



Identification & Biology of Non-Native Plants in Florida's Natural Areas

"...there are the adventive plants, the wanderers, of which we have, as yet, comparatively few species; but later, when the country is older and more generally cultivated, there will surely be an army of them."
Charles Torrey Simpson, 1920

Hundreds of non-native plants have been introduced into Florida, many of great benefit to us. Some, however, have been established outside cultivation, in expanding populations within native plant communities. If left unchecked, these non-natives may disrupt natural processes, displace native plants and animals, and interfere with management goals.

This field guide, intended as a tool for land managers, covers 62 non-native plant species considered weeds in Florida's natural areas. With descriptions and photographs, the guide provides identification characters of these plants, plus details on their ecological significance, distribution, and life history.



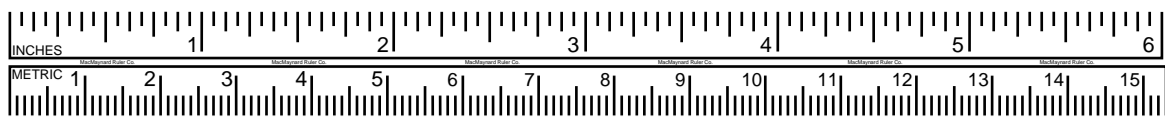
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Langeland & Burks

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Back cover photos: Top: Old World climbing fern by Richard E. Roberts; middle: skunk vine by Ken A. Langeland; bottom: hydrilla by William Haller

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FLORIDA

INTRODUCTION

“Weed,” defined by the Weed Science Society of America as “a plant growing where it is not desired,” is a word familiar to everyone. Homeowners battle weeds in their lawns, gardens, or ponds. Weeds are considered unsightly in parks and playgrounds. Foresters manage weeds to enhance the growth of commercial forests. Weeds interfere with transportation and can cause hazardous conditions along highways, railroads, and waterways. In the United States alone, farmers spend \$8 billion annually to control weeds; still, annual losses caused by weeds to crops are \$10 billion (Coble 1993).

Weeds are also a major problem and a growing concern in natural areas—lands that have been designated for preservation (or restoration) of native plant communities (Cronk and Fuller 1995, Luken and Thieret 1997, McKnight 1993, Randall and Marinelli 1996, U.S. Congress Office of Technology Assessment 1993). Plants considered weeds in natural areas are undesirable because they disrupt natural processes, such as fire and water flow, and displace native plant and animal species, including endangered species. While the total amount of money currently spent to control weeds in natural areas (or potential future cost) has not been calculated, the effort is clearly expensive. Since 1986, partial control of melaleuca (*Melaleuca quinquenervia*) and Australian pine (*Casuarina equisetifolia*) in the East Everglades, adjacent to Everglades National Park, has required 14,000 labor hours and \$546,000 in herbicide and helicopter costs. In addition, there are the intangible costs associated with native habitat loss.

Various terminologies have been used to describe weeds in natural areas. Randall (1997) uses the terms “natural-area weed” and “natural-area plant pest” interchangeably to refer to indigenous and nonindigenous species, populations, and individual plants that interfere with management goals and objectives and are therefore unwanted. These management goals in natural areas may be to support or increase populations of certain species, to maintain particular vegetation types or biological communities, or to restore ecosystem processes such as fire or seasonal flooding. While some indigenous (native) plants can be weedy under certain conditions, the impact of nonindigenous (non-native, alien, or exotic) plants on native plant and animal communities is the major concern to natural-area managers. The presence and spread of non-native plants and animals is a problem on many of these sites, and in some cases it is the single greatest threat to the species or communities the preserves are designated to protect (Randall 1997). Cronk and Fuller (1995) refer to natural-area weeds as invasive plants and incorporate non-native into their definition as follows:

. . . an alien plant spreading naturally (without the direct assistance of people) in natural or seminatural habitats, to produce a significant change in terms of composition, structure or ecosystem processes.

This publication concerns natural-area weeds in Florida. It presents information on 62 non-native species that have spread into the state’s public and private conservation lands. These plants have formed self-sustaining and expanding populations within plant communities with which they were not previously associated, and thus they are defined

as invasive. Non-native plants are those that exist outside their natural range or natural zone of dispersal and include domesticated and feral species and all hybrids, except those that naturally occur between native species (U.S. Congress Office of Technology Assessment 1993).

Only a few non-native plants become invasive, and many, in fact, are beneficial. Citrus, for example, one of the early introductions by the Spanish, is grown in greater quantity than any other fruit in the United States. Numerous horticultural introductions have served to beautify our homes and landscapes. On the other hand, just over 300 non-native plants are invading wildlands of the 49 continental states and the Canadian provinces, and about half of these were brought here as horticultural commodities (Randall and Marinelli 1996).

