 mm long; pedicellate spikelets 1.5-5 mm long; [of the Atlantic Coast]..... ***S. littorale***
        5 Ligules 0.5-1 mm long; pedicellate spikelets 4.5-8.5 mm long; [of the Gulf Coast] .....***S. maritimum***
      4 Leaf sheaths rounded or weakly keeled; hairs of the raceme internodes 1-3 (-4) mm long; stems erect, not rooting at the lower nodes.
        6 Pedicellate spikelets of the proximal spikelet units on each rame staminate, 5-10 mm long, with a lemma, the pedicellate spikelets of the distal units usually smaller (1-4 mm long) and sterile; sheaths and blades densely tomentose to glabrate..... ***S. scoparium*** *var.* ***divergens***
        6 Most pedicellate spikelets sterile, 1-6 mm long, without a lemma; sheaths and blades usually glabrous, occasionally pubescent..... .....***S. scoparium*** *var.* ***scoparium***

Schizachyrium littorale (Nash) Bicknell, Seaside Little Bluestem. Coastal dunes and maritime dry grasslands, often with *Uniola paniculata*, *Panicum amarum*, and other dune plants. August-October. E. MA south to NC (or SC?), and inland on the shores of the Great Lakes. In NC, *S. littorale* is present and abundant on dunes of barrier islands from Shackleford Banks, Carteret County south to Brunswick County, near the SC border, and entirely absent from the Outer Banks (from Cape Lookout, Carteret County, north through Hyde County to Dare County). Reported for FL for ne. FL (Duval County) and Panhandle FL (Franklin County). [= FNA, GW, K; < *Andropogon scoparius* Michaux – RAB; = *S. scoparium* var. *littorale* (Nash) Gould – C, Pa, Z; = *Andropogon scoparius* Michaux var. *littoralis* (Nash) A.S. Hitchcock – F, G; = *Andropogon littoralis* Nash – HC, S; < *S. scoparium* (Michaux) Nash ssp. *littorale* (Nash) Gandhi & Smeins – Y]

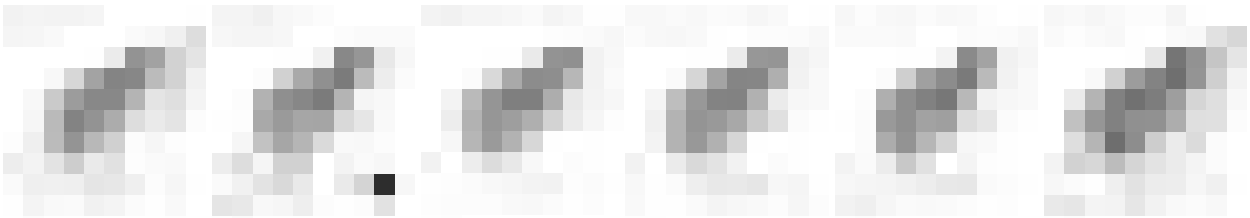
Schizachyrium maritimum (Chapman) Nash. Coastal dunes and grasslands. AL, FL west to e. LA. [= FNA, GW, K; = *Andropogon maritimus* Chapman – HC, S] {add to synonymy}

Schizachyrium niveum (Swallen) Gould, Pinescrub Bluestem. Sandhills. FL Panhandle south to s. FL. Reported for Lowndes Co. in sc. GA (Kral 1973), but the report has been discounted by later authors (Wipff in FNA 2003a). [= FNA, K; = *Andropogon niveus* Swallen – HC, S] {not yet keyed}

Schizachyrium sanguineum (Retzius) Alston *var.* ***hirtiflorum*** (Nees) Hatch, Hairy Crimson Bluestem. Pine flatwoods, sandhills, disturbed sandy sites. Sw. GA and FL west to AZ and south through Central America to South America; West Indies. [= FNA, K; = *Andropogon hirtiflorus* (Nees) Kunth – HC, S; ? *S. sanguineum* var. *brevipedicellatum* (Beal) Hatch]

Schizachyrium scoparium (Michaux) Nash *var.* ***divergens*** (Hackel) Gould, Pinehill Bluestem. Various open habitats. KY, AR, and TX, south to Panhandle FL, AL, MS, and LA. [= FNA, K; = *Andropogon scoparius* Michaux var. *divergens* Hackel; = *Andropogon divergens* – HC; < *Andropogon scoparius* – S]

Schizachyrium scoparium (Michaux) Nash *var.* ***scoparium***, Common Little Bluestem. In a wide range of moist to dry habitats. (June-) August-October. NB west to AB, south to FL and Mexico. One of the most ubiquitous plants in the modern landscape of our area, occurring throughout in the majority of habitats. This species is extremely variable, some of the variability correlated with habitat and geography; the recognition of infraspecific taxa is warranted. [= C, FNA, Pa, Z; < *Andropogon scoparius* Michaux – RAB, S, W, WV; = *S. scoparium* – GW; > *Andropogon scoparius* var. *scoparius* – F, G, HC; > *Andropogon praematurus* Fernald – F, G; > *Andropogon scoparius* var. *polycladus* Scribner & Ball – F; > *Andropogon scoparius* var. *frequens* F.T. Hubbard – F; = *S. scoparium* ssp. *scoparium* – K, Y]



Schizachyrium scoparium (Michaux) Nash *var*. ***stoloniferum*** (Nash) J. Wipff, Creeping Little Bluestem. Fall-line sandhills in the inner Coastal Plain, perhaps in other dry habitats, the habitat and range in our area requiring further study. August-October. SC and GA south to FL and west to MS. See Wipff (1996a) for additional discussion. [= FNA, K, Z; = *S. stoloniferum* Nash – GW; = *Andropogon stolonifer* (Nash) A.S. Hitchcock – HC, S; < *S. scoparium* ssp. *littorale* (Nash) Gandhi & Smeins – Y]

Schizachyrium tenerum Nees, Slender Bluestem. Longleaf pine savannas, sandhills, and flatwoods. Ne. FL, s. GA, and FL Panhandle west to e. TX. [= FNA, K; = *Andropogon tener* (Nees) Kunth – HC, S]

Sclerochloa Palisot de Beauvois 1812 (Hard Grass)

A genus of 2 species, annuals, native of s. Europe and w. Asia. References: Brandenburg in FNA (2007a); Tucker (1996)=Z; Brandenburg, Estes, & Thieret (1991).

* ***Sclerochloa dura*** (Linnaeus) Palisot de Beauvois, Hard Grass, Fairground Grass. Mt (VA, WV), {GA}: athletic fields, lawns; rare, native of Mediterranean Europe. In VA, known from a single site and doubtfully persisting (VBA 2007). Also reported from GA, MD, MS, and TN (Kartesz 1999). [= C, HC, K, Pa, Z]

Secale Linnaeus 1753 (Rye)

A genus of 3 species, native to western w. Asia and the Mediterranean. References: Barkworth in FNA (2007a); Tucker (1996)=Z.

* ***Secale cereale*** Linnaeus, Rye. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): fields; commonly cultivated, uncommonly persistent or volunteering after cultivation, native of Eurasia. May-July. An important crop, cultivated for at least 8000 years. The lemmas have awns 2-6 cm long. [= RAB, C, F, FNA, G, HC, K, Pa, Z]

Setaria Palisot de Beauvois 1807 (Foxtail Grass)

A genus of about 110-140 species, of tropical and warm temperate regions. Webster (1995) has merged *Paspalidium* into *Setaria*. References: Webster (1993)=Z; Webster (1995)=Y; Crins (1991)=X; Webster (1988); Rominger in FNA (2003a); Allen in FNA (2003a). Key adapted from FNA. [also see *Pennisetum*]

1 None of the spikelets subtended by a stiff bristle.
  2 Spikelets 2.2-2.4 mm long; glumes and sterile lemma not papery ..... ***S. geminata*** *var.* ***geminata***
  2 Spikelets 2.8-3.0 mm long; glumes and sterile lemma papery ..... ***S. geminata*** *var.* ***paludivaga***
1 Terminal spikelet on each branch subtended by a single bristle (other spikelets also sometimes so subtended)
  3 Most spikelets other than the terminal lacking a subtending bristle; leaves plicate; [rare aliens].
    4 Annual; leaves 10-25 mm wide ..... ***S. barbata***
    4 Perennial; leaves 20-80 mm wide ..... ***S. palmifolia***
  3 All spikelets subtended by 1 or more bristles; leaves flat; [aliens and natives, collectively widespread and common].
    5 Bristles 4-12 below each spikelet.
      6 Annual, with fibrous roots ..... ***S. pumila*** *ssp.* ***pumila***
      6 Perennial, noticeably rhizomatous.
        7 Panicle 3-8 (10) cm long; plant from knotty rhizomes; [native, common (sometimes weedy)] ..... ***S. parviflora***
        7 Panicle 5-25 cm long; plant from thick rhizomes; [alien, rare] ..... ***S. sphacelata***
    5 Bristles 1-3 (rarely 6) below each spikelet.
      8 Bristles retrorsely scabrous.
        9 Leaves strigose on the lower surface; sheath margins glabrous; panicles 2-6 cm long ..... ***S. adhaerans***
        9 Leaves scabrous on the lower surface; sheath margins ciliate; panicles 5-15 cm long ..... ***S. verticillata***
      8 Bristles antrorsely scabrous
        10 Perennial ..... ***S. macrosperma***
        10 Annual.

