

**FIELD AND RESTORATION
GUIDE TO COMMON
NATIVE WARM-SEASON GRASSES
OF THE
LONGLEAF PINE ECOSYSTEM**



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**JOSEPH W. JONES ECOLOGICAL
RESEARCH CENTER AT ICHAUWAY**

IN PARTNERSHIP WITH:



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NATIVE WARM-SEASON GRASSES
OF THE
LONGLeAF PINE ECOSYSTEM**

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Nomenclature is consistent with Wunderlin and Hansen's *Guide to the Vascular Plants of Florida*, second edition (2003).

MISSION STATEMENT

The Joseph W. Jones Ecological Research Center at Ichauway seeks to understand, to demonstrate, and to promote excellence in natural resource management and conservation on the landscape of the southeastern Coastal Plain of the United States.

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INTRODUCTION

WHAT IS A NATIVE WARM-SEASON GRASS?

Native warm-season grasses (NWSG) are a group of grasses that are indigenous to a particular geographical region and exhibit active growth during the warm spring and summer months of the year.

Warm-season grasses are also referred to as C4 grasses because of their chemical pathway for photosynthesis. These grasses fix energy into 4-carbon units resulting in a higher photosynthetic potential compared to cool-season or C3 grasses. C4 grasses have an advantage over C3 grasses because they can withstand harsh environmental conditions such as drought, high temperatures, and carbon dioxide and nitrogen limitations. During drought conditions, C4 grasses can minimize water loss, while greater than 95% of the water taken up by C3 grasses can be lost through transpiration. The adaptations of C4 grasses allow them to thrive in hot, dry conditions such as summers in the Coastal Plain of the southeastern United States. Warm-season grasses maximize growth when daily temperatures reach 60 °F and soil temperatures reach 55 °F. Optimum temperature range for seed production is 85-95 °F. Warm-season grasses remain dormant during late fall and winter and should be seeded or planted March through May in the Southeast for successful establishment. Seeds will germinate when soil temperatures reach 50-55 °F.

Numerous species of warm-season grasses are common in the longleaf pine ecosystem. Many of these grasses are valuable to wildlife for cover and forage and are an important source of fine fuel for prescribed burning.

WHY CHOOSE LOCAL ECOTYPES?

Native plants become genetically adapted to local environmental conditions such as temperature, soils, precipitation, elevation, and drainage. Therefore, greater success in plant establishment occurs when the environmental conditions of the source site of the seed material matches the planting site. Plant material that is native to a particular geographical region is called a local ecotype.

RESTORATION

CONSERVATION RESERVE PROGRAM: LONGLEAF PINE INITIATIVE

The longleaf pine ecosystem was once the dominant forest type of the southeastern Coastal Plain. However, due to the vast destruction of this ecosystem, only 3% of its original extent remains. The diverse flora and fauna associated with longleaf pine communities has raised awareness about the importance of restoring this ecosystem.

In 2006, the Conservation Reserve Program (CRP): Longleaf Pine Initiative was unveiled by USDA's Farm Service Agency. The initiative is designed to promote wildlife habitat through reforesting up to 250,000 acres of longleaf pine forests in nine southern states including Alabama, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Texas, and Virginia. CRP is a voluntary program that provides financial subsidies to landowners to plant longleaf pine trees in former agricultural fields.

The newest component of the CRP -CP36 is the requirement to establish native groundcover, particularly NWSG. The native grass portion of the program consists of seeding grasses (such as big bluestem, little bluestem, indiagrass, and wiregrass) that will benefit wildlife and be useful as a fine fuel source for prescribed burning. Planting native grasses may also decrease the risk of invasion by non-native plant species.

NATIVE GROUNDCOVER RESTORATION

Increased landowner participation in CRP has led to greater interest in restoration of native groundcover species associated with the longleaf pine ecosystem. In particular, NWSG are important for proper functioning of the longleaf pine ecosystem because they act as a fine fuel source for prescribed fire, provide food and cover for northern bobwhite quail and other wildlife, and are important contributors to the biodiversity of this system.

Within the last few years, there have been efforts to increase commercial availability of NWSG associated with the longleaf pine ecosystem in the Southeast. Refinement of seed cleaning techniques to remove inert materials such as stems, leaves, awns, husks of seeds, and non-viable seeds without compromising quality or loss of seed has resulted in production of clean viable seed. High quality, viable seed is important for determining appropriate quantities for seed mixes and will result in more successful planting efforts.

NATIVE SEED PRODUCTION

Native seed companies in the southeastern United States have begun large-scale production planting of native groundcover species, such as native warm-season grasses, to provide a source of seeds and seedlings for restoration efforts in the Southeast. These companies are committed to producing pure native seed and recognize the importance of providing local ecotype seed to landowners that are participating in programs such as the CRP Longleaf Pine Initiative and other restoration efforts.



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Lopsided indianguass (*Sorghastrum secundum*) (photos above) and pineywoods dropseed (*Sporobolus junceus*) (photo below) planted in a production setting at Lolly Creek Ecological Land Management and Restoration in Sumner, Georgia.



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HARVESTING TECHNIQUES

HAND HARVESTING

For most species, collecting seed from the wild will likely require harvesting by hand because plants in natural forests or old fields are typically distributed in a clumped manner, thus harvesting mechanically would be inefficient. However, species such as wiregrass (*Aristida stricta*) in the longleaf pine ecosystem can be wild harvested with equipment if it is the dominant groundcover species.

In a production setting, most species can be harvested mechanically; however, for some species such as plumegrass (*Saccharum spp.*), harvesting seed by hand may be the only feasible option. Some species can be stripped by hand while it may be necessary to harvest the entire plant for other species and then send it through a stationary thrasher.

SEED STRIPPER

Seed of many species of grasses can be harvested using a pull-type tractor or ATV mounted grass seed stripper. It can be used in the longleaf pine forest to harvest wiregrass and other native grasses but can also be used for row crops. Seed strippers are composed of large rotating brushes and a vacuum system that gently strips seed from the stalk and transfers it to a collecting bin. This harvesting method strips only mature seeds from the stalks. Harvesting on low humidity days allows seeds to be stripped from stalks easily.



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CONVENTIONAL COMBINE

Combines are designed to harvest seed on a large production scale by cutting the seedhead from the stalk, separating the seed from the stems and other debris, and sending the seed to a storage bin. In general, seedheads are cut from stalks by a cutter bar and a revolving reel causes cut stems and seedheads to fall into the auger. The auger moves the seedheads to a thresher where seeds are separated from stems and other debris and moved to a storage bin, while the stems, debris and light seeds are discarded from the machine. Various styles and sizes of conventional combines are available.



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Note: It is important to thoroughly clean harvesting equipment between each species harvested to avoid seed contamination.

SEED DRYING AND STORAGE

Immediately following harvest, seeds must be spread out in a thin layer on mesh drying racks or in drying bins to air dry for 2-7 days or even longer depending on moisture content of the seed. Drying bins should be constructed to include an air circulation system that helps to speed the drying process. If heat is used during the drying process, temperatures should not exceed 104 °F because excessive heat can destroy seeds.

Dried and cleaned seed should be stored in temperature and humidity controlled conditions. Ideal storage temperatures are 45-55 °F and humidity should be 45-55%. Carefully monitored walk-in coolers or refrigerators work well for seed storage. Shelf life will vary depending on the species and is unknown for many native species at this point. However, if seed is stored in controlled conditions, most will lose only a small percentage of viability over a 3-4 year period. Stored seed should be guarded against rodents and insects.



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Seed on a mesh rack in a drying bin (photo above, left). Air circulation system attached to the drying bin (photo above, right) allows air to flow from the bottom of the bin upward through the mesh rack.

SEED CLEANING PROCESS

Recent improvements in native seed processing have allowed for greater success in removing the majority of extraneous materials such as stems, leaves, awns, and other debris as well as allowing the removal of any weedy or undesirable seeds. This has resulted in higher quality seed that can be efficiently and uniformly planted with seeding equipment. The general seed cleaning process involves several steps that are outlined below but each step must be modified for the specific characteristics of the seed in terms of size, shape, weight, and appendages.

1. Seeds first travel through a hopper that regulates the flow of the seed causing it to be fed consistently to the next step of the cleaning process.
2. Seeds then undergo a pre-cleaning treatment consisting of a scalper that removes large stems, leaves, and other debris. The seeds and debris are first separated by a blast of air and then the seeds are moved over a series of screens with graduated mesh size that remove material larger than the desired seed. The screens vibrate mechanically allowing seed to fall through the holes.
3. Pre-cleaned seed next moves to a debarker stage to remove awns or other appendages. Debarking consists of exposing seeds to a series of rotating and stationary arms that vigorously rubs the seeds against one another. Care must be taken in this step not to damage the seed with excessive speed.
4. Air-screen separators, a combination of air, gravity, and screens, are then used to separate seed based on size and shape. Screen sizes range from 1/25 of an inch to 1 inch and are made in a variety of shapes (holes, slots, and triangles).
5. A gravity separator finally separates seed and other small materials according to specific gravity. Gravity separators use a vibrating deck that can be tilted in two directions and then moves air through the deck to separate the seed and move them into different bins. The lightest and heaviest seeds are typically considered trash and are removed from the batch. This step greatly improves the purity of the seed.

SEED VIABILITY TESTING

Tetrazolium (TZ) tests are performed on seeds to determine an estimate of total viability for seeds when germination tests are not performed or to determine viability of seeds that did not germinate during a germination test. TZ solution is composed of water and 2, 3, 5-triphenyl tetrazolium chloride. The TZ staining reaction occurs within living, respiring tissue such as the embryo of the seed. A reddish compound known as formazan is formed when the TZ solution penetrates the living tissue of the seed and hydrogen ions released by respiration enzymes react with the 2, 3, 5-triphenyl tetrazolium chloride.

Seed viability testing is available through commercial laboratories and some state agencies.

CALCULATING PURE LIVE SEED

Pure live seed (PLS) is an industry standard used to protect the consumer and it refers to the amount of live (viable) seed in a batch of bulk seed. To calculate PLS you need to know the germination rate and purity of the seed. Seeding rates should be adjusted based on the % PLS to ensure that enough seed is being sown. The following equation can be used to calculate PLS:

$$\text{PLS \%} = (\text{Purity \%} \times \text{Germination \%}) / 100$$
$$\text{lbs. of bulk seed needed} = \text{seeding rate} / \text{PLS \%} / 100$$

SEEDING EQUIPMENT CALIBRATION

Calibrating a seeder requires knowledge of the amount of seed used, distance traveled, and width of the seeder. Steps necessary to calibrate equipment include:

1. Place bags over the seed outlets and collect seed in bags during the collection run. Weigh collected seed (lbs.)
2. Determine soil area covered by driving the planter a measured distance (minimum of 350 ft) and measuring the width of the planter (ft.)
3. Seeding rate can then be determined by the following equation:

$$\text{lbs. seed/acre} = [43,560 / [\text{distance(ft.)} \times \text{width of planter (ft.)}]] \times \text{weight of collected seed (lbs.)}$$

Multiply: lbs. seed/acre by % PLS to get the actual lbs. seed/acre

Note: 43,560 = number of square feet in 1 acre

SITE PREPARATION AND GENERAL PLANTING GUIDELINES

Prior to seeding an area, site preparation is often necessary to control existing weeds and eliminate weed seeds in the soil seed bank. It is recommended that sites are treated with pre- and/or post-emergent herbicides for up to one year prior to planting to eliminate as many weeds as possible before seeding an area with native species. In particular, bermudagrass (*Cynodon dactylon*) and bahiagrass (*Paspalum notatum*) have posed serious problems with establishment and growth of NWSG and it is essential to control these grasses on sites prior to planting. Pre-treating sites with glyphosate or imazapyr in spring (late February to mid-April) and again in late summer or early fall has resulted in control of undesirable grasses through the first growing season. Sites infested with bermudagrass must be treated with herbicide for two growing seasons for complete control prior to planting NWSG.