With the beginnings of agriculture, humans began to move crops for their use, and weeds were probably accidentally moved as well (Jarvis 1977). These early movements of plants by people would have been over relatively short distances and probably did not significantly alter dispersal patterns. Long-distance movement of plants by people across natural barriers, such as oceans, deserts, and mountain ranges, has accelerated with developing transportation technologies and international commerce (Cronk and Fuller 1995, Randall and Marinelli 1996, Wagner 1993). The arrival in the Americas of Columbus in 1492, considered to be the first European contact with the New World, was followed by large-scale introductions of non-native plants for purposes such as agriculture and horticulture.

Florida, especially the southern portion, is prone to introductions and naturalization by non-native organisms (Simberloff 1997). In 1920 Charles Torrey Simpson, renowned pioneer naturalist of Florida, wrote, “. . . there are the adventive plants, the wanderers, of which we have, as yet, comparatively few species; but later, when the country is older and more generally cultivated, there will surely be an army of them.” In 1978, over 170 non-native plant species were naturalized (reproducing and continuing to exist without cultivation) in St. Lucie, Martin, Palm Beach, Broward, and Dade counties of the southeastern coast of Florida (Austin 1978). Statewide, 1,200, or 29%, of plant species now growing outside cultivation in Florida are non-native (Wunderlin *et al.* 1996).

Of those non-native plants that are invasive, some are more invasive than others, and some may be invasive in certain areas and not others. Invasiveness of certain introductions has been obvious because of their rapid expansion and widespread detrimental ecological impacts. Just four examples of invasive introductions with easily recognized impacts are Australian pines (*Casuarina* spp.), which have devastated beach plant communities; Brazilian pepper (*Schinus terebinthifolius*), which now infests over 405,000 ha (1 million acres) in the state; melaleuca (*Melaleuca quinquenervia*), which now forms monocultures in nearly 162,000 ha (400,000 acres) of wetlands; and hydrilla (*Hydrilla verticillata*), which has displaced native aquatic plant communities in over 50% of Florida's water bodies. Such species also present a clear demonstration of the potential

impact of other invasive introductions. However, the invasiveness of some plants may be subtle and recognizable only to ecologists and land managers who are closely familiar with the biotic community that is being invaded. And some species may be limited in their Florida spread by environmental conditions such as freezing winter temperatures, high summer temperatures, high humidity, low-nutrient soils, and so on.

The choice of species included in this publication is based primarily on several years' work by the Plant List Committee of the Florida Exotic Pest Plant Council (EPPC), a nonprofit professional society that was founded in 1984 to build public awareness about the serious threat invasive non-native plants pose to native ecosystems and to develop integrated management and control methods for preventing the spread of these plants. In recent years the committee has developed and published a list of invasive non-native species to help land managers focus and prioritize their management efforts related to natural-area weeds. All of the species treated here are considered "Category I" problems on the EPPC 1997 list; that is, they are non-native species known to have invaded Florida natural areas, and they are displacing native plants or otherwise disrupting the natural community structure and/or function. Placement in this category is derived from observed ecological damage and does not depend on economic severity of the problem or its geographic extent. Another section of the EPPC list includes "Category II" species, plants considered to have a real potential to become Category I problems but are not yet known to be disrupting natural-area communities. The list is revised every two years by consensus of the committee members.

Members of the EPPC Plant List Committee are D. F. Austin (Chair), Florida Atlantic University; K. C. Burks, Florida Department of Environmental Protection (DEP); N. C. Coile, Florida Department of Agriculture and Consumer Services; J. G. Duquesnel, DEP; D. W. Hall, Consulting Botanist; T. O. Hendrickson, Consulting Botanist; R. Hofstetter, University of Miami; S. Koptur, Florida International University; K. A. Langeland, University of Florida/IFAS; J. Maguire, Miami-Dade County Department of Environmental Resource Management; M. McMahon, Restoration Consultant; R. Pemberton, U.S. Department of Agriculture; D. R. Ward, University of Florida; and R. P. Wunderlin, University of South Florida.

Some species described in this manual are officially regulated by federal, state, and/or local law. Included under the Federal Noxious Weed Act (USDA, 7CFR-360) are *Hydrilla verticillata*, *Hygrophila polysperma*, *Imperata cylindrica*, *Ipomoea aquatica*, *Mimosa pigra*, *Solanum torvum*, and *Solanum viarum*. These species may only be moved into or through the United States by special permit. Florida's Noxious Weed Rule (FDACS, 5B-57) includes *Imperata cylindrica*, *Melaleuca quinquenervia*, *Mimosa pigra*, *Sapium sebiferum*, *Schinus terebinthifolius*, *Solanum torvum*, and *Solanum viarum*. These species cannot be introduced into the state or be held, moved, or released without a special permit. Prohibited under state environmental rules (FDEP 62C-52) are *Casuarina* spp., *Eichhornia crassipes*, *Hydrilla verticillata*, *Hygrophila polysperma*, *Ipomoea aquatica*, *Melaleuca quinquenervia*, *Mimosa pigra*, *Pistia stratiotes*, and *Schinus terebinthifolius*.