11 Upper lemmas smooth and shiny (occasionally with obscure rugosity)
12 Culms to 1 m tall; spikelets ca. 3 mm long; [alien, of ruderal sites] ..... ***S. italica***
12 Culms to 6 m tall; spikelets ca. 2 mm long; [native, of marshes] ..... ***S. magna***
11 Upper lemmas distinctly transversely rugose, dull.
13 Upper lemmas coarsely rugose; leaves 4-7 mm wide; [native] ..... ***S. corrugata***
13 Upper lemmas finely rugose; leaves 4-25 mm wide; [aliens, generally of ruderal sites].
14 Panicles verticillate; rachises visible, scabrous ..... ***S. verticilliformis***
14 Panicles densely spiciform; rachises not visible, villous.
15 Leaves softly pilose on the upper surface; panicles arching and drooping from the base; spikelets 2.5-3.0 mm long ..... ***S. faberi***
15 Leaves scabrous on the upper surface; panicles nodding only at the tip; spikelets 1.8-2.2 mm long.
16 Panicles 10-20 cm long; culms 10-25 dm tall; leaves 10-25 mm wide ..... ***S. viridis*** *var.* ***major***
16 Panicles 3-8 cm long; culms 2-10 dm tall; leaves 4-12 mm wide ..... ***S. viridis*** *var.* ***viridis***

Setaria adhaerans (Forsskål) Chiovenda. Cp (AL): disturbed areas; rare. Distributed widely throughout the tropics and subtropics, in North America from s. AL west to CA (perhaps only adventive in portions of that distribution). [= FNA, K, Z] {synonymy incomplete}

* ***Setaria barbata*** (Lamarck) Kunth, Mary-grass. Cp (FL, MS): on ballast at Apalachicola (Franklin County, FL), other disturbed areas; rare, native of Africa. [= FNA, HC, K]

Setaria corrugata (Elliott) J.A. Schultes. Cp (FL, GA, NC, SC): pinelands, disturbed areas; common. From ne. NC south to s. FL, west to e. TX; Cuba; Dominican Republic. [= RAB, FNA, HC, K, Z; = *Chaetochloa corrugata* (Elliott) Lamson-Scribner – S]

* ***Setaria faberi*** R.A.W. Herrmann, Nodding Foxtail Grass, Giant Foxtail-grass. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, FL, GA, NC, SC, VA): disturbed areas; common (uncommon south of VA), native of China. [= RAB, C, FNA, G, K, Pa, W; = *S. faberii* – F, HC, WV, Z, orthographic variant]

Setaria geminata (Forsskål) Veldkamp *var.* ***geminata***. Cp (AL, FL): in shallow water of swamps; uncommon. Pantropical and –subtropical. [= Y; < *Paspalidium geminatum* – FNA, GW, X; = *Panicum geminatum* Forsskål – HC, S; = *Paspalidium geminatum* (Forsskål) Stapf var. *geminatum* – K]

Setaria geminata (Forsskål) Veldkamp *var.* ***paludivaga*** (A.S. Hitchcock & Chase) R.D. Webster, Alligator Grass, Paspalidium. Cp (FL, GA, SC): in shallow water; rare. December. S. SC south to FL, west to TX; also in Central and South America. This taxon is sometimes considered an introduction from the Old World, but its occurrence in undisturbed wetlands remote from extensive human activity suggests that it is native. [= Y; = *Panicum paludivagum* A.S. Hitchcock & Chase – RAB, HC, S; < *Paspalidium geminatum* – FNA, GW, X; = *Paspalidium geminatum* (Forsskål) Stapf var. *paludivagum* (A.S. Hitchcock & Chase) Gould – K; = *Paspalidium paludivagum* (A.S. Hitchcock & Chase) Parodi]

* ***Setaria italica*** (Linnaeus) Palisot de Beauvois, Foxtail-millet, Italian-millet. Pd (DE, GA, NC, SC, VA), Cp (DE, VA), Mt (VA, WV): disturbed areas, rare (uncommon in VA Piedmont), native of Eurasia. Probably derived via cultivation from *S. viridis*, and cultivated as a food crop in China since at least 6000 BP and later in Europe (Hancock 2004). [= RAB, C, F, FNA, G, HC, K, Pa, W, WV, Z; = *Chaetochloa italica* (Linnaeus) Lamson-Scribner – S]

Setaria macrosperma (Lamson-Scribner & Merrill) K. Schumann, Coral Bristlegrass. Cp (FL, GA, SC): hammocks and maritime forests, also disturbed areas; rare. SC south to FL; Bahamas, Mexico. [= RAB, FNA, HC, K, Z; = *Chaetochloa macrosperma* Lamson-Scribner & Merrill – S]

Setaria magna Grisebach, Saltmarsh Foxtail-grass, Giant Foxtail-grass. Cp (DE, FL, GA, NC, SC, VA), Pd* (GA*): interdune swales, near-coastal marshes; common (uncommon south of DE). NJ south to s. FL, west to e. TX; disjunct inland in GA, AR, LA, TX, and NM; West Indies, Bermuda, Costa Rica. [= RAB, C, F, FNA, G, HC, K, Z; = *Chaetochloa magna* (Grisebach) Lamson-Scribner – S]

* ***Setaria palmifolia*** (J. König) Stapf, Palmgrass. Cp (FL, LA): disturbed areas; rare, native of Asia. [= FNA, HC, K]

Setaria parviflora (Poiret) Kerguélen, Knotroot Bristlegrass, Perennial Foxtail-grass. Cp (DE, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): marshes, ditches, moist disturbed areas; common (uncommon in DE and WV). MA to IA south to s. FL and s. TX, south through Mexico to Central America; CA and NV; West Indies. Gandhi & Barkworth (2003) provide a detailed discussion of the reasons for the nomenclatural change. [= FNA, K, Pa, Z; = *S. geniculata* Palisot de Beauvois – RAB, C, F, G, HC, W, WV; = *Chaetochloa geniculata* (Palisot de Beauvois) Millspaugh & Chase – S]

* ***Setaria pumila*** (Poiret) Roemer & Schultes *ssp.* ***pumila***, Yellow Foxtail. Mt (GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Cp (DE, FL, GA, NC, SC, VA): disturbed areas, lawns, fields; common (rare in FL), native of Europe. Late July-October. [= FNA; = *Setaria glauca* (Linnaeus) Palisot de Beauvois – RAB, C, F, G, W, WV, misapplied; >< *Setaria lutescens* (Weigel) Hubb. – HC, misapplied; >< *S. pumila* ssp. *pallidifusca* – K, treatment apparently garbled; < *S. pumila* – Pa; = *Chaetochloa lutescens* (Weigel) Stuntz – S]

* ***Setaria sphacelata*** (Schumacher) Stapf & C.E. Hubbard, African Bristlegrass. Cp (AL, FL, MS): disturbed areas; rare, native of Africa. [= FNA, K]

* ***Setaria verticillata*** (Linnaeus) Palisot de Beauvois, Hooked Bristlegrass. Mt (VA, WV), Pd (DE), Cp (DE): disturbed areas; common (uncommon in VA, rare in WV), native of Europe. [= FNA, G, K, Pa, WV; = *S. verticillata* var. *verticillata* – C, F, HC; = *Chaetochloa verticillata* (Linnaeus) Lamson-Scribner – S; < *S. verticillata* – Z]

* *Setaria verticilliformis* Dumortier. Reported for NJ, PA, MD, and AL (FNA 2003a, Kartesz 1999). [= FNA, K; = *S. verticillata* (Linnaeus) Palisot de Beauvois var. *ambigua* (Guss.) Parlatore – C, F, HC; = *S. viridis* (Linnaeus) Palisot de Beauvois var. *ambigua* (Guss.) Coss. & Durieu – G; = *Chaetochloa ambigua* Guss. – S; < *S. verticillata* – Z]

* *Setaria viridis* (Linnaeus) Palisot de Beauvois var. *major* (Gaudin) Pospichal, Giant Green Foxtail. Reported as introduced in TN, MD, and PA (Kartesz 1999). [= C, FNA, G, K, Pa, Z; < *S. viridis* – RAB, HC]

* ***Setaria viridis*** (Linnaeus) Palisot de Beauvois *var.* ***viridis***, Green Bristlegrass. Cp (DE, FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): fields, disturbed areas; common, native of Eurasia. [= C, FNA, K, Z; < *S. viridis* – RAB, HC, W, WV; > *S. viridis* var. *viridis* – F, G; > *S. viridis* var. *weinmannii* (Roemer & J.A. Schultes) Bolbás – F; > *S. viridis* var. *breviseta* (Doell) A.S. Hitchcock – G; = *Chaetochloa viridis* (Linnaeus) Lamson-Scribner – S]

Sorghastrum Nash 1901 (Indiangrass)

A genus of about 18-20 species, of tropical and subtropical America and Africa, rarely extending into temperate areas. References: Hall (1982)=Z; Dávila Aranda & Hatch in FNA (2003a). Key adapted from Z.

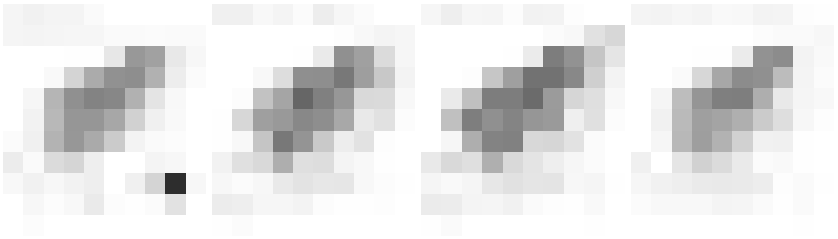
1 Awns 10-22 (-30) mm long, once-geniculate; plants rhizomatous; surfaces of the glumes tan to slightly brown basally; ligule 2-10 mm long, prominently auricled.....***S. nutans***
1 Awns 16-46 mm long, twice-geniculate; plants cespitose; surfaces of the glumes brown; ligule 1-5 mm long, truncate.
2 Axis of the panicle straight, erect, the branchlets appressed to ascending, the spikelets drooping-secund; spikelets 0.8-1.2 mm wide.....***S. secundum***
2 Axis of the panicle arching, usually strongly so, the branchlets ascending to spreading, the spikelets not drooping-secund; spikelets 1.1-1.8 mm wide.
3 Axis of the panicle straight, with the branches distributed no more than 180 degrees around the axis (as viewed from above) .....***S. apalachicolense***
3 Axis of the panicle arching, with the branchlets distributed through 360 degrees around the axis (as viewed from above).....***S. elliottii***

Sorghastrum apalachicolense D.W. Hall, Apalachicola Indiangrass, Open Indiangrass. Flatwoods and sandhills. July-August. Panhandle FL west to s. MS (Sorrie & Leonard 1999). It may well occur as well in GA. [= K, Z; < *S. elliottii* – FNA]

Sorghastrum elliottii (C. Mohr) Nash, Slender Indiangrass. Woodlands and forests, river-scour areas, including oak-hickory forests and woodlands over mafic rocks. September-October. MD south to FL and west to TX, inland to TN, AR, and OK, mainly on the Coastal Plain, but extending inland to other physiographic provinces. [= RAB, C, F, G, HC, K, S, W, Z; < *S. elliottii* – FNA (also see *S. apalachicolense*)]

Sorghastrum nutans (Linnaeus) Nash, Yellow Indiangrass. Xeric and mesic woodlands and forests of a wide variety, powerline rights-of-way, roadbanks. Late August-October. ME and QC west to s. MB, south to c. peninsular FL, TX, UT, AZ, and Mexico. Along with *Andropogon gerardii*, *Schizachyrium scoparium*, and *Panicum virgatum*, *Sorghastrum nutans* is one of the dominant grasses of the tall-grass prairie. It is also common in a variety of open habitats (natural and altered) in the forested landscape of eastern North America. [= RAB, C, F, FNA, G, HC, K, Pa, S, W, WV, Z; = *S. avenaceum* (Michaux) Nash]

Sorghastrum secundum (Elliott) Nash, Lopsided Indiangrass. Sandhills. September-October. S. SC south to s. FL and west to s. AL (Sorrie & Leonard 1999). [= RAB, FNA, HC, K, S, Z]



Sorghum Moench 1794 (Sorghum, Milo, Johnson Grass)

A genus of about 25 species, of tropical and subtropical Old World (1 species in Mexico). References: Barkworth in FNA (2003a); de Wet (1978)=Z.