NWSG should be planted February through May in the Southeast for successful establishment. Planting in early spring allows seedlings to establish root systems so they are better able to withstand hot, dry summer days and effectively compete with weeds. Seeding depth is critical for establishment of NWSG and depends largely on soil type. Seeds should be planted ¼-½ inch deep on a firm seedbed (loamy soils), but may require a planting depth of less than ¼ inch in sandy soils. Seeding rates are based on the amount of pure live seed (PLS) per acre and depend of the planting objectives. Seeding rates provided in this guide are used for conservation programs such as CRP and are provided for single species plantings. If planting seed in a mix, rates must be adjusted. Additionally, rates will be higher if planting objectives include planting for seed production or wildlife food and cover. The NWSG component of the CRP-CP36 recommends planting a mix of grasses including big bluestem (*Andropogon gerardii*), yellow indiagrass (*Sorghastrum nutans*), and little bluestem (*Schizachyrium scoparium*). Wiregrass (*Aristida stricta*) can be substituted for indiagrass or big bluestem. It is important to note that stands planted with NWSG typically take two years to become established and display noticeable aboveground growth.

Competition with weeds can be reduced following seeding and establishment by carefully applying selective herbicides. Mowing is an option (to a height of 8-10 inches) after NWSG have been established to reduce competition and prevent weedy species from producing and setting seed. During the second year after establishment, a spring burn may be used for weed control provided there is enough plant material present to carry a fire.

SEEDING EQUIPMENT

NO-TILL DRILL

Grasses can be planted with a tractor mounted no-till drill containing a specialized seed box with agitators and picker wheels, designed to keep fluffy seed from compacting and sticking together. No-till drills use coulters and openers to create a furrow for seeds to be placed. Seeds are then sown into the furrows and covered with soil by press wheels insuring proper seed to soil contact. Various drill widths (3, 5, 8, 10, 12, 15, 20, and 30 feet) are available to meet a variety of planting needs and seeding depth should be adjusted according to soil conditions (See p. 9)



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GRASSLANDER

The Grasslander™ is a specialized seeder designed with two boxes to handle light, fluffy seed such as non-debearded bluestem (*Andropogon* spp.) and wiregrass (*Aristida* spp.) and heavier seed such as switchgrass (*Panicum virgatum*) and legumes. This type of equipment has disks that scarify the soil and an agitator in the hopper that forces seed down through pvc pipes and drops them on the soil surface. Rubber tire casings then roll over the planted area to insure good seed to soil contact.



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BROADCAST SEEDERS

NWSG can also be planted using a broadcast seeding method. Broadcast seeding involves uniformly sowing seed over a large area mechanically or by hand. Broadcast seeders are composed of a hopper that contains the seed and a spinning disk with 3 or 4 fins. Seed drops from the hopper and is spread onto the field by the spinning disk.

Prepare a firm seedbed prior to planting using conventional tilling methods and then cultipack following broadcast seeding.



© Johnny's Selective Seeds



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TIPS FOR SUCCESSFUL SEEDING AND ESTABLISHMENT

1. Seeds containing awns and hairy appendages, such as bluestem species, must be planted with equipment such as a Grasslander™ seeder or no-till drill containing a specialized seed box to accommodate light, fluffy seed to ensure that the seed mix will be properly mixed and seeded at a precise rate. However, debarbed and cleaned seed can be mixed with heavier seed in the same box and planted with a conventional grain drill.
2. Do not plant seeds too deep (See pg. 9). Seeds planted too deep are unable to penetrate through the soil and will not germinate. Seeding depth should be checked frequently during the seeding process to ensure that seeds are not being planted too deep.
3. Be sure to plant in early spring to avoid establishment failures due to hot, dry weather and competition from weedy species. Optimal seeding times will vary by region.

PARTS OF A GRASS PLANT

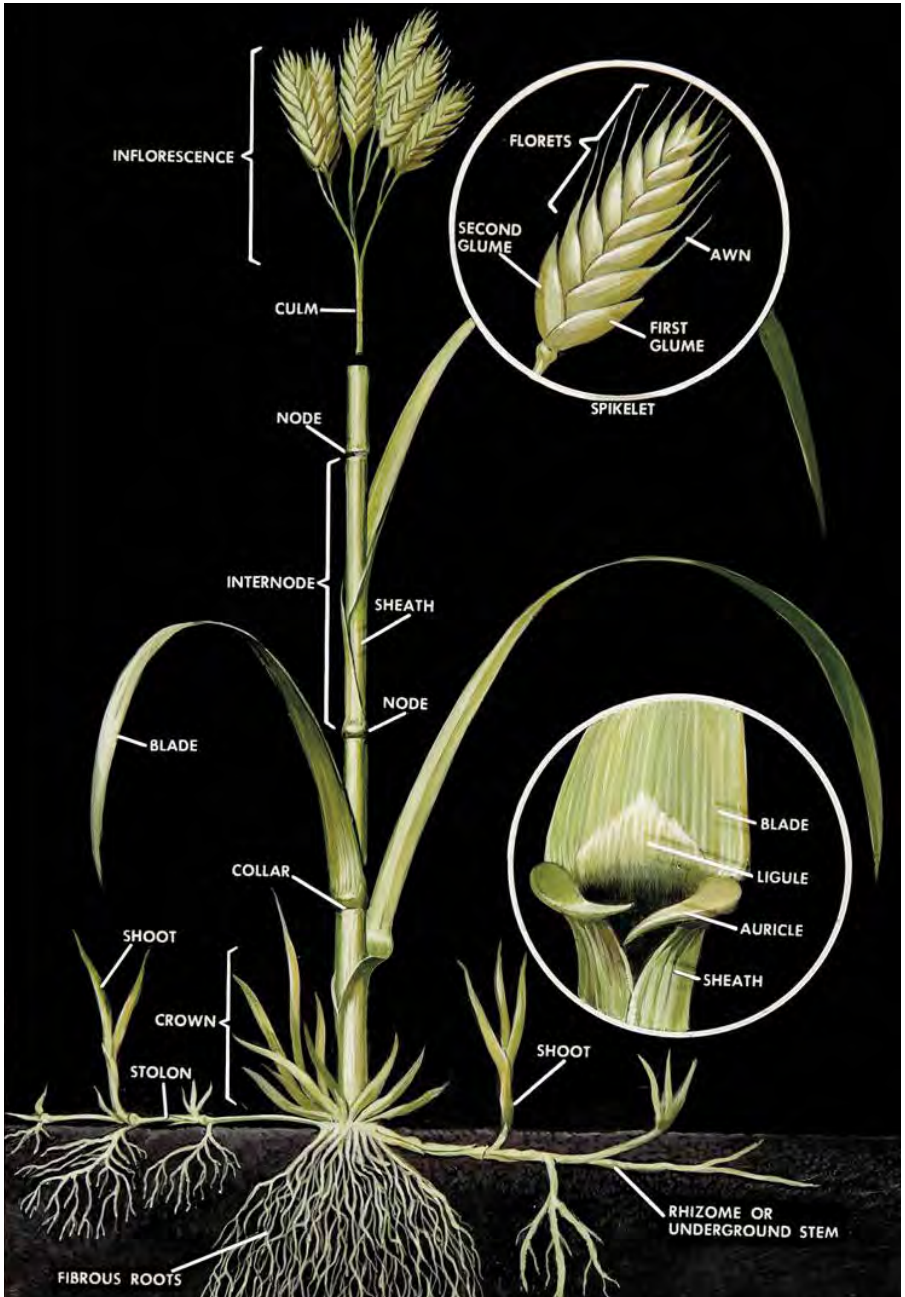


Image Source: © Fort Hays State University

PARTS OF A GRASS PLANT



Photo of a floret; part of the inflorescence where the seed is contained (above, left) and seed with outer covering (husk) removed (above, right).

TERMINOLOGY

Auricle - small, ear-shaped appendage

Awn - a narrow, bristlelike appendage

Blade - the thin and typically flat part of a leaf

Collar - area on the outside of a grass leaf at the juncture of the leaf blade and sheath

Crown - the persistent base of a herbaceous perennial plant

Culm - a hollow or pithy stalk or stem

Floret - an individual flower within a dense cluster of flowers

Glume - one of the paired bracts at the base of a grass spikelet

Husk - the tough outer covering found on some seeds and fruits

Inflorescence - the flowering portion of a plant

Internode - the portion of the stem occurring between two nodes

Ligule - a thin outgrowth at the junction of the leaf and stem, observed in many grasses

Node - the place on a stem where leaves or branches originate

Rhizome - a horizontal underground stem forming roots at the nodes

Seed - the grain or ripened ovule of a plant

Sheath - the part of an appendage that at least partially surrounds another appendage

Shoot - young stem or branch

Spikelet - small spike or secondary spike; the flower cluster of grasses and sedges

Stolon - elongated, horizontal stem that creeps along the ground (above-ground), rooting at the nodes or tip and sprouting a new plant

SPECIES ACCOUNTS

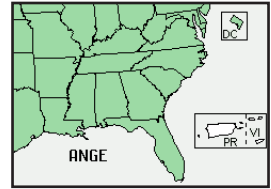
NATIVE SPECIES

BIG BLUESTEM

Andropogon gerardii Vitman

SPECIES DESCRIPTION

Tufted, perennial bunchgrass with scaly rhizomes. Plants often glaucous, growing 4-8 feet tall. Lower leaf sheaths and blades sometimes bearing long, soft hairs. Blades flat, elongate, ½-2 feet long and ½ inch wide or less, margins scabrous. Inflorescence consists of 2-6 racemes, generally 3 racemes resembling a turkey foot. Racemes 2-5 inches long. Seeds oblong, less than ¼ inch long.



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HABITAT AND RANGE

Common in prairies, hillside bogs, pine savannas, and flatwoods. Grows well on moist, sandy and clay loam soils, but also occurs on low fertility soils. Frequently planted for ornamental purposes and erosion control. Ranges from ME to FL and west to MT.

RECOGNITION DIFFICULTIES

Vegetatively similar to broomsedge but larger and very different when in flower. The inflorescence of big bluestem typically consists of 3 brownish racemes that resemble a turkey foot, while the inflorescence of broomsedge consists of 2-4 racemes that appear white in color due to the silky hairs attached to seed husks.