These species cannot be held, collected, transported, cultivated, or imported except under specially permitted circumstances. The state and federal lists noted here include other species as well; the lists may be modified by legislation over time and should be checked periodically for changes. Additional species are regulated by local ordinances (check with your local natural-resources department).

This publication is designed to provide information on plants that may or do pose threats to natural resource areas in Florida, not to imply regulatory requirements. Some species covered here are “produced commercially within the Florida nursery industry” (R. Gaskalla, Florida Department of Agriculture and Consumer Services, 1998 personal communication).* Any decision to restrict sale of a particular plant species must include many considerations; that is, economic as well as ecological factors. For example, new cultivars of some escaped ornamental species are reproductively sterile, thus providing for planted landscapes a ready substitute that will not subsequently invade natural areas. The availability of such cultivars is noted in the species treatments where appropriate and known.

*Species of particular economic interest to the Florida nursery industry, a list provided by W. Jolly, Florida Department of Agriculture and Consumer Services (1998 personal communication):

Ardisia crenata
Asparagus densiflorus
Cinnamomum camphora
Colocasia esculenta
Eugenia uniflora
Ficus microcarpa
Lantana camara

Ligustrum sinense
Lonicera japonica
Nandina domestica
Psidium cattleianum
Scaevola sericea
Schefflera actinophylla

HOW TO USE THIS MANUAL

The purpose of this manual is twofold. It is primarily intended to provide a field guide to assist land managers in recognizing the non-native plants of greatest concern that are invading natural areas and, therefore, help develop appropriate control programs. The individual treatments also provide background documentation on the species, including literature reviews and current ranges. Such information has been requested by many interested parties but has not been previously compiled in one document. Besides giving the common names, botanical synonyms, and origin of the non-native plant, each species treatment includes the following subsections:

Botanical Description

Details of the plant's form are given in this subsection, including its general habit and identification characters of its stems, leaves, flowers, and fruits. A graduated rule in centimeters and inches is provided inside the book cover for use with the various measurements given. Plants covered in the manual are grouped by their taxonomic class; that is, by their basic relationship of form and reproductive structure. The included class groups are the ferns and the two subclasses of flowering plants—monocots and dicots (see the section title pages for general identification tips for each group). Within each group, the plants are arranged alphabetically by family and within families alphabetically by genus and species. Alphabetical indexes to the scientific names (including synonyms and families) and to the common names of species and families are provided at the end of the manual. The color coding at the top of the page indicates the taxonomic classes.

Ecological Significance

An important feature of the manual is this subsection, which provides referenced information about the plant's history of introduction and its impact on native ecosystems. Every effort has been made to draw from the scientific literature published in refereed journals when available. In some cases, little research has been published so far, in part because funding for scientific study of invasive plants has generally been far from adequate. The recent publication of books such as *Strangers in Paradise* (Simberloff *et al.* 1997) and *Invasive Plants: Weeds of the Global Garden* (Randall and Marinelli 1996) clearly suggests, however, a growing concern among scientists about the impacts of introduced species in natural areas. And here in Florida, university and government scientists have documented observations of invasive non-natives since the 1970s (e.g., Austin 1978, Morton 1976). The increased experience and concern of our natural-area managers, themselves botanists or ecologists working daily in the field with the problem of invasive non-native plants, also strongly suggest that nonjournal information, or "anecdotal" evidence, cannot be taken lightly. Consequently, the summaries in this manual rely upon not only the available scientific literature but also unrefereed government and horticultural publications and personal communications from veteran observers. The availability of sterile cultivars may be noted in this subsection or the next.