1 Rhizomatous perennial; leaves 1-2 cm wide.....***S. halepense***
1 Fibrous-rooted annual; leaves (2-) 3-5 cm wide.
2 Inflorescence dense, compact; plants 0.5-1.3 m tall ..... ***S. bicolor*** *var.* ***bicolor***
2 Inflorescence open, with spreading branches; plants 1.0-3.0 m tall.....***S. bicolor*** *var.* ***drummondii***

* ***Sorghum bicolor*** (Linnaeus) Moench *var.* ***bicolor***, Sorghum, Milo, Broomcorn, Sorgo. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (VA): cultivated, rarely persistent; common in cultivation, rare as an escape. October. [= C; < *Sorghum vulgare* Persoon – RAB; < *Sorgum vulgare* – F, orthographic variant; = *S. vulgare* var. *vulgare* – HC; = *S. bicolor* ssp. *bicolor* – FNA, K, Pa; < *Holcus sorghum* Linnaeus – S]

* ***Sorghum bicolor*** (Linnaeus) Moench *var.* ***drummondii*** (Nees ex Steudel) Mohlenbrock, Shattercane. Cp, Pd (GA, NC, SC, VA): cultivated, rarely persistent; common in cultivation, rare as an escape. October. This is the taller variety with open inflorescences, usually sporadically present in sorghum fields. [= C; < *Sorghum vulgare* Persoon – RAB; < *Sorgum vulgare* – F, orthographic variant; = *Sorghum bicolor* ssp. ×*drummondii* (Nees ex Steudel) de Wet – FNA, Pa; = *Sorghum vulgare* Persoon var. *drummondii* (Nees ex Steudel) Hackel ex Chiovenda – HC; = *Sorghum bicolor* ssp. *drummondii* (Nees ex Steudel) de Wet & Harlan – K; < *Holcus sorghum* Linnaeus – S]

* ***Sorghum halepense*** (Linnaeus) Persoon, Johnson Grass. Cp (DE, FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): roadsides, fields, waste places; common, native of Eurasia. A serious weed, difficult to eradicate. [= RAB, C, FNA, GW, HC, K, Pa, W, WV; = *Sorgum halepense* – F, G, orthographic variant; = *Holcus halepensis* Linnaeus – S]

Spartina Schreber 1789 (Cordgrass)

A genus of ca. 15 species, of temperate America, Europe, and Africa. Peterson, Romaschenko, & Johnson (2010) suggest that *Spartina* is phylogenetically embedded within *Sporobolus* and should be combined into it. References: Barkworth in FNA (2003a); Peterson, Romaschenko, & Johnson (2010).

1 Leaves with smooth or slightly scabrous margins; spikelets glabrous or nearly so; [of salt to brackish coastal marshes].....***S. alterniflora***
1 Leaves with strongly scabrous margins; spikelets scabrous, at least on the keel; [of brackish to fresh marshes, or inland or upland].
2 Plants strongly cespitose, forming large clumps with numerous basal leaves and culms; leaves involute; culms 0.5-2 m tall; [of s. SC southward].
3 Spikes 3-16 per inflorescence, appressed to ascending; leaves 3-7 mm wide, involute or somewhat flat toward the bases.....***S. bakeri***
3 Spikes (6-) 15-75 per inflorescence, tightly appressed; leaves 1.5-4.5 mm wide, strongly involute .....***S. spartinae***
2 Plants with elongate rhizomes, forming large clonal patches, the culms arising singly; leaves involute or flat; culms either 0.5-3.5 m tall; [collectively widespread in our area].
4 Spikes 1-9 per inflorescence; culms 0.5-1 m tall; leaves 0.5-4 (-7) mm wide, usually involute when fresh.....***S. patens***
4 Spikes 5-70 per inflorescence; culms 1-3.5 m tall; leaves 5-20 mm wide, usually flat when fresh.
5 Second glume acute, not awned; first glume averaging ca. 1/2 as long as the lemma; spikes (6-) 20-50 (-more) per inflorescence; [of fresh to brackish coastal marshes] .....***S. cynosuroides***
5 Second glume with an awn 3-10 mm long; first glume averaging ca. 7/8 as long as the lemma; spikes (5-) 7-27 per inflorescence; [of fresh marshes, either inland or coastal].....***S. pectinata***

Spartina alterniflora Loiseleur, Saltmarsh Cordgrass, Smooth Cordgrass. Salt marshes. August-October. NL (Newfoundland) south to FL, west to TX; e. South America; introduced in n. Europe. *S. alterniflora* is the dominant plant (often essentially a monoculture) of intratidal salt marshes in our area. [= RAB, C, FNA, GW, K, WH; > *S. alterniflora* var. *alterniflora* – F, G, HC, S; > *S. alterniflora* var. *glabra* (Muhlenberg ex Bigelow) Fernald – F, G, HC, S; > *S. alterniflora* var. *pilosa* (Merrill) Fernald – F, G, HC]

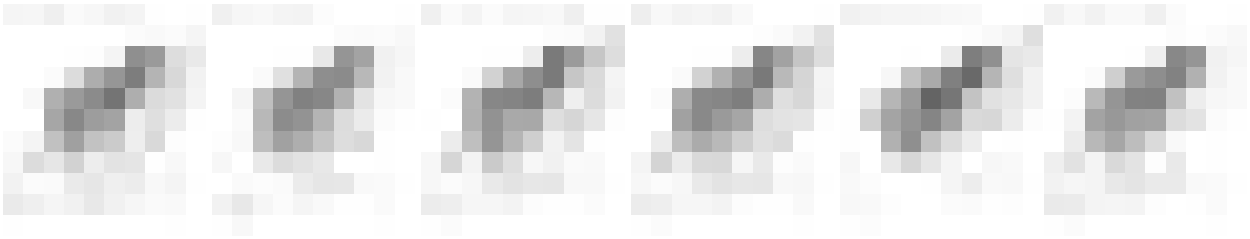
Spartina bakeri Merrill, Sand Cordgrass. Brackish marshes, marsh edges, wet coastal hammocks, under *Sabal palmetto*, *Quercus virginiana*, and *Juniperus virginiana* var. *silicicola*. June. Se. SC south to s. FL, west to Panhandle FL. Along with *S. spartinae*, distinctive among our species in its densely clumped growth form. [= FNA, GW, HC, K, S, WH]

Spartina cynosuroides (Linnaeus) Roth, Giant Cordgrass. Brackish and freshwater tidal marshes, especially along margins of tidal creeks. June-September. MA south to FL, west to e. TX. [= RAB, C, FNA, G, GW, HC, K, S, WH; > *S. cynosuroides* var. *cynosuroides* – F]

Spartina patens (Aiton) Muhlenberg, Small Saltmeadow Cordgrass, Salt Hay, Marsh-hay Cordgrass. Dunes, sand flats, upper edges of marshes, maritime wet grasslands, overwash flats. June-September. NL (Newfoundland) south to FL, west to TX. Var. *monogyna* has spikelets 7-10 mm long (vs. 9-13 mm); second glume acute to obtuse (rarely acuminate) (vs. acuminate); spikes (2-) 4-9 per inflorescence (vs. 1-4); second highest leaf blade on the stem (1-) avg. 2 (-5) dm long (vs. 0.5-2 dm); plants to 15 dm tall (vs. to 8 dm); culms to 6 mm in diameter at base (vs. to 3 mm). Whether var. *monogyna* is worthy of recognition is a matter of debate; there appear to be morphological differences correlated with geography and, according to some authors, habitat, but positive identification to variety is sometimes difficult. [= RAB, C, FNA, GW, K, S, WH; > *S. patens* var. *patens* – F, G, HC; > *S. patens* var. *monogyna* (M.A. Curtis) Fernald – F, G, HC]

Spartina pectinata Link, Prairie Cordgrass, Slough Grass. Banks of rivers and lakes, spray cliffs below waterfalls, rocky or sandy flood-scoured riverside grasslands, tidal freshwater (oligohaline) marshes, calcareous oak flatwoods and prairies. July-October. NL (Newfoundland) west to WA, south to ne. NC, sw. NC, AR, TX, and NM. [= RAB, C, F, FNA, G, GW, HC, K, Pa, W, WV; > *S. pectinata* var. *pectinata* – F; > *S. pectinata* var. *suttiei* (Farwell) Fernald – F; = *S. michauxiana* A.S. Hitchcock – S]

Spartina spartinae (Trinius) Merr. ex A.S. Hitchcock, Gulf Cordgrass. Brackish marshes and inland saline situations. AL and FL west to TX. [= FNA, GW, HC, K, S, WH]



Sphenopholis Scribner 1906 (Wedgegrass)

A genus of 6 species, North American. References: Daniel in FNA (2007a); Tucker (1996)=Z. Key based in part on C.

1 Spikelets 5-9.5 mm long; second lemma with an awn 3.5-7 mm long.....***S. pensylvanica***
1 Spikelets 1.5-5 mm long; second lemma awnless, or with an awn up to 3.5 mm long.
2 Lower leaf blades mostly (10-) 15-45 cm long, usually involute, < 2 mm wide.....***S. filiformis***
2 Lower leaf blades mostly < 10 cm long, flat, 2-8 mm wide.
3 First glume ⅓-⅔ as wide as the second glume; second lemma strongly scabrous.....***S. nitida***
3 First glume less tha ⅓ as wide as the second glume; second lemma smooth to slightly scabrous.
4 First lemma with an awn up to 3.5 mm long.....***S. ×pallens***
4 First lemma unawned.
5 Panicle open; second glume 3-6× as long as wide, acute at the tip; lowermost rachilla internode 0.8-1.0 mm long .....***S. intermedia***
5 Panicle densely cylindrical; second glume 2-3× as long as wide, rounded or truncate at the tip; lowermost rachilla internode 0.5-0.7 mm long.....***S. obtusata***

Sphenopholis filiformis (Chapman) Scribner. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC): pine savannas, sandy woodlands; common (uncommon north of FL, rare in VA). April-May. Se. VA south to n. peninsular FL, west to e. TX. [= RAB, C, F, FNA, K, S, WH, Z]

Sphenopholis intermedia (Rydberg) Rydberg, Slender Wedgegrass. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, FL, GA, NC, SC, VA): moist nutrient-rich forests; uncommon (rare in DE, GA, NC, SC, and VA). May-June. NL (Newfoundland) west to c. AK, south to Panhandle FL, c. TX, and AZ. Perhaps better treated at the varietal level. [= RAB, F, FNA, K, S, WV; = *S. obtusata* (Michaux) Scribner var. *major* (Torrey) K.S. Erdman – C, Z; < *S. intermedia* – G (also see *S.* ×*pallens*); < *S. obtusata* – GW, W, WH; = *S. obtusata* var. *intermedia* (Rydberg) Rydberg – Pa]

Sphenopholis nitida (Biehler) Scribner. Cp (DE, FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): moist forests, bottomlands; common (uncommon in FL and WV). April-June. MA west to IL, south to n. peninsular FL and TX. [= RAB, C, F, FNA, K, Pa, S, W, WH, WV, Z; > *S. nitida* var. *glabra* (Nash) Scribner – G; > *S. nitida* var. *nitida* – G]