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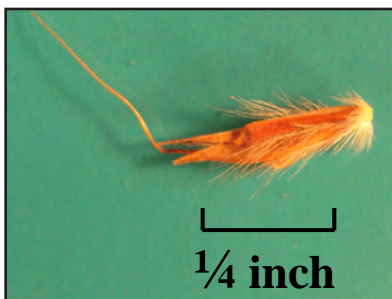
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BENEFIT TO WILDLIFE

Provides good cover and nesting sites for birds and small mammals in summer and winter. Seeds are consumed by gamebirds and songbirds. White-tailed deer graze on the foliage.

SEED PRODUCTION

Flowers from late June to late October. Seed matures in late September to late October.

HARVESTING TECHNIQUES

Harvest early in the season with a conventional combine before plants start to dry out. Use a seed stripper just before shattering occurs.

PLANTING RECOMMENDATIONS

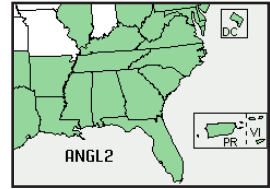
Recommended seeding rate is 6-8 lbs. of pure live seed per acre at a depth of 1/4-1/2 inch. Emergence usually occurs 4 weeks after direct sowing under favorable conditions. Seedlings established in the greenhouse can be outplanted in early spring to late October.



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BUSHY BLUESTEM

Andropogon glomeratus (Walt.) B.S.P.



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SPECIES DESCRIPTION

Perennial bunchgrass, grows to 7 feet tall. Stem stout, slightly flattened at base, leaves $\frac{1}{2}$ - $3\frac{1}{2}$ inches long and $\frac{1}{3}$ inch wide or less.

Inflorescence dense, fan-shaped clusters composed of paired silky racemes.

Seeds less than $\frac{1}{4}$ inch long with a straight awn, $\frac{1}{2}$ - $\frac{3}{4}$ inch long.

HABITAT AND RANGE

Grows on low wet sites, such as open pinelands, roadside ditches, and marsh borders, particularly on more clayey soils due to its low drought tolerance. Native to and found mainly in the southeastern U.S., but also occurs in all eastern states. Ranges from CA to FL, north to MA, and west to WI.

RECOGNITION DIFFICULTIES

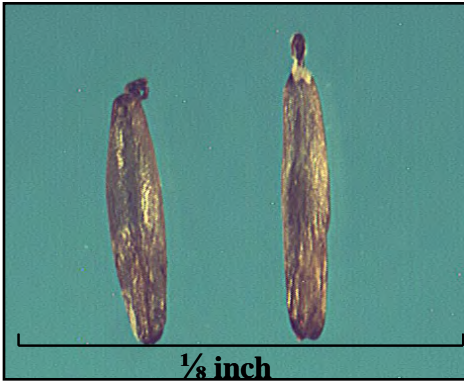
Similar to broomsedge, but the inflorescence of bushy bluestem is distinctly bushy and branched. Leaf blades of broomsedge are 10-16 inches long with smooth leaf sheaths, while blades of bushy bluestem are $\frac{1}{2}$ - $3\frac{1}{2}$ feet long with generally rough leaf sheaths.



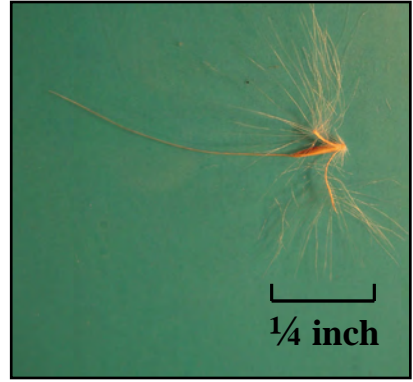
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BENEFIT TO WILDLIFE

Browsed by white-tailed deer and rabbits. Seeds consumed sparingly by northern bobwhite quail and seed-eating songbirds.

SEED PRODUCTION

Flowers in late summer and seed matures in November through early December in the Coastal Plain.

HARVESTING TECHNIQUES

Mature seed can be collected for several weeks. Harvest seed during the warmest and driest time of day with a seed stripper.

PLANTING RECOMMENDATIONS

Plant in late winter or early spring. Seed at a rate of 1-2 lbs. pure live seed per acre at a depth of $\frac{1}{4}$ - $\frac{3}{4}$ inches.



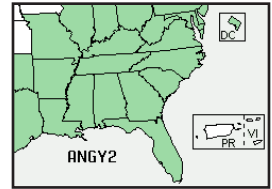
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ELLIOTT'S BLUESTEM

Andropogon gyrans Ashe

SPECIES DESCRIPTION

Perennial bunchgrass, growing 1-3 feet tall. Base slightly flattened with scattered hairs. Leaves to 1½ feet long and less than ¼ inch wide. Inflorescence composed of tufted spikes in a paired terminal cluster. Spike 1-2 inches long, enclosed within a leaf-like bract, 3-6 inches long. Seed to ¼ inch long with a hair-like awn.



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HABITAT AND RANGE

Occurs on sites with broomsedge including grasslands, pastures, and open forests. Ranges from TX to FL, north to NJ, and west to IL and MO.

RECOGNITION DIFFICULTIES

Elliott's bluestem is similar to broomsedge, however, Elliott's bluestem is distinguished by the large leaf-like bract (3-6 inches long) that encloses the inflorescence. The inflorescence of broomsedge partially extends from a small bract that is 2 inches long or less.



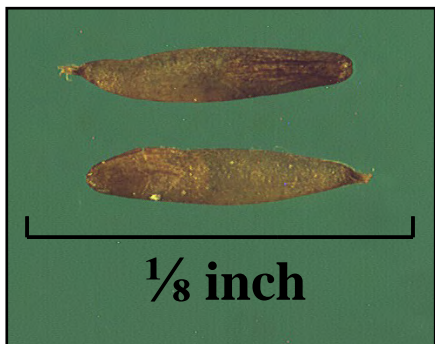
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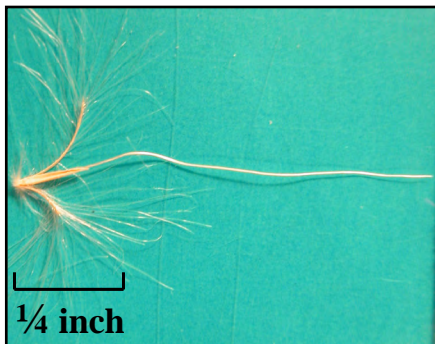
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BENEFIT TO WILDLIFE

Seeds consumed by seed-eating songbirds and northern bobwhite quail. Provides good habitat for nesting northern bobwhite quail and cover for many species of wildlife.

SEED PRODUCTION

Flowers from September to early October in the Coastal Plain. Seed matures in November.

HARVESTING TECHNIQUES

Harvest during warm, low humidity time of day. Can harvest with a seed stripper when the seed is easily hand stripped from stalks.

PLANTING RECOMMENDATIONS

Seed in late winter in the southeastern United States. Seed to a depth of 1/4-3/4 inch at a rate of 1 3/4-3 lbs. of pure live seed per acre.

SPLITBEARD BLUESTEM

Andropogon ternarius Michx.

SPECIES DESCRIPTION

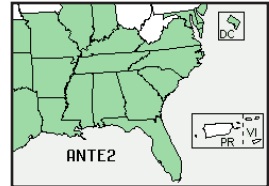
Perennial bunchgrass, grows 2½-3¼ feet tall. Slightly flattened or not flattened at the base. Leaf blades 12-20 inches long and ⅛-¼ inch wide. Inflorescence a paired raceme with silvery-white hairs, 1½ inches long or less on long stalks. Inflorescence stalks up to 3 inches long. Spikelets ¼-⅓ inch long with twisted awns, ½-1 inch in length. Seeds reddish-brown, ⅛ inch long and less than ⅛ inch wide.

HABITAT AND RANGE

Adapted to dry, sandy soils. Ranges from TX to FL, north to DE, and west to KS.

RECOGNITION DIFFICULTIES

Similar to broomsedge and Tracy's blue-stem, but inflorescence stalks of splitbeard bluestem are longer, with 1 or more stalks 2 or more inches long at maturity, while inflorescence stalks of broomsedge are ¼ inch long or less and those of Tracy's blue-stem are ½-1 inch long.



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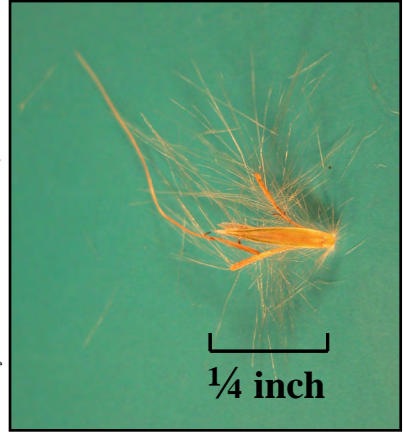


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BENEFIT TO WILDLIFE

Provides cover and forage for wildlife, particularly good as nesting sites for northern bobwhite quail. Seed consumed occasionally by seed-eating songbirds and northern bobwhite quail.

SEED PRODUCTION

Flowers from August to November in the Coastal Plain. Seed matures in November. Collection window is approximately 2 to 4 weeks.

HARVESTING TECHNIQUES

Harvest during warm, low humidity time of day. Can harvest with a seed stripper when the seed is easily hand stripped from stalks.

PLANTING RECOMMENDATIONS

Seed 1/4 inch deep or less. Recommended seeding rate is 4½-6½ lbs. pure live seed per acre.



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TRACY'S BLUESTEM

Andropogon tracyi Nash

SPECIES DESCRIPTION

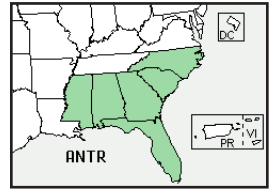
Perennial bunchgrass, grows 1½-4 feet tall. Leaf blades rough, 4-12 inches long and less than ⅛ inch wide. Inflorescence composed of paired racemes, 1-1½ inches long. Inflorescence stalks ½-1 inch long.

HABITAT AND RANGE

Occurs on sandhills, sandy pinelands, and scrublands in the southeastern United States. Occurs from FL, west to MS, and north to NC.

RECOGNITION DIFFICULTIES

Tracy's bluestem resembles broomsedge but Tracy's bluestem has an overall more slender appearance. The leaf blades of Tracy's bluestem are shorter (4-9 inches long), compared to the leaf blades of broomsedge (10-16 inches long). Tracy's bluestem is also similar to splitbeard bluestem but the latter has longer inflorescence stalks (up to 3 inches long) compared to the inflorescence stalks of the former (½-1 inch long).



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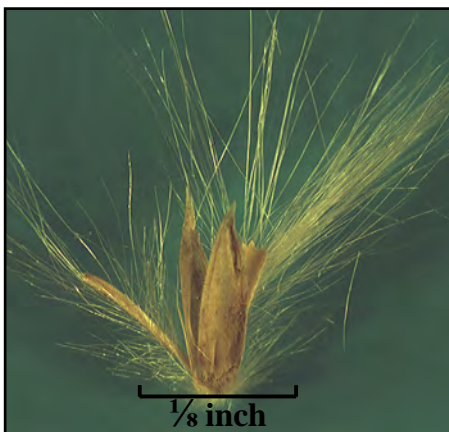
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BENEFIT TO WILDLIFE

Provides food and cover for many species of wildlife. Seed consumed occasionally by seed-eating songbirds and northern bobwhite quail.