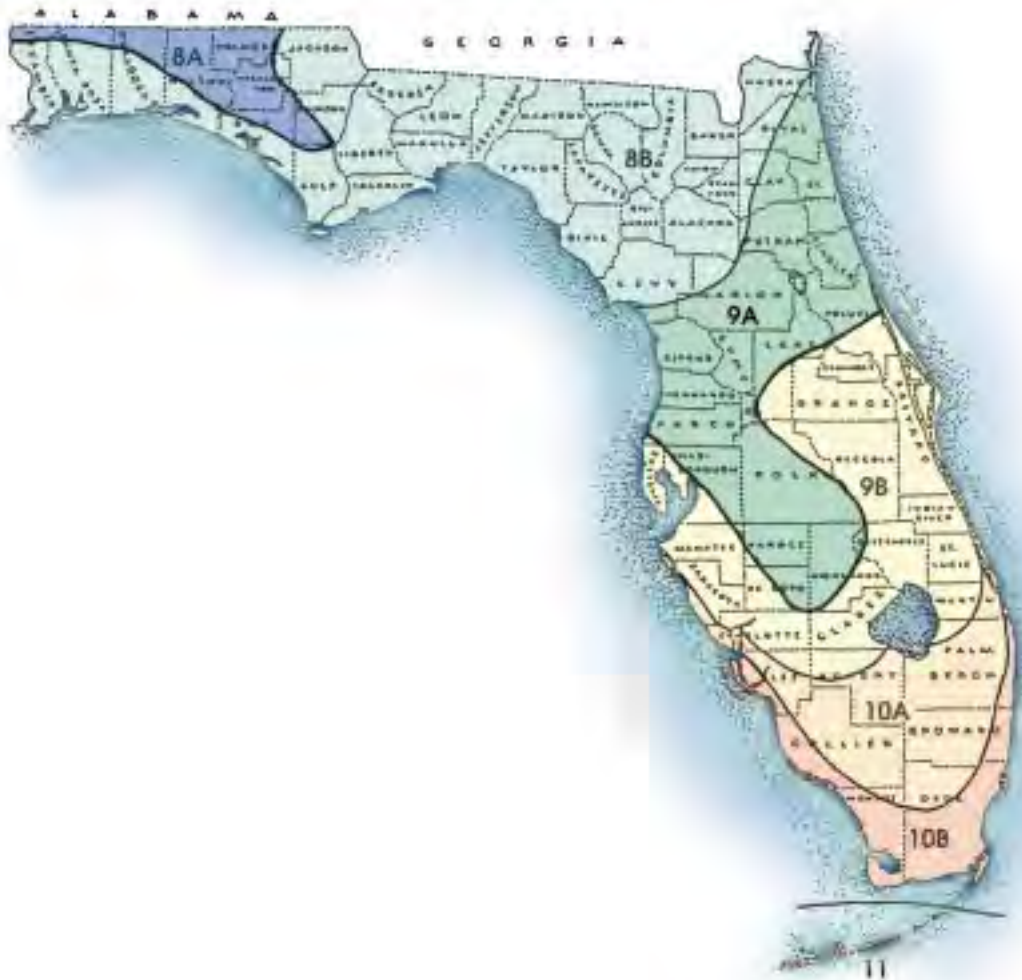
Distribution

This subsection provides current information on the native and naturalized range of a plant species worldwide. For Florida range information, two observational databases are frequently referred to, either here or in the “ecological significance” subsection. One is cited as EPPC 1996, a computerized database established by the Florida Exotic Pest Plant Council to build a central source of information on the occurrences of invasive non-natives in Florida natural areas. It is derived from detailed sight records submitted by land managers, that is, local, state, and federal biologists closely familiar with our natural landscapes. Many, but not all, of the records are further supported by herbarium vouchers (identified plant specimens held for future reference in Florida’s regional herbaria). A second database is cited as Wunderlin *et al.* 1995 (Internet version) or 1996 (CD-ROM version); it was established by the Institute for Systematic Botany at the University of South Florida to provide a quick reference to counties where a plant species occurs (or has occurred) in Florida outside of cultivation. It is based on studies of herbarium specimens housed at USF, Florida State University, University of Florida, and Fairchild Tropical Garden. See the “Literature Cited” list for further details on these databases.

Life History

Referenced information in this subsection focuses on the traits of a plant species that allow it to survive and reproduce, including what is known about the conditions it may thrive in or be limited by. For example, a plant’s cold hardiness is described when information is available; temperature tolerances can be correlated to those on the Florida map on page 7, which delineates hardiness zones established by the U.S. Department of Agriculture. Knowledge about a plant’s developmental characteristics can often help a land manager decide whether a species can be expected to become a major problem in a particular locale, or which season is best for implementation of control measures.

Specific information on the control of particular invasive non-native plant species is not included in this manual. However, such information may be found in *Control of Non-native Plants in Natural Areas of Florida*, Publication SP 242, available at low cost from IFAS Publications, 1-800-226-1764.



Average minimum-temperature ranges for Florida

8A	15° to 10° F	(-9.5° to -12.2°C)
8B	20° to 15° F	(-6.7° to -9.4°C)
9A	25° to 20° F	(-3.9° to -6.6°C)
9B	30° to 25° F	(-1.2° to -3.8°C)
10A	35° to 30° F	(+1.6° to -1.1°C)
10B	40° to 35° F	(+4.4° to +1.7°C)
11	40°F & above	(+4.5°C & above)

FERNS

(PTERIDOPHYTES)

Ferns are vascular plants that do not produce seeds. Sexual reproduction is accomplished by the release of spores, which develop in special structures called sporangia (singular: sporangium). The sporangia usually occur in clusters called sori (singular: sorus), found on the underside of “fertile” leaves. Fern leaves, often called fronds, usually arise from underground stems (rhizomes). The primary divisions of compound leaves are referred to as pinnae (singular: pinna), and further divisions of pinnae are known as pinnules.