Sphenopholis obtusata (Michaux) Scribner, Prairie Wedgegrass. Cp (DE, FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): forests, roadsides, disturbed areas; common (uncommon in Mountains). April-May. ME west to MN and BC, south to s. FL, TX, c. Mexico, and s. CA. [= RAB, FNA, G, K, S, WV; = *S. obtusata* var. *obtusata* – C, Pa, Z; > *S. obtusata* var. *obtusata* – F; > *S. obtusata* var. *pubescens* (Lamson-Scribner & Merrill) Lamson-Scribner – F; < *S. obtusata* – GW, W, WH (also see *S. intermedia*)]

Sphenopholis* ×*pallens (Biehler) Scribner (pro sp.) [*S. obtusata* × *pensylvanica*]. Cp (NC, SC, VA): ditches, wet forests; rare. Seemingly not always with its parents. May. [= C, K; = *S. pallens* – RAB, F, S; < *S. intermedia* (Rydberg) Rydberg – G; = *S. obtusata* × *pensylvanica* – Pa]

Sphenopholis pensylvanica (Linnaeus) A.S. Hitchcock, Swamp-oats. Mt (GA, NC, SC, VA, WV), Pd (DE, GA, NC, SC, VA), Cp (DE, FL, NC, SC, VA): bogs, ditches, wet forests; uncommon (rare in DE). April-June. MA west to OH and se. MO, south to n. peninsular FL and LA. [= C, FNA, K, Pa, WH, Z; = *Trisetum pensylvanicum* (Linnaeus) Palisot de Beauvois ex Roemer & J.A. Schultes – RAB, F, G, S, WV; = *S. pennsylvanica* – GW, orthographic variant]

Sporobolus R. Brown 1810 (Dropseed)

A genus of about 160 species, perennials and annuals, of tropical, subtropical, and warm-temperate parts of the New World and Old World. References: Riggins (1977)=Z; Weakley & Peterson (1998)=Y; Peterson, Hatch, & Weakley in FNA (2003a); Simon & Jacobs (1999)=X.

1 Inflorescence an open panicle, > 2 cm broad, the branches ascending to spreading.
  2 Branches of the panicle verticillate, whorled; spikelets 2.5-4 mm long..... ***S. junceus***
  2 Branches of the panicle alternate (some occasionally rather randomly subopposite or opposite, but never regularly whorled); spikelets either 4-6.5 mm long, or 1.5-2.5 (2.7) mm long.
    3 Spikelets 1.5-2.5 (-2.7) mm long.
      4 Panicle branches bare of spikelets in the lower ¼-⅛ of their length ..... ***S. cryptandrus***
      4 Panicle branches bearing spikelets to the base..... ***S. domingensis***
    3 Spikelets 4-6.5 mm long.
      5 First glume scaberulous, acuminate or awn-like; spikelets dark gray; base of plant relatively fibrous; grain spherical; [of rocky barrens of the Mountains of NC and VA]..... ***S. heterolepis***
      5 First glume glabrous, acute to acuminate; spikelets purplish (fading tan); base of plant smooth and hard, made up of the indurated leaf bases; grain oblong (when present, usually abortive); [of pine savannas and seeps of the Coastal Plain of NC, SC, and southward].
        6 Leaves terete or subterete (wiry), oval in cross-section, sometimes irregularly channelled for portions of their lengths (never with any portion above the sheath flat), < 1 mm wide, tending to senesce and turning tan in autumn, the margins generally smooth; culms (including the inflorescence) (2-) 4-7 (-10) dm tall; culms (from base to first inflorescence branch) 1.5-5 dm tall; first glume averaging about 0.7× as long as the second glume (though variable, ranging from 0.5-0.75×)..... ***S. teretifolius***
        6 Leaves flat (folded when dry), plane or V-shaped in cross-section, with free margins their entire length, 1.2-2 (-2.7) mm wide, tending to remain green into the winter (at least until December), the margins scabrous (except in *S. curtissii*); culms (including the inflorescence) 3-22 dm tall; culms (from base to first inflorescence branch) (4-) 6-10 dm tall; first glume averaging 0.75-1× as long as the second glume (though variable, collectively ranging from about 0.6-1.2×).
          7 First glume averaging 0.95-1.1× as long as the second glume (though variable, ranging from 0.8-1.3×); pedicels mostly 1-3 mm long (a few sometimes as long as 10 mm long), appressed; culms (including the inflorescence) 3-7 dm tall; inflorescence branches stiffly ascending; leaves 0.5-1.5 mm wide (or to 2.0 mm wide when unburned), mostly 1.5-4 dm long (rarely to 5 dm long), smooth on the margins; [of e. SC southward]..... ***S. curtissii***
          7 First glume averaging 0.6-0.9× as long as the second glume (though variable, ranging from 0.6-0.95×); pedicels mostly 4-15 mm long, spreading; culms (including the inflorescence) (3-) 7-16 (-22) dm tall; inflorescence branches initially ascending, later loosely ascending to spreading; leaves 1.2-10.0 mm wide, mostly (3-) 4-8 dm long, upwardly scabrous on the margins; [of e. NC southward].
            8 Leaves (2.0-) 3-10 mm wide, pale bluish-green (often with some yellowish leaves as well); first glume averaging 0.75-0.9× as long as the second glume (though variable, ranging from 0.6-0.95×); culms (including the inflorescence) usually 12-22 dm tall; inflorescence usually 3.5-5 dm long; [of se. SC southward] ..... ***S. floridanus***
            8 Leaves 1.2-2.0 (-3.0) mm wide, dark green; first glume averaging 0.6-0.8× as long as the second glume (though variable, ranging from 0.6-0.8×); culms (including the inflorescence) usually 6-12 (-18) dm tall; inflorescence usually 2-3.5 dm long; [of e. NC south to e. GA] ..... ***S. pinetorum***

1 Inflorescence a contracted, spike-like panicle, < 2 cm broad, the branches appressed.
  9 Plant a geniculate annual; most inflorescences enclosed by sheaths (or most or all exserted); inflorescence 2-5 cm long.
    10 Spikelets (1.3-) 1.6-2.8 mm long; grain falling free of the lemma and palea; lemma glabrous ..... ***S. neglectus***
    10 Spikelets 2.3-5 mm long; grain falling enclosed in the lemma and palea; lemma strigose (use 10× or more) or glabrous.
      11 Lemma and palea shorter than the glumes; palea usually shorter than the lemma; lemma glabrous or strigose with hairs < 0.2 mm long; spikelets 2.3 -3.3 (-3.8) mm long; floret (lemma, palea and enclosed grain) 1.6-3.3 (-3.8)× as long as wide..... ***S. ozarkanus***
      11 Lemma and palea longer than the glumes; palea usually longer than the lemma; lemma strigose with hairs > 0.2 mm long; spikelets 2.8-5 mm long; floret (lemma, palea and enclosed grain) 2.2-5.7 (-7.5)× as long as wide..... ***S. vaginiflorus***
  9 Plant a rhizomatous or tufted perennial; most inflorescences exserted to partly enclosed; inflorescence 5-15 cm long.

12 Plant creeping extensively by slender rhizomes; leaf blades cauline, distichous, to 12 cm long.....***S. virginicus***
12 Plant loosely tufted, from short rhizomes; leaf blades basal or cauline, not distichous, 10-100 cm long.
13 Spikelets 1.5-2.2 mm long; first glume 0.5-0.8 mm long; leaves primarily basal.
14 Panicle branches appressed, 0.5-2 cm long in the middle of the inflorescence; second glume acute, > ½ as long as the spikelet.....***S. indicus***
14 Panicle branches ascending, 2-8 cm long in the middle of the inflorescence; second glume truncate or broadly obtuse, < ½ as long as the spikelet.
15 Plants to 7.5 dm tall; leaf blades to 4 dm long and 2.5-3.5 mm wide.....***S. jacquemontii***
15 Plants to 17 dm tall; leaf blades to 7 dm long and 6-8 mm wide.....***[S. pyramidalis]***
13 Spikelets 4-8 mm long; first glume 2-5 mm long; leaves cauline and basal.
16 Lemma pubescent, usually conspicuously shorter than the palea; pericarp loose when moist.....***S. clandestinus***
16 Lemma glabrous, about as long as the palea; pericarp gelatinous when moist.
17 Culms (1.4-) 2.0-5.0 mm thick; terminal sheath (1.3-) 1.5-6.0 mm wide; panicles with 12-35 primary branches, crowded, dense.....***S. compositus*** *var.* ***compositus***
17 Culms 1.0-2.0 (-2.5) mm thick; terminal sheath 0.8-2.0 (-2.5) mm wide; panicles with 8-18 primary branches, lax, loosely flowered.....***S. compositus*** *var.* ***drummondii***

* ***Sporobolus airoides*** (Torrey) Torrey, Alkali Sacaton. Waste areas near wool-combing mills, not known to be established or persistent; native of w. North America. [= FNA, HC, K] {not keyed}

Sporobolus clandestinus (Biehler) A.S. Hitchcock, Rough Dropseed. Glades, barrens, and thin soil of woodlands, also in dry sands. Late August-October. This species is widespread in e. United States. Wipff & Jones (1995) recommend reducing this taxon to a variety under *S. compositus*, because of its morphologic similarity. While *S. clandestinus* and *S. compositus* are undoubtedly closely related, I prefer to retain the two as species. [= RAB, C, FNA, F, G, HC, K, Pa, S, W, Z; = *S. compositus* (Poiret) Merrill var. *clandestinus* (Biehler) J. Wipff & S.D. Jones]

Sporobolus compositus (Poiret) Merrill *var.* ***compositus***, Tall Dropseed. Diabase glades and barrens, limestone glades and barrens, disturbed areas over diabase or calcareous rocks. September-November. This species and variety are reported for NC in a recent revision of the *S. asper* group (Riggins 1977); little is known about the occurrence of this species in NC. The general range is centered in the Plains, but extending east into ne. United States. The name *S. compositus* has nomenclatural priority over the more familiar *S. asper* (Kartesz & Gandhi 1995). [= FNA, K; = *S. asper* (Michaux) Kunth var. *asper* – C, G, HC, Z; = *S. asper* – F, S, WV; < *S. compositus* – Pa]

Sporobolus compositus (Poiret) Merrill *var.* ***drummondii*** (Trinius) Kartesz & Gandhi. Glades, barrens, roadsides, disturbed areas. East to the Ridge and Valley province of e. TN (Chester et al. 1993), occurring over limestone, and allegedly to GA (Kartesz 1999). It could very likely occur in sw. VA, as it is in Hawkins County, TN, immediately adjacent to VA (Chester et al. 1993). [= FNA, K; = *S. asper* (Michaux) Kunth var. *drummondii* (Trinius) Vasey – C, Z; = *S. drummondii* (Trinius) Vasey – F, S; = *S. asper* var. *hookeri* (Trinius) Vasey – G, HC, misapplied]