SEED PRODUCTION

Flowers from August to November in the Coastal Plain. Seed matures in November.

HARVESTING TECHNIQUES

Harvest during warm, low humidity time of day. Harvest with a seed stripper when the seed is easily hand stripped from stalks.

PLANTING RECOMMENDATIONS

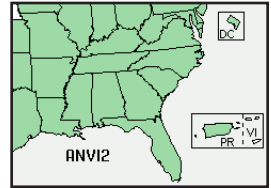
Seed at a rate of 1 $\frac{3}{4}$ -3 lbs. of pure live seed per acre.

BROOMSEDGE BLUESTEM

Andropogon virginicus L.

SPECIES DESCRIPTION

Perennial bunchgrass, grows to 4 feet tall. Leaf sheaths smooth, flattened and overlapping at the base. Leaf blades 10-16 inches long and 1/8-1/4 inch wide, often densely hairy. Inflorescence composed of 2-4 racemes, 1 inch long. Seeds less than 1/8 inch in length and width.



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HABITAT AND RANGE

Grows in a wide variety of open habitats including grasslands, pastures, and open forests. Also common along roads and railroad tracks. Grows well on sandy, low-fertility soils. Ranges from TX to FL, north to ME, and west to ND.

RECOGNITION DIFFICULTIES

Similar to several other bluestem species in the vegetative stage, but most similar to splitbeard bluestem when in flower. Broomsedge can be differentiated from splitbeard bluestem by the inflorescence stalk length. At maturity, inflorescence stalks of broomsedge are shorter (1/4 inch or less) compared to splitbeard bluestem which has 1 or more inflorescence stalks that are 2 or more inches long.



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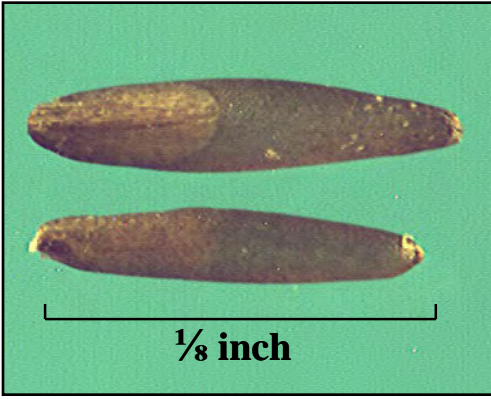


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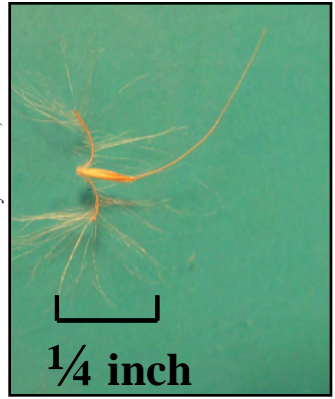


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BENEFIT TO WILDLIFE

Provides cover and nesting sites for birds, especially northern bobwhite quail. Seeds consumed by several species of birds and small mammals in winter when seeds of other plants are not available.

SEED PRODUCTION

Flowers from late September to early October in the Coastal Plain. Seeds mature early November to mid-December.

HARVESTING TECHNIQUES

Collection window lasts for several weeks. Seed can be harvested with a seed stripper.

PLANTING RECOMMENDATIONS

Optimal seeding time is late winter in the southeastern United States or when average daily temperatures are around 60 °F. Seeds should be planted to a depth of 1/4-3/4 inch at a rate of 4-5 lbs. of pure live seed per acre.



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ARROWFEATHER THREEAWN

Aristida purpurascens Poir.

SPECIES DESCRIPTION

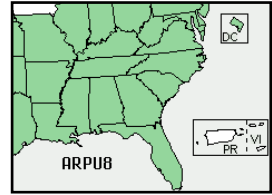
Tufted perennial bunchgrass, grows 1½-3 feet tall. Long, thin leaves 6-12 inches long and less than ⅛ inch wide, curling with age and forming ringlets. Inflorescence a light brown, spike-like panicle, 6-16 inches long. Seed ⅛-¼ inch long with 3 straight awns, ½-¾ inch long.

HABITAT AND RANGE

Abundant on dry sandy sites in open forests and along forest edges. Prefers moderate shade. Ranges from TX to FL, north to MA, and west to MO.

RECOGNITION DIFFICULTIES

Arrowfeather threeawn can be easily confused with wiregrass, but the latter has thinner, more wiry leaf blades and a distinctive white tuft of hair at the base of the blades.



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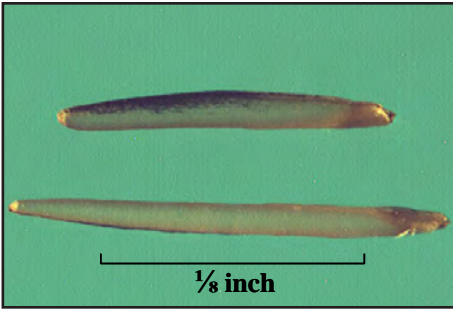
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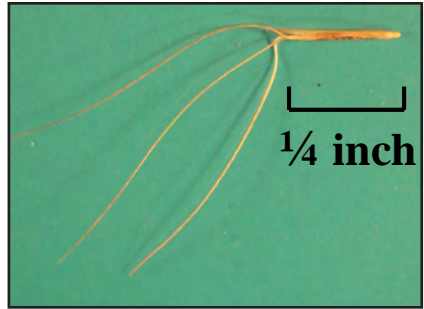
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BENEFIT TO WILDLIFE

Seeds consumed by songbirds.

SEED PRODUCTION

Flowers August to November and seed matures October to January.

HARVESTING TECHNIQUES

Harvesting on low humidity days allows awns to open, exposing the seed and making it easier to strip from the stalk. Can be harvested with a seed stripper or a conventional combine. Seed collection window lasts for several weeks.

PLANTING RECOMMENDATIONS

Optimal seeding rate is 2-3½ lbs. pure live seed per acre or ¼-1 lb. pure live seed per acre if seed is debarbed and hulled.



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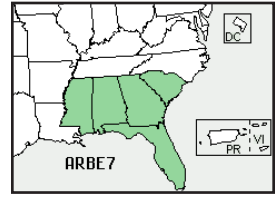
WIREGRASS, PINELAND THREEAWN

Aristida stricta Michx.

SPECIES DESCRIPTION

Densely-tufted, perennial bunchgrass. Leaves with a small dense tuft of white hair near the base. Leaves wire-like and unbranched, 4-18 inches long and less than 1/8 inch wide, margins rolled inward.

Inflorescence a spike-like panicle, 6-16 inches long. Seeds 1/4 inch long or less and less than 1/8 inch wide, with 3 hair-like awns. Awns 1/2-3/4 inch long.



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HABITAT AND RANGE

Historically the dominant grass of frequently burned longleaf pine savannas and slash pine flatwoods. Some sources recognize two species, with *A. stricta* occurring only in SC and NC and *A. beyrichiana* occurring in the Coastal Plain from SC, south to southern FL, and west to MS.

RECOGNITION DIFFICULTIES

Wiregrass can be easily confused with muhly grass and pineywoods dropseed in the vegetative stage, but wiregrass has a distinctive tuft of white hairs at the base of the leaf blades. Muhly grass can also be differentiated from wiregrass by the presence of a ligule that is lacking in the latter.



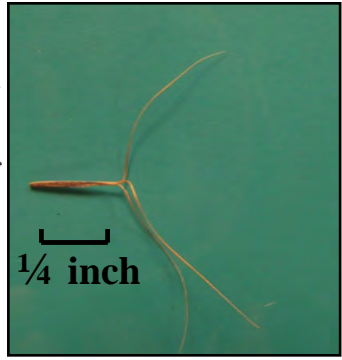
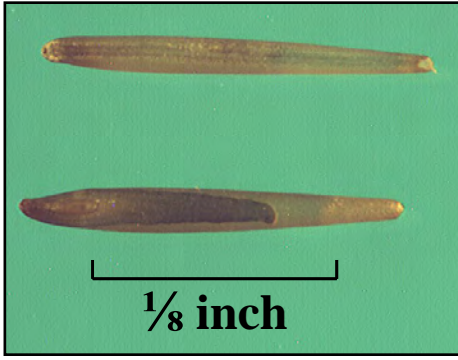
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BENEFIT TO WILDLIFE

Seeds occasionally consumed by songbirds. Provides important nesting sites for northern bobwhite quail. Provides cover for gopher tortoises and they also graze on young vegetative growth.

SEED PRODUCTION

Flowers and produces most viable seed following a late spring or summer burn. Flowers September to November. Seeds can be tested for maturity by “snapping” the seed in half between your thumb and index finger. Seeds are mature when seed snaps firmly in half. Harvest from mid-November to mid-December. Seed viability varies from year to year.

HARVESTING TECHNIQUES

Harvesting on low humidity days allows awns to open, exposing the seed and making it easier to strip from the stalk. Harvest with a seed stripper. Seed collection window lasts for several weeks.

PLANTING RECOMMENDATIONS

Optimal seeding rate is 2-3½ lbs. of pure live seed per acre or ¼-1 lb. of pure live seed per acre if seed is debearded and hulled. Seedling plugs should be planted at a density of 2-3 per square meter.



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GENERAL COMMENTS

Historically, wiregrass was the dominant groundcover in the longleaf pine-wiregrass ecosystem and is considered functionally important as a fine fuel source to carry prescribed fire in this ecosystem. Does not readily re-establish naturally following soil disturbance such as harrowing or cultivation.

TOOTHACHE GRASS

Ctenium aromaticum (Walter) A.W. Wood

SPECIES DESCRIPTION

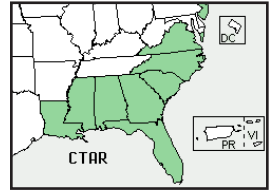
Perennial bunchgrass forming dense clumps, grows 2-3½ feet tall. Leaves darker green on top and lighter green on bottom. Leaves to 18 inches long and ¼-½ inch wide. Inflorescence with spikelets on one side of the rachis resembling a comb, 2-6 inches long. Seeds dark brown, ⅛ inch long.

HABITAT AND RANGE

Grows in wet to moist pine flatwoods, savannas, prairies, and pitcher plant bogs of the southeastern Coastal Plain. Ranges north to NJ, south to FL, and west to LA.

RECOGNITION DIFFICULTIES

Toothache grass resembles Florida dropseed in the vegetative stage but the leaf blades of the latter are paler and bluish and the tips of the leaf blades are blunt rather than sharply pointed compared to the former.