NEPHROLEPIS CORDIFOLIA (L.) PRESL

Dryopteridaceae/Wood Fern Family

Common Names: Erect sword fern, tuber sword fern, fish-bone fern, ladder fern, Boston fern

Synonymy: *Polypodium cordifolium* L., *Aspidium cordifolium* (L.) Swartz [also sometimes placed in Nephrolepidaceae, ladder fern family, or Davalliaceae, sword fern family]

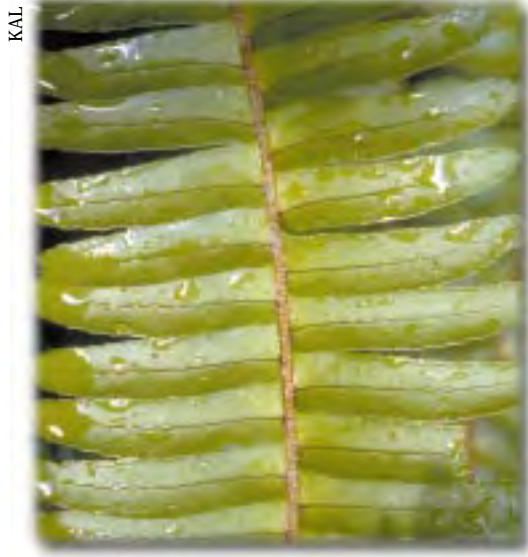
Origin: Tropics, perhaps pantropical

Botanical Description: Epiphytic, epilithic (on rock), or terrestrial in habit. Rhizomes suberect, with spreading, orange-brown to pale brown linear scales, these with hairlike tips; wiry, straw colored, scaly stolons usually present in great numbers, often producing small, scaly underground tubers. Leaves (fronds) once pinnate, fertile and sterile fronds similar in shape and size, to 1 m (3 ft) long and 7 cm (2.8 in) wide; petioles to 20 cm (8 in) long, with spreading, pale-brown scales; leaflets (pinnae) many, 40-100 on each side of rachis (main stalk of frond); each leaflet (pinna) oblong-lanceolate with a deltoid lobe (auricle) on upper side of blade base that usually overlaps rachis; leaflet margins entire to slightly toothed; leaflet midvein glabrous above; rachis with two-toned (bicolored) scales above, pale brown with distinctly darker point of attachment. Sori numerous at ends of veinlets between leaflet midvein and margin, with kidney-shaped indusia (tissue covering the sporangia).

NOTE: May be confused with native *N. exaltata* (L.) Schott, which never bears tubers, has one-color rachis scales (sometimes obscurely bicolored), and has leaflet tips more sharply pointed than those of *N. cordifolia* (Coile 1996a). Other *Nephrolepis* species in Florida also with pointed leaflet tips and without the bicolored rachis scales of *N. cordifolia*.



Scaly tubers



Scaly rachis

ERECT SWORD FERN

Ecological Significance: Occurs most densely in partial or full shade of hammocks, as far north as Florida Panhandle (Clewell 1985). Also noted as naturalized in Georgia (Duncan and Kartesz 1981). Can spread aggressively in the landscape, tending to form dense stands that displace native ground cover (K. A. Langeland, University of Florida, personal observations). Said to thrive in common or even poor conditions and produce dense crowns of long, drooping leaves (Bailey and Bailey 1976). By 1981 (Nauman), noted as a widespread escapee from cultivation in central and south Florida. Reported from conservation areas of Dade, Palm Beach, Martin, Collier, and Pinellas counties, in pine rocklands, flatwoods, and marsh edges as well as in hammocks (EPPC 1996). Once thought by some writers (e.g., Wherry 1964) to be native to southernmost Florida, but many herbarium specimens of *N. exaltata* previously misidentified as *N. cordifolia* (Nauman 1981). *N. cordifolia* also not described for Florida in earlier works (e.g., Small 1918a, 1918b), and presently distributed in the state without conformity to natural boundaries such as the frost line (Nauman 1981). Natural populations in Old World found in areas as remote as northwest Himalayas (Gaur and Painuli 1993). Origin in New or Old World tropics still considered uncertain (Nauman 1993b).

Distribution: Most abundantly naturalized in peninsular Florida, from Gainesville south (Nauman 1981). Documented by herbarium specimens from 23 counties: Escambia, Leon, and Duval in north Florida, and on both coasts and in the interior from Citrus, Marion, and Volusia south to Dade and Collier (Wunderlin *et al.* 1995).

Life History: Fertile all year (Wunderlin 1982). Spread by natural dispersal of spores and by accidental movement of stolons, tubers, and rhizomes, particularly by dumping of yard refuse. Tuber production apparently limited to plants growing in humus (Nauman 1981). Fronds of plants north of the frost line overwintering in protected areas or dying back—the rhizomes, stolons, or tubers producing new fronds in spring.



KAL

Habit

TECTARIA INCISA CAV.