Sporobolus compositus (Poiret) Merritt *var.* ***macer*** (Trinius) Kartesz & Gandhi. [= FNA] {not yet keyed; add to synonymy}

Sporobolus cryptandrus (Torrey) A. Gray, Sand Dropseed. Floodplains, shores, disturbed areas; native west of the Appalachians, introduced eastward. August-September. C. and w. North America. This species is reported for NC by HC, F, and S. [= C, FNA, G, K, HC, Pa, S, WV, Z; > *S. cryptandrus* var. *cryptandrus* – F]

Sporobolus curtissii (Vasey ex Beal) Small ex Scribner, Curtiss's Dropseed. Moist, gummy-clay flatwoods. September-November. E. SC south to c. FL. First positively documented for our area in 1993. Earlier attributions of *S. curtissii* to NC and SC were apparently based on misapplication or confusion with *S. teretifolius* and/or *Sporobolus pinetorum*. *S. curtissii* differs from other "bunchgrass" *Sporobolus* of our area in having the spikelets short-pedicelled and appressed against the panicle branches (as opposed to long-pedicelled and spreading in *S. teretifolius* and *Sporobolus pinetorum*). [= FNA, HC, K, S, Y]

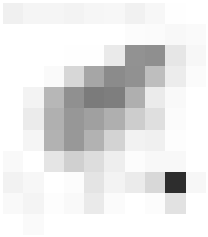
* ***Sporobolus diandrus*** (Retzius) Palisot de Beauvois. Native of e. and se. Asia[= FNA, X] {not yet keyed}

*? ***Sporobolus domingensis*** (Trinius) Kunth, Coral Dropseed. Cp (GA): coastal sands?; rare, uncertain whether native or introduced. Se. GA south to s. FL; West Indies, Mexico. The e. GA record (Glynn County) is at Univ. of Georgia (Sorrie, pers. comm.). [= FNA, HC, K, S]

* ***Sporobolus fimbriatus*** (Trinius) Nees. Cp (SC): waste areas near wool-combing mills, probably only a waif; native of Africa. [= FNA, HC, K] {not keyed}

* ***Sporobolus flexuosus*** (Thurb. ex Vasey) Rydberg. Cp (SC): waste areas near wool-combing mills, probably only a waif; native of sw. United States and n. Mexico. [= FNA, HC, K] {not keyed}

Sporobolus floridanus Chapman, Florida Dropseed. Wet savannas. June-September. Se. SC south to ne. FL, west to Panhandle FL. First positively documented for SC in 1995. Earlier attributions of *S. floridanus* to NC and SC were based on misapplication of the name to material actually representing *Sporobolus pinetorum*. [= FNA, K, Y; < *S. floridanus* – GW, HC, S (also see *S. pinetorum*); the inclusion of *S. floridanus* in RAB was based on a misidentification of *S. pinetorum*]



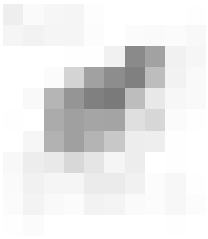
Sporobolus heterolepis (A. Gray) A. Gray, Prairie Dropseed. Mt (GA, NC, VA), Ip (KY): barrens, glades, and prairies over mafic, ultramafic, and calcareous rocks (olivine, serpentine, limestone); rare. August-September. The primary distribution of *S. heterolepis* is in the Plains, with outliers east to nw. GA (Jones & Coile 1988), c. TN (Estes & Beck 2005), w. NC, w. VA, se. PA, ne. United States, and adjacent Canada. [= RAB, C, F, FNA, G, HC, K, Pa, W, Y]

Sporobolus indicus (Linnaeus) R. Brown, Smut Grass, Blackseed. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, KY, NC, SC, VA), Ip (KY): roadsides, lawns, disturbed situations; common (rare in KY, rare in VA Mountains). Pantropical and subtropical, its original distribution apparently in the New World tropics, but obscured by its weedy capabilities and sometimes considered introduced in whole or in part in our area. July-October. [= C, FNA, GW, W, X; > *S. poiretii* (Roemer & J.A. Schultes) A.S. Hitchcock – RAB, F, G, HC; > *S. indicus* – HC, S; > *S. berteroanus* (Trinius) A.S. Hitchcock & Chase – S; = *S. indicus* var. *indicus* – K]

Sporobolus jacquemontii Kunth, West Indian Dropseed. Pine flatwoods, beaches, roadsides on barrier islands. FL Panhandle (Wakulla County), FL peninsula; West Indies. The original distribution is the New World tropics and subtropics, but its exact extent is unclear, and the species may be entirely or partly alien in our area. [= FNA, X; < *S. indicus* var. *pyramidalis* (Palisot de Beauvois) Veldkamp – K; ? *S. berteroanus* (Trinius) A.S. Hitchcock & Chase – S; < *S. pyramidalis* Palisot de Beauvois]

Sporobolus junceus (Palisot de Beauvois) Kunth, Sandhills Dropseed. Cp (FL, GA, NC, SC), Pd (GA, NC, SC, VA): sandhills, other dry, open areas; common (uncommon in Piedmont, rare in VA). September-October. Se. VA south to FL and west to se. OK (Mink, Singhurst, & Holmes 2012) and se. TX. [= RAB, C, F, FNA, G, HC, K, Y; = *S. gracilis* (Trinius) Merrill – S]

Sporobolus neglectus Nash, Barrens Dropseed. Ip (KY), Mt (VA, WV): dry rocky barrens and outcrops, over calcareous rocks (such as limestone or dolomite); uncommon (rare in VA and WV). August-September. ME west to ND, south to NJ, w. VA, TN, LA, and TX; apparently disjunct in WA and AZ. *S. ozarkanus*, *S. neglectus*, and *S. vaginiflorus* form a still very poorly understood complex. [= C, F, FNA, G, HC, K, Pa, S, W]



Sporobolus ozarkanus Fernald, Ozark Dropseed. Ip (KY), Pd (NC), Mt (VA): limestone glades, diabase glades; rare. September-October. KY west to KS, south to e. TN, AR, and TX; disjunct in c. NC. In Granville County, NC, it is associated (on glades of diabase, a mafic rock) with other taxa with affinities to midwestern glades and prairies: *Solidago rigida, Solidago ptarmicoides, Baptisia australis var. aberrans, Symphyotrichum depauperatum, Silphium terebinthinaceum, Parthenium auriculatum, Ruellia humilis*, and others. *S. ozarkanus*, *S. neglectus*, and *S. vaginiflorus* form a still very poorly understood complex. [= C, F, G, HC, K; = *S. vaginiflorus* (Torrey ex A. Gray) Wood var. *ozarkanus* (Fernald) Shinners – FNA, K]

Sporobolus pinetorum Weakley & P.M. Peterson, Carolina Dropseed, Savanna Dropseed. Wet savannas, savanna-pocosin ecotones, sandhill-pocosin ecotones, and extending upslope into mesic flatwoods or loamy or clayey shelves in the fall-line sandhills. June-September (and into December in response to growing-season fire). The identity of this taxon has been obscure; it is now clear that it is a previously unrecognized species, endemic to NC, SC, and adjacent e. GA. RAB included it in their concept of *S. teretifolius*, though it does not key well (keying imperfectly to either *S. floridanus* or *S. heterolepis*); in S and HC, it will key to *S. floridanus*, but the leaves are much narrower. Additionally, *S. floridanus* is a taller and coarser plant, the culms often averaging about 1.5 meters in height and 2-3 mm in diameter basally (vs. 1 meter high and 1 mm in diameter for *Sporobolus pinetorum*). In wet savannas of Columbus County, NC, *S. pinetorum* occurs with true *S. teretifolius* (the two codominant over many hectares!), and the two taxa are manifestly distinct. The leaves of *S. pinetorum* are not terete; after lengthy drought in the field (or dry on an herbarium sheet), the leaves become tightly folded to involute and can appear wiry. Like many Southeastern pineland grasses, *S. pinetorum* flowers only following fire. In vegetative condition it may be distinguished from *Aristida stricta and A. beyrichiana*, with which it often grows, by the leaf pubescence (*S. pinetorum* with scaberulous margins, best felt by running a finger along the margin near the base, from apex toward base, *A. stricta* and *A. beyrichiana* not scaberulous, and with a sparse line of pilose hairs running more or less the length of the leaf in *A. stricta* and sometimes in *A. beyrichiana*) and base (much more indurated and polished in *Sporobolus* than in *Aristida*). [= FNA, K, Y; >< *S. teretifolius* – RAB, misapplied; > *S. floridanus* – RAB, misapplied; < *S. floridanus* Chapman – HC, S]

* ***Sporobolus pyramidalis*** Palisot de Beauvois, Giant Ratstail Grass. Roadsides; native of the Old World Tropics. Taxonomically confused with *S. jacquemontii*. [= X; < *S. indicus* var. *pyramidalis* (Palisot de Beauvois) Veldkamp – K]

* ***Sporobolus tenuissimus*** (Martius ex Schrank) Kuntze. Waste areas near wool-combing mills, probably only a waif; native of the tropical Old World and New World. [= FNA, K] {not keyed}

Sporobolus teretifolius R.M. Harper, Wireleaf Dropseed. Wet savannas, pitcherplant bogs. July-September (and later in response to growing-season fire). Very similar vegetatively to *Aristida stricta*, *S. teretifolius* can be distinguished by its tuft of

hairs at the base of the otherwise glabrous blade (as opposed to line of pilose hairs the length of the blade in *A. stricta*). This very rare species is known only from se. NC, ne. SC, s. GA, and se. AL (Houston County). Many of the counties reported for this species in RAB actually are based on misidentified specimens of *S. pinetorum*. In a few very wet savannas of Columbus and Brunswick counties, NC, *S. teretifolius* is dominant or codominant over many hectares. Like many savanna grasses, *S. teretifolius* generally flowers only following fire. [= FNA, HC, K, S, Y; < *S. teretifolius* – RAB (also see *S. pinetorum*)]

Sporobolus vaginiflorus (Torrey ex A. Gray) Wood, Poverty Dropseed. Pd (GA, NC, SC, VA), Mt (GA, KY, NC, SC, VA, WV), Cp (FL, KY, VA), Ip (KY): glades, barrens, open disturbed sites; common (uncommon in FL, GA, KY, NC, SC, VA, rare in KY and WV Mountains). September-October. The species occurs nearly throughout e. United States. *S. ozarkanus*, *S. neglectus*, and *S. vaginiflorus* form a still very poorly understood complex. [= RAB, C, G, HC, Pa, W, WV; = *S. vaginiflorus* var. *vaginiflorus* – F, FNA, K; = *S. vaginaeflorus* – S, orthographic variant]

Sporobolus virginicus (Linnaeus) Kunth, Seashore Dropseed, Coastal Dropseed. Cp (FL, GA, NC, SC): salt marshes, tidal mud flats, and low dunes in the outer Coastal Plain; common (rare north of FL). September-October. Se. NC along the coast to TX, in the West Indies and into n. South America (its alleged occurrence in se. VA is apparently incorrect); also native in e. Asia, Africa, Australia and the Pacific region (Simon & Jacobs 1999). *Sporobolus virginicus* is current;y treated as a polymorphous and very widespread species, with a wide range of morphology and several ploidy levels (Simon & Jacobs 1999). *Sporobolus virginicus* is similar in aspect and growth form to *Distichlis spicata*, with which it occurs in tidal flats. *Sporobolus virginicus* is more delicate, and typically has long hairs on either side of the collar of the sheath; *Distichlis spicata* is generally a coarser plant, and lacks long hairs around the collar of the sheath. [= RAB, C, F, FNA, G, GW, HC, K, S]

* ***Sporobolus wrightii*** Munro ex Scribner, Giant Sacaton. Cp (SC): waste areas near wool-combing mills, probably only a waif, native of sw. United States. [= FNA, HC, K] {not keyed}

Steinchisma Rafinesque 1830 (Gaping Panic Grass)

A genus of about 6 species, perennial herbs, of s. North America, Central America, and South America. See discussion following *Panicum* regarding generic concepts. References: Zuloaga et al. (1998)=Z; Freckmann & Lelong in FNA (2003a).