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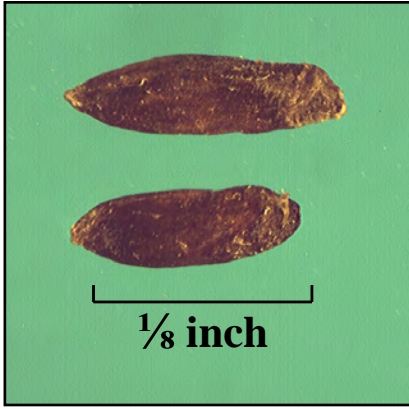
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SEED PRODUCTION

Flowering begins in September and seeds mature October through December in the Coastal Plain. A good seed crop is produced the first growing season following a burn.

HARVESTING TECHNIQUES

Seed collection window is generally two or more weeks. Seed can be harvested with a seed stripper. Seed can also be easily collected by cutting off the entire seedhead by hand.

PLANTING RECOMMENDATIONS

Viability of wild collected seed appears to be low. Recommended seeding rate is 4-6 lbs. of pure live seed per acre.

GENERAL COMMENTS

The roots and base of this grass contain a substance that numbs the tongue and gums when chewed. Fresh leaves and inflorescences are very aromatic (odor resembling citrus) when crushed or bruised.



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MUHLY GRASS

Muhlenbergia capillaris (Lam.) Trin.

SPECIES DESCRIPTION

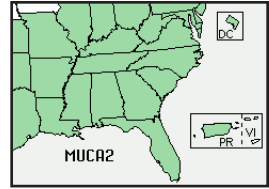
Perennial bunchgrass, growing 2-3½ feet tall. Leaves wiry and unbranched, 4-20 inches long and ¼ inch wide or less. Ligules membranous, less than ¼ inch. Inflorescence a purple, silky panicle, 1-3 feet tall. Spikelets less than ¼ inch in length with awns ¼-½ inch long. Seed less than ⅛ inch long.

HABITAT AND RANGE

Adapted to a range of sites including seeps, marshes, stabilized sand dunes, pine savannas, and flatwoods. Ranges south to FL, north to NY, and west to TX.

RECOGNITION DIFFICULTIES

Muhly grass is easily confused with wiregrass in the vegetative stage but can be differentiated based on the presence of a ligule on muhley grass and absence of the white tuft of hair found at the base of leaf blades of wiregrass.



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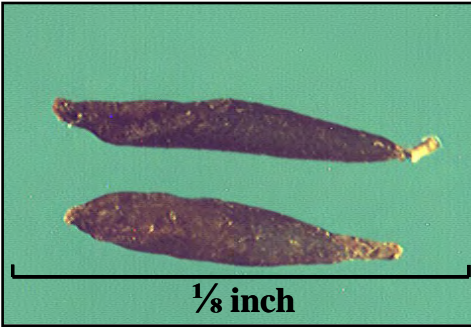
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BENEFIT TO WILDLIFE

Provides cover for wildlife. Seeds consumed by birds during winter months.

SEED PRODUCTION

Flowering begins in August. Seeds mature from October through early November.

HARVESTING TECHNIQUES

Can be harvested with a seed stripper or conventional combine.

PLANTING RECOMMENDATIONS

Seed to a depth of $\frac{1}{8}$ inch. Recommended seeding rate is $\frac{3}{4}$ -1 $\frac{1}{2}$ lbs. of pure live seed per acre.

GENERAL COMMENTS

Fills a role similar to wiregrass in pineland habitats. Important as a fuel source for prescribed burning programs, provides cover for wildlife in the longleaf pine ecosystem, and is attractive when in flower.



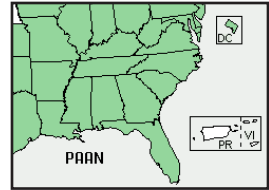
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BEAKED PANICUM

Panicum anceps Michx.

SPECIES DESCRIPTION

Perennial, rhizomatous, clump-forming grass. Rhizomes thick and scaly. Leaves flat, 8-16 inches long and 1/4-1/2 inch wide. Ligule an irregular fringe of hairs less than 1/8 inch long. Inflorescence an open panicle, 4-20 inches long and 3-5 inches wide. Seed dark purple, ellipsoid, less than 1/8 inch long.



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HABITAT AND RANGE

Occurs in open forests, forest openings, and along forest margins. Tolerates a wide range of soil conditions from well-drained sandy soils to very wet soils. Occurs in open or semi-shaded areas, preferring 30-35% shading. Frequent in the Coastal Plain, ranging from TX to FL, north to NJ, and west to KS.

RECOGNITION DIFFICULTIES

Beaked panicum can be confused with switchgrass, however, the former grows only to 3 feet tall while the latter grows 3-6 feet tall. The inflorescence of switchgrass is wider and more open (10 inches) than that of beaked panicum (3-5 inches wide), which is more triangular in shape.



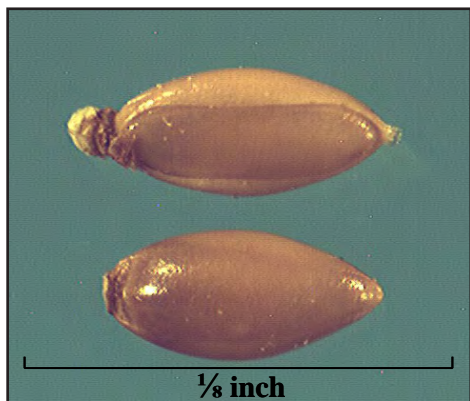
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BENEFIT TO WILDLIFE

Seeds consumed by upland birds and some waterfowl. Deer browse on the foliage of beaked panicum.

SEED PRODUCTION

Flowers July to November and seed matures from August to November. Produces an abundant seed crop.

HARVESTING TECHNIQUES

Harvest seed with a conventional combine before significant shattering occurs.

PLANTING RECOMMENDATIONS

Seeds should be planted in the fall or early winter. Recommended seeding rate is 2-3¼ lbs. of pure live seed per acre.

SWITCHGRASS

Panicum virgatum L.

SPECIES DESCRIPTION

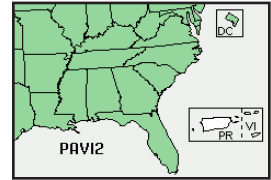
Perennial rhizomatous grass, grows 3-6 feet tall. Stem and leaf sheaths smooth. Leaf blades 6-22 inches long, ¼-½ inch wide, hairy on upper surface. Ligule a fringe of dense hairs, ⅛-¼ inch long. Inflorescence an open, branched panicle, 6-20 inches long and 10 inches wide or less. Flowers have reddish-purple anthers and spikelets occur near the ends of the branches. Seeds ⅛ inch long or less, shiny and smooth.

HABITAT AND RANGE

Grows in a wide range of soil and climatic conditions. Prefers deep sandy loams and wet-mesic to mesic soil conditions. Soil pH range is 4.5-8. Ranges from FL, north to ME, and west to NV.

RECOGNITION DIFFICULTIES

Switchgrass can be easily confused with beaked panicum, however, the inflorescence of switchgrass is wider and more open (10 inches) than that of beaked panicum (3-5 inches wide) which is more triangular in shape.



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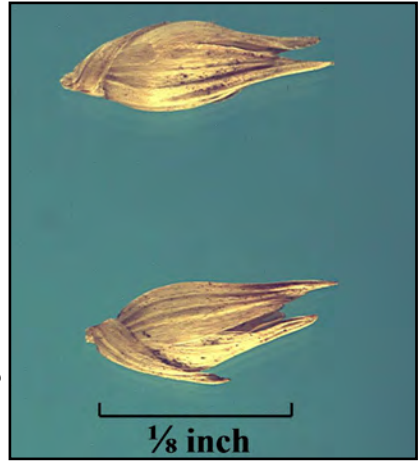


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BENEFIT TO WILDLIFE

Seeds consumed by wild turkeys, northern bobwhite quail, and songbirds. Provides cover for small mammals, rabbits, and northern bobwhite quail.

SEED PRODUCTION

Flowering occurs from late July to early September in the southeastern United States. Seed matures in September and October.

HARVESTING TECHNIQUES

Use a conventional combine to harvest seed before significant shattering occurs.

PLANTING RECOMMENDATIONS

Seed to a depth of 1/4-1/2 inch. Recommended seeding rate is 4-6 lbs. of pure live seed per acre.

GENERAL COMMENTS

Switchgrass is drought tolerant, and has a high tolerance to fire. Switchgrass is also planted for use as a biofuel.



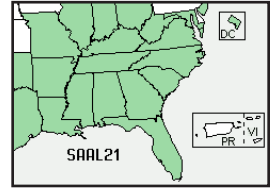
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SILVER PLUMEGRASS

Saccharum alopecuroides (L.) Nutt.

SPECIES DESCRIPTION

Perennial rhizomatous, erect grass, 5-10 feet tall. Stem stout, round, densely hairy just below the panicle. Nodes generally densely hairy and purplish. Ligule a fringed membrane, less than ¼ inch long. Leaf blades to 2½ feet long and ½-1 inch wide, white midvein. Inflorescence a silvery whitish or purplish woolly panicle, 8-12 inches long. Spikelets ½ inch long with flattened and spirally twisted awns. Seeds reddish, ¾ inch long or less.



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HABITAT AND RANGE

Grows in forests, field margins, and open areas. Occurs on dry to moist sites and open to semi-shaded habitats. Ranges from TX to FL, north to NJ, and west to IL and MO.

RECOGNITION DIFFICULTIES

Silver plumegrass is similar to sugarcane plumegrass but can be distinguished by the differences in the awns of the spikelets. The awns of silver plumegrass are flattened and twisted at the base whereas the awns of sugarcane plumegrass are straight or curved at the base, but not twisted.



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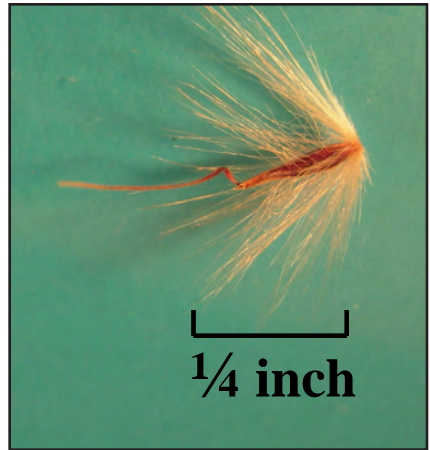
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BENEFIT TO WILDLIFE

Value to wildlife is limited but the seeds are occasionally consumed by song-birds. Provides cover for wildlife.

SEED PRODUCTION

Flowers from September to November and seed matures October to November.

HARVESTING TECHNIQUES

Seed can be hand harvested by cutting the entire seedhead from the culm.



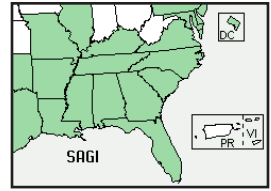
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SUGARCANE PLUMEGRASS

Saccharum giganteum (Walt.) Pers.

SPECIES DESCRIPTION

Tall, perennial bunchgrass, 3-13 feet tall. Leaf blades flat, to 1½ feet long and 1 inch wide, long white hairs near base of blades. Ligule a fringed membrane, ¼ inch or less. Inflorescence a terminal panicle with brown spikelets, ¼ inch wide with straight awns. Seeds reddish, ¾ inch long or less.