Dryopteridaceae/Wood Fern Family

- Common Name:** Incised halberd fern
Synonymy: *Tectaria martinicensis* (Spreng.) Copel., *Aspidium martinicense* Spreng., *Aspidium macrophyllum* Rudolphi [sometimes placed in Aspleniaceae, or placed under illegitimate family name of Aspidiaceae]
Origin: Mexico, Central and South America, West Indies

Botanical Description: Terrestrial or epilithic (on rock) in habit. Rhizomes stout, short-creeping, with brownish black scales. Leaves (fronds) pale green, once pinnate, fertile and sterile fronds similar in shape and size; petioles as long or longer than blades, pale brown above, dark brown and scaly at base, pubescent on both sides; blades to 90 cm (35 in) long and 60 cm (24 in) wide, with a large, deeply lobed terminal leaflet (pinna) and below that, 3-6 pairs of mostly entire pinnae; each leaflet of the lowest pair with usually 1 large, downward-pointing (basispic) lobe. Sori in 1-several rows on lower surface of leaflets between midvein and margin; indusia (tissue covering sporangia) round-reniform, attached at 1 edge (not centrally attached).

NOTE: May be confused with native *T. heracleifolia* (Willd.) Underw., which has centrally attached (peltate) indusia; dark green, slightly shiny fronds, with all margins at least shallowly lobed and on each of the basal pinnae at least 2 basispic lobes. Other *Tectaria* species in Florida much smaller in size.

Ecological Significance: First noted in Florida in the late 1970s (Nauman 1978, Austin *et al.* 1979), in a few localities. Since noted for several more localities in Dade and Broward County tropical hammocks (D. Austin, Florida Atlantic University, 1997 personal communication), where it competes in the understory with rare native ferns, such as the state-listed threatened species, *T. heracleifolia*. Thought by some to be of uncertain origin (G. Gann, Institute for Regional Conservation, 1997 personal communication) or possibly native (Lucansky, University of Florida, 1997 personal communication), but appearing from best current evidence to be a recent introduction. Not described for Florida in earlier works (Small 1918a and 1918b, Long and Lakela 1971, Lakela and Long 1976). By 1985 (Lellinger), noted as “rare to infrequent” in Dade and Broward. Grown as a landscape plant (Lellinger 1985) and possibly escaped from cultivation via dumping of yard refuse (Ward, University of Florida, 1997 personal communication). Considered “often a weedy plant” by Standley (1927) in describing ferns of the Panama Canal Zone, a plant “able to persist in partly denuded areas” of Barro Colorado Island. Also noted by Kenoyer (1928) as remaining common in “pioneer forest” areas on the island 50 years after abandoned agricultural cultivation.

Distribution: Widely distributed in its native range (Morton 1966). In Florida, found in Dade County in Bill Fadowsky Park, Charles Deering Estate, Black Creek Forest, and Hattie Bauer Hammock, and in Broward County in the Fern Forest Nature Area. Documented by herbarium specimens from these two counties (Wunderlin *et al.* 1995).

INCISED HALBERD FERN

Life History: Fertile all year (Wunderlin 1982). Spread by natural dispersal of spores and aided by dumping of yard refuse (D. B. Ward, University of Florida, 1997 personal communication). Cold-sensitive tropical. Prefers moist to wet habitats (Standley 1927). Occurs in Florida most often in shade of rocky hammocks. Able to hybridize—a known cross, *Pleuroderris michleriana* (D. C. Eaton) Maxon, occurring in *T. incisa*'s Central American range (Wagner *et al.* 1978), suggesting the potential for genetic swamping of threatened and endangered native *Tectaria*.



In Fern Forest natural area, Broward County



Frond



Sporangia clusters

LYGODIUM JAPONICUM (THUNB.) SW.

Lygodiaceae/Climbing Fern Family

- Common Name:** Japanese climbing fern
Synonymy: *Ophioglossum japonicum* Thunb. ex Murray [sometimes placed in Schizeaceae, ray fern family]
Origin: Eastern Asia, temperate to tropical

Botanical Description: Fern with climbing, twining fronds of indeterminate growth, to 30 m (90 ft) long; main rachis wiry, stemlike. Leafy branches off main rachis (constituting the pinnae) compound, triangular in overall outline, 10-20 cm (4-8 in) long and about as wide. Leaflets (pinnules) lobed, stalked, with terminal lobes often dissected (pinnatifid), basal lobes irregularly lobed or dissected; leaf-blade tissue pubescent below with short, curved hairs. Fertile leaflets contracted in shape, with two rows of sporangia along the leaf margin, which is enrolled to partially cover the sporangia.

NOTE: May be confused with *L. microphyllum* (Cav.) R. Brown, Old World climbing fern, but its leaflets unlobed (usually), glabrous below, articulate stalked (leaving wiry stalks when blade detached).

Ecological Significance: Present as a weed in the Philippines and considered a common weed in Taiwan (Holm *et al.* 1979). Most frequently naturalized in north and west Florida, in shady or sunny, usually damp, disturbed areas such as yards and roadsides, but also in less disturbed edges of swamps, marshes, lakes, creeks, hammocks, and upland woodlands. Can form tangled masses over ground cover and shrubs, its dense canopy eliminating the underlying vegetation (Nauman 1993a). Reported forming sun-blocking "walls" of fern in tributary floodplains of the Apalachicola River (L. C. Anderson, Florida State University, 1997 personal communication), and smothering seedlings of overstory tree species (K. C. Burks, Fla. Dept. of Env. Protection, personal observations). Introduced in 1932 as an ornamental (Gordon and Thomas 1994). Reported as weedy in southern Alabama as well (Nauman 1993a).