Steinchisma hians (Elliott) Nash, Gaping Panic Grass. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC), Mt (GA, WV*): stream, pond, and lake shores, low woods, cypress-gum ponds, floodplains, marshes, ditches, seepage slopes; common (uncommon in Coastal Plain, rare in Mountains). May-October. Se. VA south to FL, west to TX and OK, and south through Mexico and Central America to Colombia; also in s. South America. The large, thickened, pale sterile palea of this species is unique among panicoids of our region; it is one of several characters that has led to the segregation of *Steinchisma* as a genus, or as a subgenus of *Panicum*. The enlargement of the sterile palea causes the spikelet to spread open, or "gape." [= FNA, K, Z; = *Panicum hians* Elliott – RAB, C, F, G, GW, HC, S, W]

Stenotaphrum Trinius 1820 (St. Augustine Grass)

A genus of about 7 species, tropical and subtropical. References: Allred in FNA (2003a); Sauer (1972)=Z.

Stenotaphrum secundatum (Walter) Kuntze, St. Augustine Grass, Carpet Grass. Cp (FL, GA, NC, SC, VA*): brackish marshes, roadsides, lawns; common. July-October. A pioneer species of beaches and shores, *S. secundatum* was known from the Carolinas prior to 1800. It has been interpreted as native or introduced in our area; its original range is probably now impossible to determine. Sauer (1972) maps it as widespread along the coasts of s. North America, Central America, South America, the West Indies, Africa, Australia, and sw. Pacific Islands. In our area it is certainly now more frequently encountered as a lawn or roadside grass than in anything that could be construed as a natural habitat. The other 6 species in the genus are Asian, or on islands of the sw. Pacific or Indian Oceans. [= RAB, FNA, HC, K, S, WH, Z]

Thinopyrum (Prat) Á. Löve 1980

A genus of about 10 species, perennials, native of w. Asia and the Mediterranean region. References: Barkworth in FNA (2007a); Tucker (1996)=Z; Barkworth (1997)=Y.

1 Plants rhizomatous; lemmas 7.5-10 mm long; lateral veins slightly shorter than and less prominent than the midvein..... ***T. intermedium***
1 Plants cespitose; lemmas 9-12 mm long; lateral veins of the glumes about as long as and as prominent as the midvein.....***T. ponticum***

* ***Thinopyrum intermedium*** (Host) Barkworth & D.R. Dewey. Pd (GA): waif in railroad yards; rare, native of Europe and w. Asia. Tucker (1996) states that the record is as a waif in railroad yards. [= K, Z; > *T. intermedium* spp. *intermedium* – FNA; = *Elytrigia intermedia* (Host) Nevski; = *Agropyron intermedium* (Host) Palisot de Beauvois – HC] {add to synonymy}

* ***Thinopyrum ponticum*** (Podpěra) Barkworth & D.R. Dewey, Tall Wheatgrass. Cp (SC): waste areas near wool-combing mills; rare, native of Europe and w. Asia, not known to be established or persistent. [= FNA, K; *? Agropyron elongatum* (Host) Palisot de Beauvois] {add to synonymy}

Torreyochloa G.L. Church 1949 (Pale Mannagrass)

A genus of 4 species, with a classic Tertiary moist temperate disjunct pattern; *Torreyochloa* is distributed in e. North America and e. Asia. References: Davis in FNA (2007a); Davis (1991)=Y; Tucker (1996)=Z.

1 Leaf blades 1-3 mm wide; anthers 0.2-0.5 mm long ..... ***T. pallida*** *var.* ***fernaldii***
1 Leaf blades 4-8 mm wide; anthers ca. 1 mm long ..... ***T. pallida*** *var.* ***pallida***

Torreyochloa pallida (Torrey) Church *var.* ***fernaldii*** (A.S. Hitchcock) Dore ex Koyama & Koyama. Mt (WV): beaver ponds, swamps; rare. NL (Newfoundland) west to MN, south to ne. WV and TN. [= FNA, K, Pa, Y, Z; < *Glyceria pallida* (Torrey) Trinius – RAB, GW, HC, W; < *Puccinellia pallida* (Torrey) Clausen – C; = *G. fernaldii* (A.S. Hitchcock) St. John – F, WV; = *G. pallida* var. *fernaldii* A.S. Hitchcock – G]

Torreyochloa pallida (Torrey) Church *var.* ***pallida***, Pale Mannagrass. Mt (GA, NC, VA, WV), Cp (DE, NC, VA), Pd (SC, VA): bogs, mucky wetlands such as old beaver-ponds, pools in cypress swamps, drawdown shores of natural ponds; common (rare in GA, NC, SC, VA, and WV). June-July. The species as a whole is widespread in e. North America. Var. *pallida* ranges from NS west to MN, south to e. VA, se. NC (Columbus County), nw. NC (Avery County), and nw. GA (Jones & Coile 1988). Var. *pauciflora* (J. Presl) J.J. Davis is distributed in w. North America. Intermediates occur between the varieties. [= FNA, K, Pa, Y, Z; < *Glyceria pallida* (Torrey) Trinius – RAB, GW, HC, W; < *Puccinellia pallida* (Torrey) Clausen – C; = *G. pallida* – F, WV; = *G. pallida* var. *pallida* – G; = *Panicularia pallida* (Torrey) Kuntze – S]

Tragus Haller 1768 (Burgrass)

A genus of 7 species, annuals and perennials, of tropical and subtropical Eurasia and Africa. References: Wipff in FNA (2007a).

* *Tragus australianus* S.T. Blake, Australian Burgrass. Cp (SC): waste areas around wool-combing mills; rare, perhaps only a waif, native of Australia. [= FNA, K] {not keyed}

* *Tragus berteronianus* J.A. Schultes, Spiked Burgrass. Cp (SC): waste areas around wool-combing mills; rare, perhaps only a waif, native of Africa and Asia. Also reported from chrome ore piles at Newport News, VA. [= FNA, K] {not keyed}

* *Tragus heptaneuron* W.D. Clayton. Cp (SC): waste areas around wool-combing mills; rare, perhaps only a waif, native of tropical Africa. [= FNA, K] {not keyed}

* ***Tragus racemosus*** (Linnaeus) Allioni, Stalked Burgrass, Texas Burgrass. Mt (VA), Cp (NC): roadsides, disturbed areas, on ballast near old seaports; rare, native of Mediterranean Europe and w. Asia. July-early October. [= HC, C, F, FNA, G, K, Pa; = *Nazia racemosa* (Linnaeus) Kuntze – S]

Tridens Roemer & J.A. Schultes 1817 (Triodia, Redtop, Tridens, Fluffgrass)

A genus of about 14 species, native to the Western Hemisphere. References: Valdés-Reyna in FNA (2003a).

1 Panicle dense and spike-like, > 4× as long as wide, the branches ascending to appressed.
  2 Plants from elongate rhizomes; lemma 4-5 mm long; spikelet 7-9 mm long ..... ***T. carolinianus***
  2 Plants cespitose; lemma 2.5-3 mm long; spikelet 4-6 mm long ..... ***T. strictus***
1 Panicle open and spreading, < 4× as long as wide, the branches well-developed and spreading-ascending to reflexed.
  3 Spikelets 4-5 mm long, 2.5-3.5 mm wide ..... ***T. ambiguus***
  3 Spikelets 6-8 mm long, 1.5-2.2 mm wide.
    4 Primary pulvini densely pubescent, the hairs encircling the base of the panicle branch; secondary pulvini pubescent; spikelets mostly on pedicels 3-20 mm long; main branches of the inflorescence stiffly spreading ..... ***T. chapmanii***
    4 Primary pulvini glabrous to sparsely pubescent, tufted only in the axil (the upper surface of the panicle branch); secondary pulvini glabrous; spikelets on pedicels mostly < 3 mm long; main branches of the inflorescence spreading, ascending or drooping ..... ***T. flavus***

Tridens ambiguus (Elliott) J.A. Schultes, Pineland Triodia, Flatwoods Fluffgrass. Cp (FL, GA, NC, SC): wet savannas, clay-based Carolina bays; uncommon (rare north of GA). August-October. S. NC south to FL, west to e. TX. [= RAB, FNA, GW, HC, K; = *Triodia elliottii* Bush – S]

Tridens carolinianus (Steudel) Henrard, Carolina Triodia, Carolina Fluffgrass. Cp (FL, GA, NC, SC): mesic swales in sandhills; uncommon (rare north of FL). August-October. S. NC south to FL, west to LA. [= RAB, FNA, HC, K; = *Triodia drummondii* Scribner & Kearney – S]

Tridens chapmanii (Small) Chase, Chapman's Triodia. Cp (DE, FL, GA, NC, SC, VA): loamy sands of disturbed longleaf pine woodlands, roadsides; rare. August-October. NJ south to FL, west to TX and OK. [= HC; = *Tridens flavus* (Linnaeus) A.S. Hitchcock var. *chapmanii* (Small) Shinners – RAB, C, FNA, K; = *Triodia chapmanii* (Small) Bush – F, G; < *Triodia flava* (Linnaeus) Smyth – S]

Tridens flavus (Linnaeus) A.S. Hitchcock, Redtop, Tall Redtop, Purpletop Tridens, Greasy Grass. Cp (DE, FL, GA, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): roadsides, disturbed areas, glades; common. July-October. NH west to NE, south to FL and TX. [= HC, Pa; = *Tridens flavus* var. *flavus* – RAB, C, FNA, K; = *Triodia flava* (Linnaeus) Smyth – F, G, WV; < *Triodia flava* (Linnaeus) Smyth – S (also see *Tridens chapmanii*); < *Tridens flavus* – W]

Tridens strictus (Nuttall) Nash, Spike Triodia, Longspike Fluffgrass, Longspike Tridens. Cp (FL, GA, NC, SC, VA), Pd (GA, SC, VA): sandhills, moist pine savannas, roadsides; rare. August-October. S. VA south to AL, west to TX, north in the interior to IL and KS. It is possible that this grass is introduced only north and east of GA. Rhoads & Klein (1993) report an old specimen from w. PA, presumably a waif. [= RAB, FNA, GW, HC, K; = *Triodia stricta* (Nuttall) Bentham ex Vasey – F, G, S]

Triplasis Palisot de Beauvois 1812 (Sandgrass)

A genus of 2 species, of eastern and central North America south through Mexico to Costa Rica. References: Hatch in FNA (2003a).