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HABITAT AND RANGE

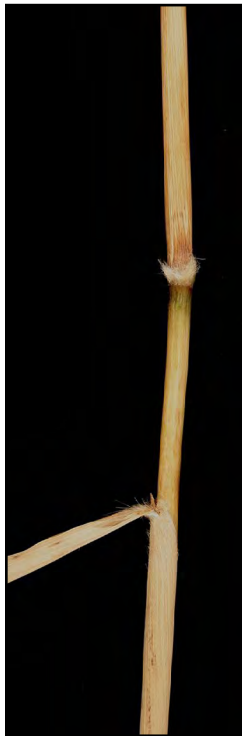
Occurs on mesic to wet sites in open forests and along roadsides. Ranges from FL, north to NY, and west to TX.

RECOGNITION DIFFICULTIES

Sugarcane plumegrass and silver plumegrass are similar but the spikelet awns of the former are straight or curved at the base but not twisted whereas the awns of the latter are flattened and twisted at the base.



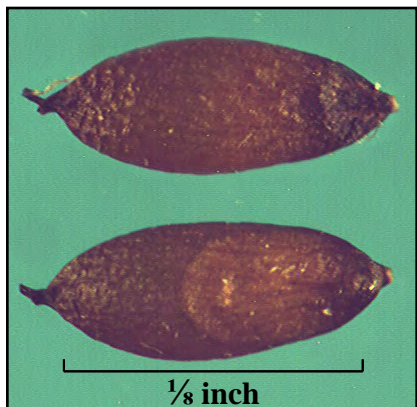
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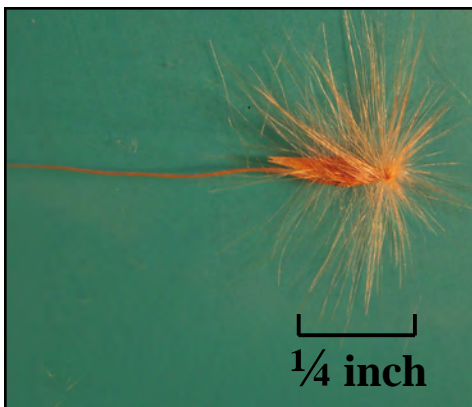
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BENEFIT TO WILDLIFE

Provides little value to wildlife but seeds are occasionally consumed by songbirds. Provides cover for wildlife.

SEED PRODUCTION

Flowers from September to November and seed matures October to November.

HARVESTING TECHNIQUES

Seed can be hand harvested by cutting the entire seedhead from the culm.



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LITTLE BLUESTEM

Schizachyrium scoparium (Michx.) Nash

SPECIES DESCRIPTION

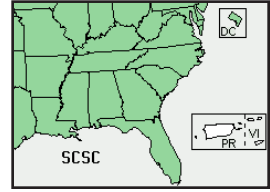
Erect perennial bunchgrass, grows 2-4 feet in height. Leaves light green during spring and summer, turning purplish-red in fall. Leaf blades narrow, up to 14 inches long and ½ inch wide or less. Inflorescence a single raceme 1-3 inches long. Spikelets ¼-½ inch long, twisted awns.

HABITAT AND RANGE

Grows well in old fields, open forests, and prairies. Drought and shade tolerant. Prefers well-drained, moist soils but can tolerate a wide variety of conditions including dry, infertile soil conditions. Little bluestem is one of the most widely distributed grasses in the United States, occurring in all of the contiguous states except NV and OR.

RECOGNITION DIFFICULTIES

Little bluestem is easily mistaken for broomsedge but the former has twisted, bent awns and a single raceme per inflorescence branch, while broomsedge has straight awns and two or more racemes per branch.



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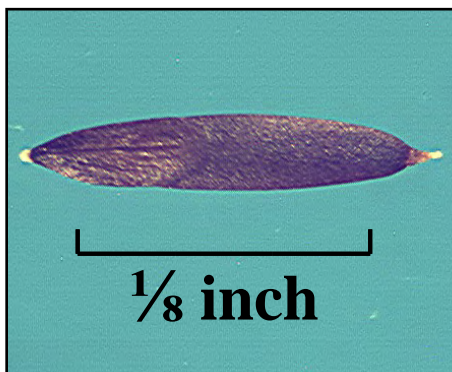
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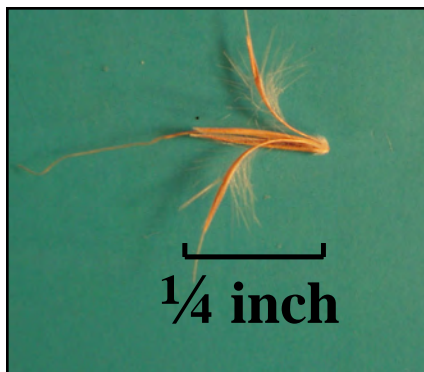
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BENEFIT TO WILDLIFE

Provides cover for birds and small mammals. Seed consumed by songbirds and upland gamebirds.

SEED PRODUCTION

Flowering occurs July to October. Seeds mature from late November to early December. Seeds are released over several weeks.

HARVESTING TECHNIQUES

Harvest early in the season with a conventional combine before plants start to dry out. Use a seed stripper just before shattering occurs.

PLANTING RECOMMENDATIONS

Plant as early in the spring as possible after last freeze. Seed at $\frac{1}{4}$ - $\frac{1}{2}$ inch depth. Recommended seeding rate is 4-6 lbs. pure live seed per acre.



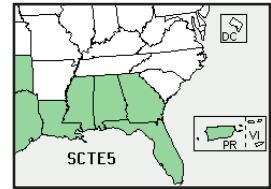
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SLENDER BLUESTEM

Schizachyrium tenerum Nees

SPECIES DESCRIPTION

Perennial bunchgrass, grows 1-3 feet tall. Often found “lying down” on the ground. Wiry, narrow leaf blades 2-10 inches long and less than 1/8 inch wide. Inflorescence a single raceme with paired spikelets. Racemes 1-2½ inches long and spikelets less than 1/2 inch long.



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HABITAT AND RANGE

Prefers open to sparsely wooded areas and grows on sandy, well-drained soils. Ranges from GA and FL, west to TX and OK.

RECOGNITION DIFFICULTIES

Slender bluestem can resemble wiregrass in the vegetative stage due to the wiry leaf blades. However, slender bluestem has several nodes along the length of the leaf blade making it appear “jointed”.



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SLENDER INDIANGRASS

Sorghastrum elliottii (Mohr) Nash

SPECIES DESCRIPTION

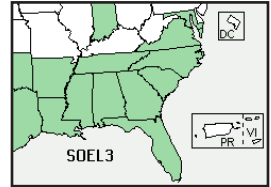
Tall, erect perennial bunchgrass, growing 2-6 feet in height. Leaf blades 8-21 inches long and 1/4-1/2 inch wide. Ligules membranous, 1/4 inch or less. Inflorescence an open, arching panicle, 4-14 inches long. Spikelets 1/4 inch long and less than 1/8 inch wide with long, twisted awns, 1-1 1/2 inches long.

HABITAT AND RANGE

Generally occurs in dry, open forests in the southeastern United States. Ranges south to FL, north to MD and IN, and west to TX.

RECOGNITION DIFFICULTIES

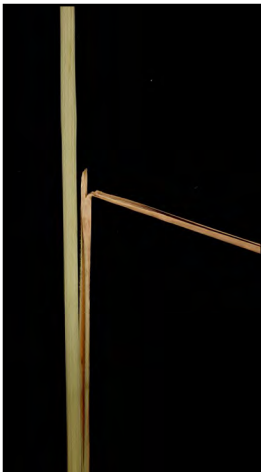
Slender indiagrass is easily confused with lopsided indiagrass, but the former has a more sparsely flowered diffuse arching panicle, while the latter has a densely flowered panicle with a straight axis and spikelets arranged on only one side of the axis. Slender indiagrass is also similar to yellow indiagrass but the former has longer awns (1-1 1/2 inches) and is non-rhizomatous, while the latter has awns 1/3-1 inch in length and is rhizomatous.



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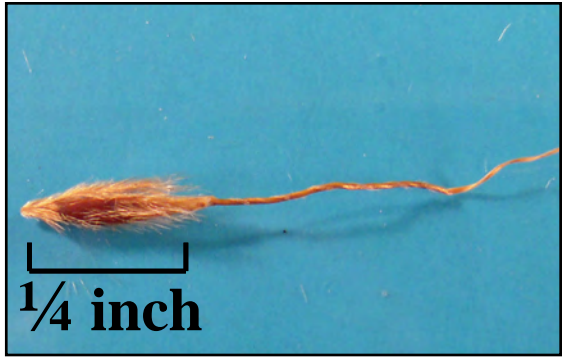
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BENEFIT TO WILDLIFE

Provides habitat for wildlife and foliage is browsed by deer. Seeds consumed by songbirds and small mammals.

SEED PRODUCTION

Flowers September to October and matures throughout October.

HARVESTING TECHNIQUES

Collection window is very narrow, generally between 5 and 10 days. Once mature, seeds immediately drop off the plant. Harvest seed with a seed stripper or seedheads can be clipped from the stalk by hand. Harvest seed during the warmest and driest time of day.

PLANTING RECOMMENDATIONS

Recommended seeding depth is $\frac{1}{4}$ inch. Seed at a rate of 6-8 lbs. pure live seed per acre.



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YELLOW INDIANGRASS

Sorghastrum nutans (L.) Nash

SPECIES DESCRIPTION

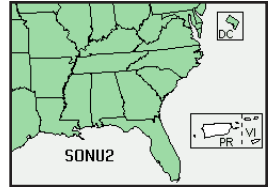
Tall, perennial, rhizomatous bunchgrass, grows 3-5 feet tall. Leaf blades up to 3 feet long and ¼-½ inch wide. Ligule membranous, ¼ inch long or less. Inflorescence a narrow-oblong, bronze-yellow panicle 4-16 inches long and 1-1½ inches wide. Spikelets ¼-½ inch long, awns bent and twisted, ½ inch long. Seeds ⅛ inch long or less.

HABITAT AND RANGE

Found in forest plantations and open forests, and along forest margins and right-of-ways. Ranges from FL, north the Canada, and west to ND, WY, and UT.

RECOGNITION DIFFICULTIES

Yellow indiagrass is similar to lopsided and slender indiagrass, but yellow indiagrass is rhizomatous and has shorter awns (½-1 inch) on the spikelets, while the other two species are non-rhizomatous and have awns 1-1½ inches in length.