Distribution: Occurs naturalized in the U.S. from the Carolinas through Georgia, Florida, Alabama, Mississippi, and Louisiana, to Texas and Arkansas. In Florida, occurs across north and west Florida and south into central Florida, with documented sightings as far south as Hardee and Highlands counties (Fla. Dept. of Agriculture, unpublished records), and Broward County (R. Pemberton, U. S. Dept. Of Agriculture, 1997 personal communication). Verified herbarium specimens collected from naturalized populations in 29 Florida counties (Wunderlin *et al.* 1995).

Life History: North of the frost line, leaflets die in winter but stalks of leaves usually remain intact, providing a "ladder" for climbing stalks of new growth. Spores wind-dispersed, and perhaps carried in dust on moving objects such as vehicles. Thought to prefer soils of circumneutral pH (Nauman 1993).

JAPANESE CLIMBING FERN

KAL



Fertile pinnae

KAL



At hammock edge, Gulf County

KAL



Section of rachis, 2 pinnae

LYGODIUM MICROPHYLLUM (CAV.) R. BROWN

Lygodiaceae/Climbing Fern Family

- Common Name:** Old World climbing fern
Synonymy: *Lygodium scandens* (L.) Sw., *Ugena microphylla* Cav.
[sometimes placed in Schizeaceae, ray fern family]
Origin: Africa to Southeast Asia, south Pacific islands, Australia

Botanical Description: Fern with dark brown, wiry rhizomes and climbing, twining fronds of indeterminate growth, to 30 m (90 ft) long; main rachis (leaf stalk above petiole) wiry, stemlike. Leafy branches off main rachis (constituting the pinnae) once compound, oblongish in overall outline, 5-12 cm (2-5 in) long. Leaflets (pinnules) usually unlobed, stalked, articulate (leaving wiry stalks when detached); leaf-blade tissue usually glabrous below; fertile leaflets of similar size, fringed with tiny lobes of enrolled leaf tissue covering the sporangia along the leaf margin.

NOTE: May be confused with *L. japonicum*, whose pinnae are often twice compound (see preceding pages).

Ecological Significance: Considered a principal agricultural weed in Malaysia and present as a weed in Vietnam (Holm *et al.* 1979). Reported from Florida natural areas of Broward, Highlands, Lee, Martin, Palm Beach, and Sarasota counties (EPPC 1996). In 1993, infested 1,233 acres (11% of the area) of Jonathan Dickinson State Park and the Loxahatchee National Wild and Scenic River, including many acres of cypress swamps (Roberts and Richardson 1995). By 1995, infested 17,000 acres (12% of the area) of the Loxahatchee National Wildlife Refuge (Palm Beach County), blanketing entire tree islands and even clambering over sawgrass in standing water (Jewell 1996). Poses management problems for both wildfires and prescribed burns because growth into canopy creates an avenue for fire to spread where swamp waters have usually provided a natural barrier. Has caused loss of some canopy trees with such “crown” fires, as well as loss of native bromeliads residing on tree trunks (S. Farnsworth, Palm Beach County, 1995 personal communication; Roberts 1996).



Section of rachis with pinnae

OLD WORLD CLIMBING FERN

Distribution: Center of dispersal in Florida reported by Beckner (1968) and Nauman and Austin (1978) as Loxahatchee River Basin in southern Martin and northern Palm Beach counties. Herbarium specimens now recorded from Broward, Collier, DeSoto, Highlands, Lee, Polk, and Sarasota counties (Wunderlin *et al.* 1996). Widespread in Old World tropics from Africa and India to Malaysia and in Australia from Ryukyu Islands south to New South Wales (Singh and Panigrahi 1984, Tagawa and Iwatsuki 1979).

Life History: Wiry rhizomes able to accumulate into dense mats 1 m (3 ft) or more thick above native soil (J. Street, Palm Beach County, 1996 personal communication). Vegetative growth and production of fertile pinnules continuous throughout year. Can germinate from spores in 6-7 days, with 5-month-old spores still having an 80% germination rate (Brown 1984). Fertile pinnules usually produced where plant receives sunlight, with such exposed locations also aiding windborne dispersal of the spores. Often establishes first at pineland/wetland ecotone. Usually killed back by fire, but not eliminated (Maithani *et al.* 1986).

RRR



In natural area, Martin County

RRR



Fertile pinnules



MONOCOTS

Like all flowering plants, monocots produce flowers and form seeds within fruits. The common name of this class of plants derives from the trait of producing 1 seed leaf (cotyledon) at germination. Monocots are nearly always herbaceous in form, never forming true wood (apparent exceptions, such as bamboo stems and palm trunks, derive from hardened vascular bundles or leaf bases, not from true wood cells). The roots of monocots are usually fibrous (i.e., without a taproot), and the leaves usually have parallel veins. The flower parts (sepals, petals, etc.) are usually in threes or multiples of 3.