Identification notes: The foliage of both of our species has a sour taste.

1 Lemma awn 4.5-8 mm long; culm internodes appressed pilose or puberulent; perennial .....***T. americana***
1 Lemma awn 0.5-1.5 mm long; culm internodes glabrous to minutely scaberulous; annual (or rarely perennial).....***T. purpurea*** *var*. ***purpurea***

Triplasis americana Palisot de Beauvois, Southern Sandgrass. Cp (FL, GA, NC, SC): open sandy areas; common. August-October. A Southeastern Coastal Plain endemic: NC south to s. FL, west to e. LA. [= RAB, FNA, HC, K, S]

Triplasis purpurea (Walter) Chapman *var*. ***purpurea***, Purple Sandgrass. Cp (DE, FL, GA, NC, SC, VA): dunes, maritime dry grasslands, open sandy areas; common. September-October. NH south to s. FL, and west to TX, along the coast; also around the Great Lakes, and in central United States. Var. *caribensis* R.W. Pohl is in the New World tropics. [= FNA; < *T. purpurea* – RAB, C, F, G, HC, K, Pa; > *T. intermedia* Nash – S; > *T. purpurea* – S]

Tripsacum Linnaeus 1759 (Gama Grass)

A genus of about 12 species, tropical and subtropical American. References: Barkworth in FNA (2003a); DeWet, Harlan, & Brink (1982)=Z.

Tripsacum dactyloides (Linnaeus) Linnaeus *var*. ***dactyloides***, Gama Grass. Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA< WV), Cp (DE, FL, GA, NC, SC, VA): roadsides, moist areas, disturbed areas, moist riverbanks; common (uncommon in VA, rare in WV). Late May-November. *T. dactyloides* is widespread in e. North America north to MA, MI, IA, and NE, ranging south into tropical Central and South America; var. *dactyloides* is North American. This important species of moist and wetland areas in the Great Plains is generally seen in disturbed habitats in our area; its original habitats in our area (if indeed it was native in the flora area) are poorly understood. [= FNA, Z; < *T. dactyloides* – RAB, C, G, C, K, Pa, S, W, WV; > *T. dactyloides* var. *dactyloides* – F, HC; > *T. dactyloides* var. *occidentale* Cutler & Anderson – F, HC]

Trisetum Persoon 1805 (Oat-grass)

A genus of about 75-85 species, north and south temperate. References: Rumely in FNA (2007a); Randall & Hilu (1986)=Z; Tucker (1996)=Y. [also see *Sphenopholis*]

Trisetum spicatum (Linnaeus) K. Richter, Alpine Oat-grass, Spike Trisetum. Mountain cliffs at high elevations on metabasalt. June-August. A circumboreal species, widespread and common in arctic and alpine areas, south in e. North America to New England, NY, and, rarely, PA, and disjunct to Hawksbill Mountain, Page County, VA (where extant) and Roan Mountain, Mitchell County, NC (where not seen since the nineteenth century). The species is also known from the West Indies, Mexico, and s. South America. *T. spicatum*, as broadly treated here, following Randall & Hilu (1986), is polymorphic and consists of several ploidies. [= C, FNA, HC, K, Pa, S, Y, Z; > *T. spicatum* var. *molle* (Michaux) Beal – RAB, F, G; > *T. triflorum* (Bigelow) Löve & Löve ssp. *molle* (Michaux) Löve & Löve – W; > *T. spicatum* var. *maidenii* (Gandoger) Fernald – F]

Triticum Linnaeus 1753 (Wheat)

A genus of about 25 species (the taxonomy complicated by extensive and ancient cultivation), native of w. and c. Asia. References: Morrison in FNA (2007a); Tucker (1996)=Z; Zohary & Hopf (1994).

* ***Triticum aestivum*** Linnaeus, Bread Wheat. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): fields; frequently cultivated, rarely persistent or volunteering following cultivation, native of Eurasia. May-June. One of the most important crops in the world. The lemmas can either be awnless or with long awns (to 8 cm long). [= RAB, C, F, FNA, G, HC, K, Pa, WH, Z]

Uniola Linnaeus 1753 (Sea Oats)

A genus of 2 species. The only other species of the genus ranges from Baja California south along the Pacific Ocean to Ecuador; other species previously treated in *Uniola* have been shown to be only distantly related and are now treated as *Chasmanthium*. References: Yates in FNA (2003a); Yates (1966a, 1966b)=Z. [also see *Chasmanthium*]

Uniola paniculata Linnaeus, Sea Oats. Cp (DE*, FL, GA, NC, SC, VA): abundant on unforested primary and secondary dunes on barrier islands, and on dry to mesic sand flats and interdune swales; common (rare in DE and VA). June-November. Se. VA south to FL and west to TX and Mexico; West Indies. This is the most important sand-binding grass on ocean dunes from NC south, playing a critical role in primary succession on dunes. It is against the law in NC to pick or destroy *Uniola paniculata*. [= RAB, C, F, FNA, G, HC, K, S, WH, Z]

Urochloa Palisot de Beauvois 1812 (Para-grass, Signal-grass)

A genus of about 100 species, pantropical and subtropical. References: Crins (1991)=Z; Webster (1988)=Y; Wipff & Thompson in FNA (2003a). Key adapted in part from GW. [also see *Megathyrsus*]

1 Spikelets suffused with purple, borne in pairs (or threes) in each row ..... ***U. mutica***
1 Spikelets green, borne singly in each row.
  2 Upper half of second glume and first lemma with evident transverse veins connecting the longitudinal veins; spikelets 3.5-4.7 mm long ..... ***U. platyphylla***
  2 Upper half of second glume and first lemma without evident transverse veins, or with very obscure cross-veins; spikelets either 2-4 mm or 5-6 mm long.
    3 Spikelets 2-4 mm long ..... ***U. ramosa***
    3 Spikelets 5-6 mm long ..... ***U. texana***

* ***Urochloa adspersa*** (Trinius) R. Webster. Cp (FL): moist, sunny, disturbed areas; rare, apparently native of s. FL, the West Indies, and Argentina. Reported from AL, FL peninsula and Panhandle (FNA), and chrome ore piles in Newport News, VA (Reed 1964). [= FNA, K] {not keyed; add to synonymy}

Urochloa fusca (Swartz) B.F. Hansen & Wunderlin *var*. ***reticulata*** (Torrey) B.F. Hansen & Wunderlin, east to GA (Kartesz 1999). [< *Urochloa fusca* – FNA; ? *Urochloa fasciculata* (Sw.) R. Webster – K; *? Panicum fasciculatum* Swartz – HC] {not yet keyed; synonymy incomplete}

* ***Urochloa mutica*** (Forskål) Nguyen, Para-grass. Cp (SC): margin of pond; rare, native of Africa. August. [= FNA, K, Z; *? Panicum purpurascens* Raddi – RAB, HC; *? B. purpurascens* (Raddi) Henrard – GW; = *Brachiaria mutica* (Forskål) Stapf]

Urochloa piligera (Muell. ex Bentham) R.D. Webster. Cp (FL): roadsides; rare, native of Australia. Reported for Escambia County in the FL Panhandle (Kunzer et al. 2009). [= WH] {not yet keyed; synonymy incomplete}

* ***Urochloa plantaginea*** (Link) R. Webster. Cp (FL, GA): Reported for s. GA (Jones & Coile 1988), as *Brachiaria plantaginea*, and for Escambia County in the FL Panhandle (Kunzer et al. 2009). [= FNA, K, Y, Z; = *Brachiaria plantaginea* (Link) A.S. Hitchcock] {not yet keyed; synonymy incomplete}

* ***Urochloa platyphylla*** (Munro ex Wright) R. Webster, Broadleaf Signal-grass. Cp (FL, GA, NC, SC, VA), Pd (GA, SC, NC, VA), Mt (VA): disturbed wet or seasonally moist areas; rare, apparently native of South America. E. NC south to FL, west to TX, north in the interior to AR, OK, and se. MO; also in MD (Terrell & Reveal 1996). [= FNA, K, Y, Z; = *Brachiaria platyphylla* (Munro ex Wright) Nash – RAB, GW, HC; *? B. extensa* Chase – S]

* ***Urochloa ramosa*** (Linnaeus) Nguyen, Browntop Millet, Dixie Signalgrass. Pd (GA, NC, SC, VA), Cp (FL, GA, NC, SC, VA): disturbed areas; rare, native of tropical Africa and Asia. This species has apparently been widely planted for wildlife food and erosion control in southeastern states. [= FNA, K, Z; = *Panicum ramosum* Linnaeus – HC; = *Brachiaria ramosa* (Linnaeus) Stapf]

Urochloa reptans (Linnaeus) Stapf. Cp (GA): [= FNA, K] {not yet keyed; synonymy incomplete}

* ***Urochloa texana*** (Buckley) R. Webster, Texas Millet, Texas Signalgrass. Cp (FL, GA, NC, SC, VA), Pd (GA, SC): disturbed areas, fields, gardens; uncommon (rare in VA), native of TX. First reported for South Carolina by Hill & Horn (1997). [= K, Y, Z; = *Panicum texanum* Buckley – RAB, C, HC, S; = *Brachiaria texana* (Buckley) S.T. Blake]

* *Urochloa villosa* (Lamarck) Nguyen, Hairy Signalgrass. Reported from chrome ore piles in Newport News, VA (Reed 1964); native of tropical Asia and Africa. [= FNA, K] {not keyed; add to synonymy}

Vulpia C.C. Gmelin 1805 (Annual Fescue)

A genus of about 30 species, north and south temperate. References: Lonard in FNA (2007a); Tucker (1996)=Z. Key based in part on C.