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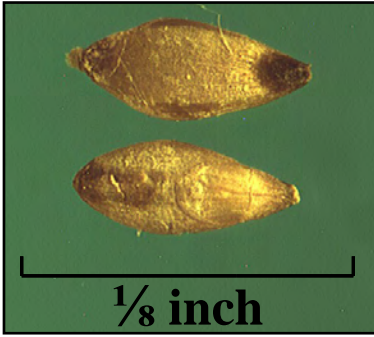
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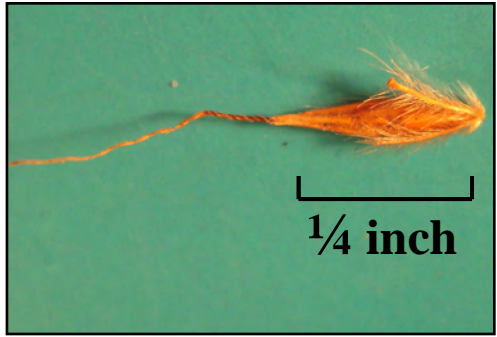
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BENEFIT TO WILDLIFE

Provides habitat for wildlife and foliage is browsed by white-tailed deer. Seeds consumed by songbirds and small mammals.

SEED PRODUCTION

Flowers August to September with seeds maturing in October.

HARVESTING TECHNIQUES

Collection window is very narrow, generally between 5 and 10 days. Harvest seed with a seed stripper or harvest manually by clipping the entire seedhead from the stalk. Seed can also be harvested with a conventional combine.

PLANTING RECOMMENDATIONS

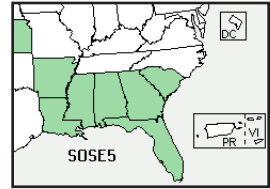
Seed can be sown in the fall and will germinate in the spring. Optimal seeding depth is $\frac{1}{4}$ inch. Seed at a rate of 6-8 lbs. pure live seed per acre.



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LOPSIDED INDIANGRASS

Sorghastrum secundum (Ell.) Nash



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SPECIES DESCRIPTION

Tall, erect perennial bunchgrass, 3-7 feet tall. Leaf blades flat and often hairy, 1-2 feet long and $\frac{1}{4}$ - $\frac{1}{2}$ inch wide. Ligule membranous, $\frac{1}{8}$ inch or less.

Inflorescence a densely flowered, one-sided panicle, 6-20 inches long. Spikelets $\frac{1}{4}$ - $\frac{1}{3}$ inch long and less than $\frac{1}{8}$ inch wide with long thread-like, twisted awns, 1-1 $\frac{1}{2}$ inches long.

HABITAT AND RANGE

Found on well-drained soils on upland sites, particularly sites that are frequently burned. Ranges from FL, north to GA and SC, and west to KS.

RECOGNITION DIFFICULTIES

Lopsided indiangrass is easily confused with slender indiangrass before inflorescence is fully mature, but the former has a straight axis with spikelets arranged on only one side of the axis, while the latter has a widely spreading panicle. Lopsided indiangrass is also similar to yellow indiangrass but the former has longer awns on the spikelet, 1-1 $\frac{1}{2}$ inches in length and is non-rhizomatous, while the latter is rhizomatous and has awns $\frac{1}{3}$ -1 inch in length.



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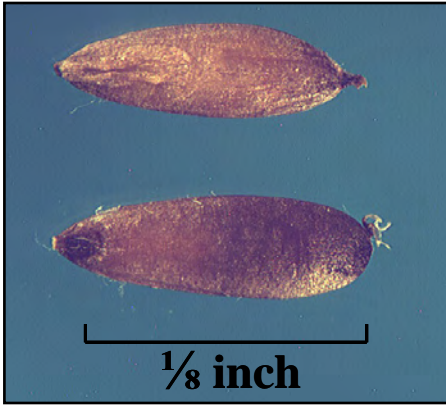


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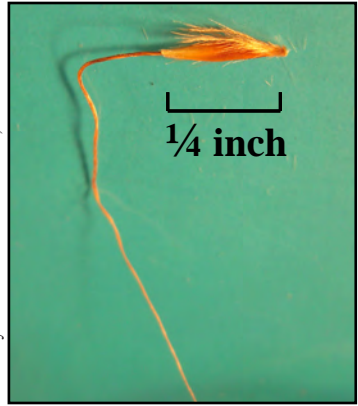


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BENEFIT TO WILDLIFE

Provides cover for many wildlife species. Seeds consumed by song-birds and small mammals.

SEED PRODUCTION

Flowers September to October and matures throughout October.

HARVESTING TECHNIQUES

Collection window is very narrow, generally between 5 and 10 days. Harvest seed with a seed stripper or clip seedheads from the culm by hand.

PLANTING RECOMMENDATIONS

December and January are the optimal planting months. Seed should be planted to a depth of 1/2 inch or less. Seed at a rate of 5-7 lbs. of pure live seed per acre.



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FLORIDA DROPSEED

Sporobolus floridanus Chapm.

SPECIES DESCRIPTION

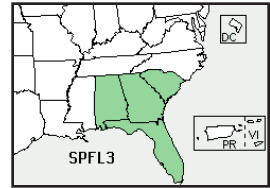
Perennial bunchgrass, grows 2½-3½ feet tall. Leaf blades glabrous, pale, bluish-green, 10-20 inches long. Inflorescence an open panicle, 10-20 inches long and 1½-6 inches wide.

HABITAT AND RANGE

Prefers moist to wet pine forests dominated by slash pine and longleaf pine and wet ecotones of depressional wetlands, bayheads, and streamheads. Occurs in AL, GA, FL, and SC.

RECOGNITION DIFFICULTIES

Florida dropseed resembles toothache grass in the vegetative stage but the leaf blades of the former are paler, bluish and the tips of the leaf blades are blunt rather than sharply pointed compared to the latter.



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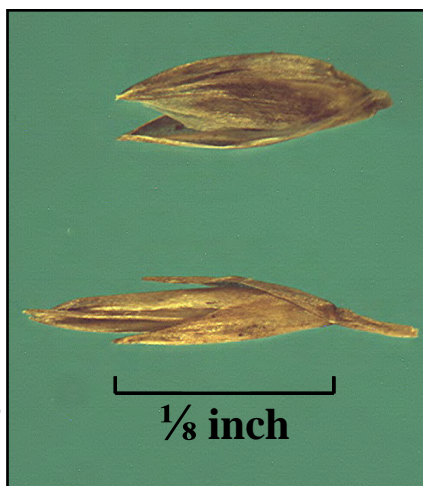


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BENEFIT TO WILDLIFE

Deer occasionally forage on the foliage during the spring and summer.

SEED PRODUCTION

Flowers in October and seeds mature in October and November.

HARVESTING TECHNIQUES

Harvest seed with a seed stripper, conventional combine, or by hand.

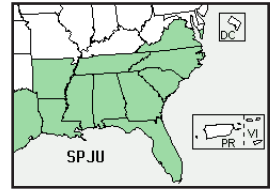
NOTE: Florida dropseed seedlings look very similar to seedlings of pineywoods dropseed (See page 56).

PINEYWOODS DROPSEED

Sporobolus junceus (Beauv.) Kunth

SPECIES DESCRIPTION

Perennial bunchgrass, 1-3 ft. tall. Leaf blades narrow, margins rolled inward, 4-15 inches long and $\frac{1}{8}$ inch wide or less. Inflorescence a narrow, open panicle, 3-6 inches long, branches whorling around stem. Seed oblong, flattened, less than $\frac{1}{8}$ inch in length and width.



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HABITAT AND RANGE

Adapted to longleaf pine savannas, flatwoods, and longleaf pine-turkey oak sandhills. Prefers open to semi-shady dry sites. Ranges from TX to FL and north to VA, found mainly in the Coastal Plain.

RECOGNITION DIFFICULTIES

Pineywoods dropseed can be confused with wiregrass in the vegetative stage, but wiregrass has a tuft of white hairs at the base of the leaf blades while pineywoods dropseed does not. Young seedlings of pineywoods dropseed can have wider leaves than that of mature leaves with rolled margins.



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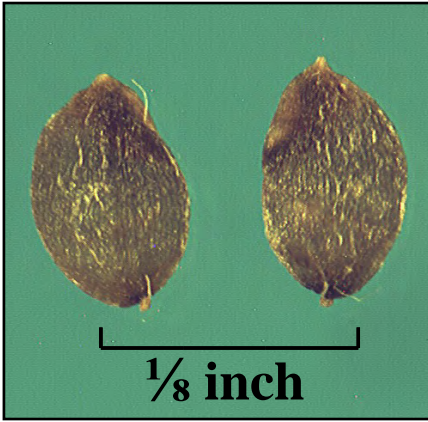


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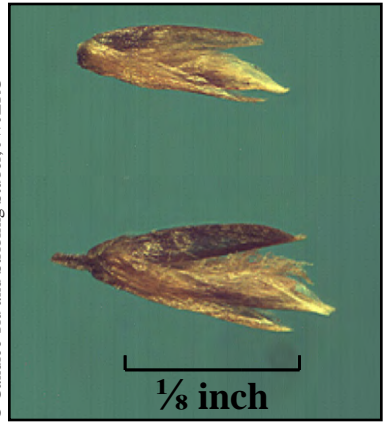


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BENEFIT TO WILDLIFE

Seeds consumed by songbirds and foliage browsed by white-tailed deer. Provides cover for wildlife.

SEED PRODUCTION

Flowers September to October. Seed matures in early November, maturing from the top of the seedhead down. Seed matures over a period of about two weeks and seeds drop rapidly from plant once mature.

HARVESTING TECHNIQUES

Can be harvested with a seed stripper or conventional combine.

PLANTING RECOMMENDATIONS

Early winter is the optimal planting period. Recommended seeding rate is 1½-2½ lbs. pure live seed per acre. Seed to a depth of a ¼ inch or less.



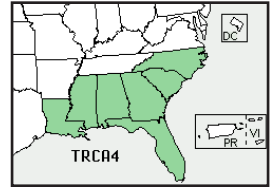
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CAROLINA FLUFFGRASS

Tridens carolinianus (Steud.) Henrard

SPECIES DESCRIPTION

Perennial, rhizomatous grass, growing 2½-4 feet tall. Leaf blades flat, to ¼ inch wide. Inflorescence a panicle, 3½-6 inches long and ½-1½ inches wide. Spikelets ¼-½ inch with 3-5 florets.



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HABITAT AND RANGE

Occurs in the Coastal Plain in open sandy forests. Ranges from LA to FL and north to NC.



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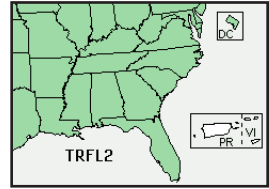
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PURPLETOP TRIDENS

Tridens flavus (L.) Hitchc.



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SPECIES DESCRIPTION

Tufted, perennial bunchgrass, 2-5 feet tall. Leaf blades flat, 10-30 inches long and ¼-½ inch wide or less. Ligule a hairy fringe, less than ⅛ inch.

Inflorescence a terminal, open panicle, purple, 8-14 inches long. Seed whitish-yellow, oblong, less than ⅛ inch long and less than ⅛ inch wide, feels greasy to the touch.

HABITAT AND RANGE

Occurs in open to shady habitats and dry to moist sites including old fields, floodplains, forest plantations, and open forests such as pine flatwoods. Ranges from TX to FL, north to NH, and west to MN and KS.

RECOGNITION DIFFICULTIES

Purpletop tridens can be confused with switchgrass, but the panicle of purpletop tridens is very purple when in flower, while the panicle of switchgrass is white to light green.



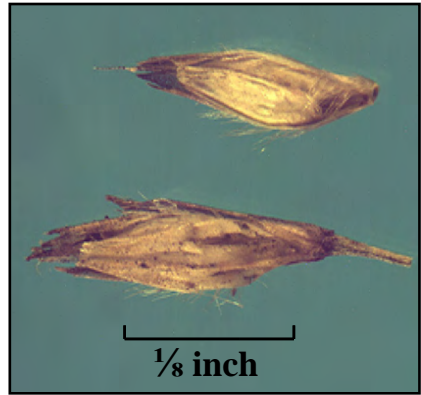
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BENEFIT TO WILDLIFE

Provides cover for wildlife and seeds occasionally consumed by wild turkey and northern bob-white quail. Considered poor forage for white-tailed deer.

SEED PRODUCTION

Flowers August and September and seed matures October and November. Spikelets are generally red or purple when mature.

HARVESTING TECHNIQUES

Harvest seed with a conventional combine.

PLANTING RECOMMENDATIONS

Seed at a rate of 2-3 lbs. pure live seed per acre. Recommended seeding depth is ¼ inch.



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SPECIES ACCOUNTS

NON-NATIVE SPECIES

WHAT IS A NON-NATIVE INVASIVE SPECIES?

An invasive species is any species that is not native to an ecosystem and causes environmental, ecological and/or economic harm to the ecosystem into which it was either intentionally or accidentally introduced. Non-native plants have been introduced on ships from overseas and have been brought to North America for commercial nursery trade, erosion control, or as food or forage crops.

Not all non-native species are invasive species. Some non-native species are non-aggressive competitors when introduced into new ecosystems and therefore do not become problematic. There are certain life history traits that allow plant species to become successful invaders in new habitats. These traits include production of large numbers of seed, ability to grow in a wide range of habitats, ability to reproduce both sexually (by seed) or asexually (vegetative reproduction), rapid growth, ability to compete aggressively, and lack of natural enemies or pests in the new ecosystem.

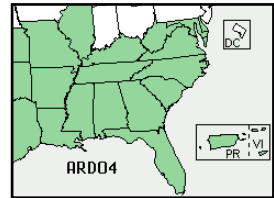
Invasive species can have negative impacts on an ecosystem by altering community composition and reducing native species diversity, reducing wildlife habitat, and altering ecosystem function such as fire and nutrient cycling. Additionally, invasive species cause economic losses amounting to billions of dollars annually due to production loss in agriculture and invasive species management.

GIANT REED

Arundo donax L.

SPECIES DESCRIPTION

Tall, rhizomatous, perennial grass, growing 6-30 feet tall. Leaves broad at the base, tapering to a point. Leaf blades 1-3 feet long and $\frac{3}{4}$ -2 $\frac{3}{4}$ inches wide. Inflorescence a large, plume-like panicle, 1-2 feet long and up to 1 foot wide.



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HABITAT AND RANGE

Native to eastern Asia but has been cultivated throughout Asia, southern Europe, northern Africa, and the Middle East for thousands of years. In the United States, giant reed ranges from CA to FL, to MD in the Northeast, IL in the central United States, and is found throughout the Southeast. Occurs in wetter areas along ditches, roadsides, and culverts.

OTHER INFORMATION

Intentionally introduced to California from the Mediterranean in the early 1800's and has been widely planted throughout the southern half of the United States for ornamental purposes and erosion control.

CONTROL METHODS

Giant reed can be controlled by cutting and removing all stalks, allowing plant to resprout and grow 2-4 feet in height, then applying a post-emergent herbicide, such as glyphosate. Several applications may be necessary.



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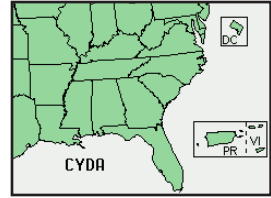
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BERMUDAGRASS

Cynodon dactylon (L.) Pers.

SPECIES DESCRIPTION

Aggressive, perennial grass that spreads by stolons, rhizomes, and seed. Grows 2-40 inches tall. Leaf blades ½-2½ inches long and less than ¼ inch wide. Inflorescence a panicle with 4-6 branches arranged in a whorl, branches ½-2½ inches long. Spikelets less than ¼ inch.



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HABITAT AND RANGE

Native to Africa. Can be found in all southeastern states in the United States. Occurs in disturbed areas such as lawns, pastures, and roadsides.

OTHER INFORMATION

Introduced to the United States in 1751 as a forage crop and later for use as a turf grass. Bermudagrass is considered one of the world’s worst weeds and is extremely difficult to eradicate where it has become established. It is also very competitive with planted pine and native groundcover species and has a high tolerance to fire.

CONTROL METHODS

Bermudagrass can be successfully controlled or eradicated by removing all plant parts when first detected. If infestations already occur, a combination of burning, herbicide application (glyphosate), clipping, and shading have been effective control measures, but usually require multiple treatments.



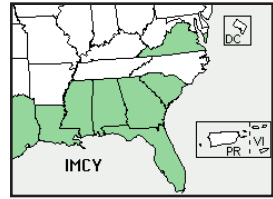
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COGONGRASS

Imperata cylindrica (L.) P. Beauv.



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SPECIES DESCRIPTION

Colony-forming, perennial bunchgrass often forming dense circular infestations, grows to 6 feet tall. Leaf blades up to 6 feet long and 1 inch wide, white, off-center midrib. Inflorescence a showy terminal, spike-like panicle, 1-8 inches long and up to 1 inch wide.

HABITAT AND RANGE

Native to Southeast Asia and India. In the United States, cogongrass ranges from TX to FL, north to SC, and has invaded VA and OR. Grows in full sunlight to partial shade and has invaded forest plantations, open forests, old fields, pastures, and right-of-ways.

OTHER INFORMATION

Cogongrass is listed as a Federal Noxious Weed and any occurrence should be reported to the appropriate state or federal agency. First introduced to Alabama accidentally in 1912 as a packing material originating from Japan. Following the first introduction, it was intentionally introduced for use as a forage crop. Cogongrass is often transported by soil moving, highway construction equipment, and forestry equipment. Cogongrass is tolerant of fire.

CONTROL METHODS

Cogongrass can often be controlled with a minimum of two applications of glyphosate or imazapyr (post-emergent herbicides) per year with older infestations requiring 2-3 years of treatment.



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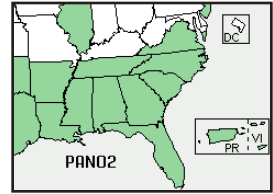
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BAHIAGRASS

Paspalum notatum Flugge

SPECIES DESCRIPTION

Perennial, rhizomatous grass, growing ½-3½ feet tall. Leaf blades 2-12 inches long and less than ½ inch wide. Inflorescence a terminal panicle composed of a pair of branches, each branch 1-6 inches long. Spikelets solitary, ⅛ inch long and less than ⅛ inch wide.



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HABITAT AND RANGE

Native to tropical America ranging from Mexico through the Carribean, and Central America to Brazil and Argentina. In the southeastern United States, it has invaded disturbed areas, forest plantations, open forests, right-of-ways, and along stream banks.

OTHER INFORMATION

Introduced to Florida from Brazil in 1913 for use as a forage crop and erosion control. Bahiagrass has negatively impacted restoration efforts in the Southeast by outcompeting newly planted pine trees and native herbaceous species.

CONTROL METHODS

Bahiagrass can be controlled with herbicide treatments. Several applications of herbicides, such as glyphosate, may be necessary for complete control.



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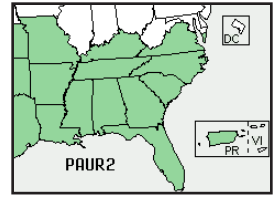
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VASEYGRASS

Paspalum urvillei Steud.

SPECIES DESCRIPTION

Densely tufted, erect perennial, growing 3-6½ feet tall. Lower leaf sheaths pubescent and purplish, upper sheaths glabrous. Leaf blades 4½-22 inches long, ½ inch wide, flat and hairy at the base. Inflorescence a panicle, 4-16 inches long with 6-25 crowded racemes. Racemes 2-5 inches long with paired spikelets.



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HABITAT AND RANGE

Native to South America. It is naturalized in the United States, ranging from TX to FL, north to MD, and west to MO. Occurs in forest plantations, open forests, right-of-ways, and along banks of streams and ponds.

OTHER INFORMATION

Introduced intentionally to the United States before 1880 for use as a forage crop but has become a problematic weedy species displacing native species.

CONTROL METHODS

Control with herbicide treatments. Efforts to control vaseygrass have shown that it is sensitive to glyphosate and imazapyr.



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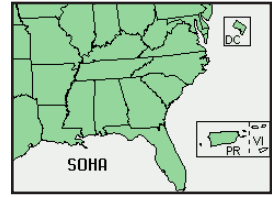
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JOHNSONGRASS

Sorghum halepense (L.) Pers.

SPECIES DESCRIPTION

Perennial, rhizomatous grass, grows to 6½ feet tall. Leaf blades 4-35 inches long and ⅓-1½ inches wide. Inflorescence a panicle, 4-20 inches long, 1-10 inches wide. Spikelets ¼ inch long or less and less than ⅛ inch wide.



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HABITAT AND RANGE

Native to the Mediterranean region of Europe and Africa. In the United States, found in all states of the contiguous U.S., except Maine. Occurs in old fields, along field margins, and right-of-ways enabling it to invade open forests and forest plantations.

OTHER INFORMATION

First introduced to the United States in South Carolina in 1830 for use as a forage grass. Still planted for forage in some areas of the U.S. but is considered a noxious weed in many states and is most invasive in the Southeast.

CONTROL METHODS

Johnsongrass can be chemically controlled with applications of glyphosate applied during the growing season. Several applications may be necessary for control.



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GLOSSARY (See also pp. 13-14)

Axis - the central supporting structure from which various appendages are borne

Bract - a reduced leaf or leaflike structure at the base of a flower or inflorescence

Bunchgrass - a grass that grows in clumps or tufts rather than forming a mat

Debearded - seed lacking awns or bristlelike hair

Glabrous - smooth, hairless

Glaucous - covered with a whitish or bluish waxy film

Hulled - to remove the outer covering of a seed

Lemma - one of the bracts enclosing a grass floret

Margin - the edge, such as the edge of a leaf blade

Midvein - the central vein

Palea - the inner or uppermost of the two bracts surrounding a grass floret

Panicle - a branched inflorescence maturing from the bottom upwards

Peduncle - the stalk of a flower or of an inflorescence

Perennial - a plant that completes its life cycle in three or more years, despite die back of aboveground stems during the dormant period

Raceme - an elongated, unbranched inflorescence with stalked flowers, maturing from the bottom upwards

Rachis - main axis of a structure

Scabrous - rough to the touch due to the presence of stiff hairs or epidermal cell structure

Secund - arranged on one side of the axis (such as a stem)

Sessile - attached directly, without a supporting stalk

Spathe - a bract or pair of bracts that often encloses an inflorescence

Spike - unbranched, elongated inflorescence with sessile or subsessile flowers or spikelets

Terminal - at the end or tip

Tufted - arranged in a dense cluster

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