1 First glume < ½ as long as the second glume ..... ***V. myuros***
1 First glume > ½ as long as the second glume.
  2 Lemma pubescent; lowest lemma 2.5-3.5 mm long; grains 1.5-2 mm long ..... ***V. sciurea***
  2 Lemma glabrous or scabrous; lowest lemma 2.7-7 mm long; grains 1.7-3.3 mm long.
    3 First glume 1.7-4.5 mm long; lemma awns 3-12 mm long; spikelets with 4-7 loosely imbricate florets; rachilla internodes mostly 0.9-1.1 mm long ..... ***V. bromoides***

3 First glume 3.5-5 mm long; lemma awns 0.3-6 (-9) mm long; spikelets with 5-11 (-more) closely imbricate florets; rachilla internodes mostly 0.5-0.7 mm long.
4 Spikelets 4-5.5 (-6.5) mm long; awn of the lowest lemma 0.3-3 mm long ..... ***V. octoflora*** *var.* ***glauca***
4 Spikelets 5.5-10 (-13) mm long; awn of the lowest lemma 3-9 mm long ..... ***V. octoflora*** *var.* ***octoflora***

* ***Vulpia bromoides*** (Linnaeus) S.F. Gray, European Squirreltail Fescue, Brome Fescue. Cp (FL, VA): sandy disturbed areas; rare, native of Eurasia. [= C, FNA, K, Z; = *Festuca dertonensis* (Allioni) Ascherson & Graebner – G, HC]

* ***Vulpia myuros*** (Linnaeus) K.C. Gmelin, Rat-tail Fescue. Cp (FL, NC, SC, VA), Pd (DE, GA, NC, SC, VA), Mt (GA, NC, SC, WV): roadsides, fields, disturbed areas; common (rare in FL and WV), native of Eurasia. May-June. [= C, F, FNA, K, Pa, Z; = ***Festuca myuros*** Linnaeus – RAB, G, HC, S, W, WV]

Vulpia octoflora (Walter) Rydberg *var.* ***glauca*** (Nuttall) Fernald, Northern Six-weeks Fescue. Mt (WV), Cp (DE), Pd (DE), {Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA)}: fields, roadsides, disturbed areas; common (rare in WV). April-June. S. ME west to BC, south to GA, AR, TX, and CA. [= C, FNA, K, Pa; < *Festuca octoflora* Walter – RAB, GW, S, W, WV; = *Vulpia octoflora* var. *tenella* (Willdenow) Fernald – F; = ***Festuca octoflora*** Walter *var.* ***tenella*** (Willdenow) Fernald – G, HC; < *Vulpia octoflora* – Z]

Vulpia octoflora (Walter) Rydberg *var.* ***octoflora***, Southern Six-weeks Fescue. Mt (WV), Cp (DE), {Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA)} fields, roadsides, disturbed areas; common (uncommon in WV). April-June. S. NJ south to FL, west to TX, north in the interior to MO and OK. [= C, F, FNA, K; < *Festuca octoflora* Walter – RAB, GW, S, W, WV; > *Festuca octoflora* var. *aristulata* Torrey ex L.H. Dewey – G; = ***Festuca octoflora*** *var.* ***octoflora*** – HC; < *Vulpia octoflora* – Z]

Vulpia sciurea (Nuttall) Henrard, Squirreltail Fescue. Cp (DE, FL, GA, NC, SC, VA), Pd (GA): sandy roadsides, fields, disturbed areas; common (uncommon in DE and VA). April-May. S. NJ south to n. peninsular FL, west to TX, and north in the interior to MO. [= FNA, Z; = *Vulpia elliotea* (Rafinesque) Fernald – C, F, K; = ***Festuca sciurea*** Nuttall – RAB, G, HC, S]

Zea Linnaeus 1753 (Corn, Maize)

A genus of about 5 species, native of Mexico and Central America. References: Iltis in FNA (2003a).

1 Pistillate spikelets (kernels) borne on a spongy rachis (cob) in rows ..... ***Z. mays*** *spp.* ***mays***
1 Pistillate spikelets embedded in a hardened rachis.
2 Annual..... ***[Z. mays*** *ssp.* ***mexicana]***
2 Perennial from creeping rhizomes..... ***Z. perennis***

* ***Zea mays*** Linnaeus *ssp.* ***mays***, Corn, Maize. Cp (FL, GA, NC, SC, VA), Pd (GA, NC, SC, VA), Mt (GA, NC, SC, VA, WV): very commonly cultivated, rarely volunteering in old fields or around trashpiles; common in cultivation, rare as a short-lived escape. June-October. *Zea* is one of the most important cultivated plants in the world, originating in Mexico, probably from *Zea mays* ssp. *parviglumis* Iltis & Doebley. It was initially cultivated in sw. Mexico (before 8000 BP), spreading to the sw. United States before 5000 BP, and to the e. United States by 2000 years BP. At the time of European contact, *Zea mays* ssp. *mays* was an important staple crop from s. Canada south to s, South America (Hancock 2004). [= FNA, K; < *Z. mays* – RAB, F, HC, S]

* *Zea mays* (Schrader) Kuntze ssp. *mexicana* (Schrader) H.H. Iltis, Chalco Teosinte, Nobogame Teosinte. Reported for AL (Kartesz 1999) and FL (Hansen & Wunderlin 2006). HC state that this taxon is "occasionally cultivated in the Southern States for green forage" and is similar to *Z. perennis*, except in being, like *Z. mays* ssp. *mays*, a coarse annual. It is considered to be an ancestor of *Zea mays*. [= FNA; = *Z. mexicana* (Schrader) Kuntze – K; = *Euchlaena mexicana* Schrader – HC, S]

* ***Zea perennis*** (A.S. Hitchcock) Reeves & Manglesdorf, Mexican Teosinte. Cp (SC): disturbed areas; rare, apparently established at least formerly. *Z. perennis* was considered by HC to be "established on James Island, S.C." [= K; = *Euchlaena perennis* A.S. Hitchcock – HC]

Zizania Linnaeus 1753 (Wild-rice)

A genus of 4 species (and 6 taxa) of northern and eastern North America. References: Terrell in FNA (2007a); Terrell et al. (1997)=Y; Tucker (1988)=Z; Judziewicz et al. (2000)=X. Key based on Terrell in FNA (2007a).

1 Lemmas of the pistillate spikelets flexible and chartaceous, dull, bearing short scattered hairs, these not or only slightly more dense toward the tip..... ***Z. aquatica*** *var.* ***aquatica***
1 Lemmas of the pistillate spikelets stiff and coriaceous, lustrous, glabrous or with lines of short hairs, the tips usually more hairy.
2 Lower pistillate branches with 9-30 spikelets; pistillate portion of the inflorescence 10-40 (or more) cm wide, the branches ascending to widely divergent; leaves 10-40+ mm wide..... ***Z. palustris*** *var.* ***interior***
2 Lower pistillate branches with 2-8 spikelets; pistillate portion of the inflorescence 1-8 (-15) cm wide, the branches appresses or ascending; leaves 3-21 mm wide..... ***Z. palustris*** *var.* ***palustris***

Zizania aquatica Linnaeus *var.* ***aquatica***, Southern Wild-rice. Freshwater marshes, usually tidal. May-October. Var. *aquatica* ranges from ME west to WI, south to FL and LA; var. *brevis* Fassett is restricted to the St. Lawrence River in QC. *Zizania* was formerly an important food for Amerindians; it is now gathered as a specialty grain, commanding high prices. [= C, F, FNA, G, HC, K, X, Y, Z; < *Z. aquatica* – RAB, GW, Pa, S]

Zizania palustris Linnaeus *var.* ***interior*** (Fassett) Dore, Interior Wild-rice. Wetlands. ON west to MN, south to KY, MO, and NE. [= C, FNA, K2; = *Z. aquatica* var. *interior* Fassett – F, G, HC] {add synonymy: X, Y, Z}

* ***Zizania palustris*** Linnaeus *var*. ***palustris***, Northern Wild-rice. Lake shores; rare, native of n. North America. Reported for a single county in WV, where apparently introduced. [= C, FNA; = *Z. aquatica* Linnaeus var. *angustifolia* Hitchcock – F, G, HC; < *Z. palustris* – Pa; < *Z. aquatica* – WV] {add synonymy: X, Y, Z}

Zizaniopsis Döll & Ascherson 1871 (Giant Cutgrass)

A genus of about 5 species, of tropical and subtropical America. References: Terrell in FNA (2007a); Tucker (1988)=Z; Judziewicz et al. (2000)=Y.

Identification notes: Superficially similar to *Zizania* in its habitat and large size, *Zizaniopsis* may be distinguished by its very different inflorescence and by its stout horizontal rhizomes (our taxa of *Zizania* are annual and not rhizomatous).

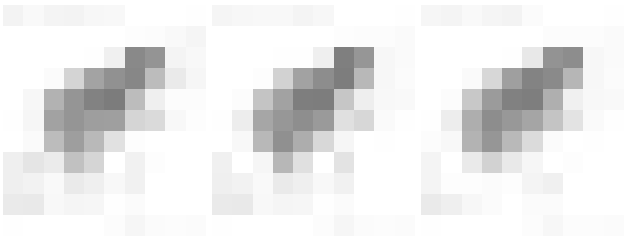
Zizaniopsis miliacea (Michaux) Döll & Ascherson, Southern Wild-rice, Giant Cutgrass, Water-millet. Brackish and freshwater marshes; common. May-July. MD south to FL, west to TX, north in the interior to MO, and disjunct in w. Mexico. The other species of the genus are South American. [= RAB, C, F, FNA, G, GW, HC, K, S, Y, Z; = *Zizania miliacea* Michaux]

Zoysia Willdenow 1801 (Zoysia, Temple-grass)

A genus of about 11 species, perennials, of tropical, subtropical, and temperate Asia. References: Anderson in FNA (2003a). Key closely following FNA.

1 Leaves < 0.5 mm wide; racemes with 3-12 spikelets; peduncles included to extending < 1 cm beyond the sheaths of the flag leaves..... ..... ***Z. pacifica***
1 Leaves 0.5-5 mm wide; racemes with 10-50 spikelets; peduncles extending (0.3-) 1-6.5 cm beyond the shetahs of the flag leaves.
  2 Pedicels 1.6-3.5 mm long; spikelets ovate, 1.1.4 mm wide; culm internodes 2-10 mm long; blades ascending..... ***Z. japonica***
  2 Pedicels 0.6-1.6 mm long; spikelets lanceolate, 0.6-1.0 mm wide; culm internodes 5-40 mm long, all plants with at least some internodes > 14 mm long; blades spreading at nearly 90 degree angles..... ***Z. matrella***

* ***Zoysia japonica*** Steudel, Japanese Lawngrass, Korean Lawngrass, Zoysia. Used as a lawngrass, persisting or spreading; native of Japan. Reported for VA (Kartesz 1999). [= C, FNA, HC, K]
* ***Zoysia matrella*** (Linnaeus) Merrill, Zoysia, Manila Temple-grass. Used as a lawngrass, persisting or spreading; native of the Philippines. [= FNA, HC, K; = *Z. matrella* var. *matrella* – K]
* ***Zoysia pacifica*** (Goudswaard) M. Hotta & Kuroki, Mascarene-grass, Korean Velvetgrass. Used as a lawngrass, persisting or spreading; native of e. Asia. [= FNA; ? *Z. tenuifolia* Willdenow – HC; > *Z. tenuifolia* Willdenow – K; > *Z. matrella* var. *pacifica* Goudswaard – K]



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