COLOCASIA ESCULENTA (L.) SCHOTT

Araceae/Arum Family

Common Names: Taro, wild taro, dasheen

Synonymy: *Colocasia antiquorum* var. *esculenta* Schott, *Caladium esculentum* Hort.

Origin: India, southeastern Asia

Botanical Description: Perennial herb to 1.5 m (4 ft) tall, with thick shoots from a large corm; slender stolons also often produced, along with offshoot corms. Leaf blades to 60 cm (24 in) long and 50 cm (20 in) wide, arrowhead shaped, with upper surface dark green and velvety; leaves peltate (stalked from back of blade); petioles large, succulent, often purplish near top. Inflorescence on a fleshy stalk shorter than leaf petioles; part of fleshy stalk enveloped by a long yellow bract (spathe). Flowers tiny, densely crowded on upper part of fleshy stalk, with female flowers below and male flowers above. Fruit a small berry, in clusters on the fleshy stalk.

NOTE: May be confused with other plants in Florida having large arrowhead-shaped leaf blades, such as the native arums (*Peltandra* spp.) and the exotic elephant's ear (*Xanthosoma sagittifolium*), but leaves of all similar-looking species not peltate (i.e., their petioles are attached at the leaf-blade margin).

Ecological Significance: Brought from Africa to the Americas as a food crop for slaves (Greenwell 1947). Introduced into Florida and other southern states in 1910 by U.S. Department of Agriculture as a substitute crop for potatoes (Fairchild 1947, Greenwell 1947). Considered an "aggressive weed" in parts of the Southeast by 1974 (Cook *et al.* 1974). Widely naturalized in Florida along streams, marshy shores, canals, and ditches by 1979 (Godfrey and Wooten 1979). Still promoted as food, feed, and fuel crop for Florida in 1980s (e.g., O'Hair *et al.* 1982, Shih and Snyder 1984). Reported as naturalized in 183 public water bodies in 1990 (Schardt and Schmitz 1990); found in 235 public water bodies by 1994 (Schardt 1997). Forms dense growth along river and lake shores, displacing native shoreline vegetation (Arridge and Fonteyn 1981, McCann *et al.* 1996).

KCB



Flowering spathe

Distribution: Now found throughout the tropics and much of the subtropics. Considered a principal agricultural weed in Puerto Rico and present as a weed in Jamaica (Holm *et al.* 1979). Dense to scattered populations reported from natural areas throughout Florida, particularly on the peninsula (EPPC 1996). Also reported from natural areas in southern Georgia, Alabama, Louisiana, and Texas (C. Jacono, U.S. Geological Survey, 1998 personal communication).

Life History: Can grow in a wide range of dry to wet sites (de la Pena 1983). Dispersed primarily by purposeful or accidental movement of vegetative fragments. Only a portion of corm crown and petiole needed to establish new plant (Begley 1979). Flowers occasionally, fruit not often seen (Godfrey and Wooten 1979). Seed production (2-5 per berry) considered uncommon, with low viability and difficulty in germination (Jackson *et al.* 1977, Nyman and Arditti 1985, O'Hair *et al.* 1982, Strauss 1983).

AMF



Along pond shoreline

KAL



Corm and plantlet

PISTIA STRATIOTES L.

Araceae/Arum Family

Common Name: Waterlettuce
Synonymy: None
Origin: Africa or South America

Botanical Description: Floating herb in rosettes of gray-green leaves, rosettes occurring singly or connected to others by short stolons. Roots numerous, feathery. Leaves often spongy near base, densely soft pubescent with obvious parallel veins, slightly broader than long, widest at apex, to 15 cm (6 in) long. Flowers inconspicuous, clustered on small fleshy stalk nearly hidden in leaf axils, with single female flower below and whorl of male flowers above. Fruit arising from female flower as a many-seeded green berry.

Ecological Significance: May have been introduced to North America by natural means or by humans (Stoddard 1989). Seen as early as 1774 by William Bartram, in “vast quantities ... several miles in length, and in some places a quarter of a mile in breadth” in the St. Johns River (Van Doren 1928). Has been suggested that trade via St. Augustine, founded in 1565, may have provided an early avenue for introduction into the St. Johns watershed (Stuckey and Les 1984). Capable of forming vast mats that disrupt submersed plant and animal communities and interfere with water movement and navigation (Bruner 1982, Attionu 1976, Sharma 1984, Holm *et al.* 1977); also serves as host for at least 2 genera of mosquitoes (Holm *et al.* 1977). Considered a serious weed in Ceylon, Ghana, Indonesia, and Thailand and at least present as a weed in 40 other countries (Holm *et al.* 1979). A target of management research and control in Florida for at least 2 decades.

KAL



Flowering spathe

Distribution: Now one of the most widely distributed hydrophytes in the tropics (Holm *et al.* 1977). In North America, occurs in peninsular Florida and locally westward to Texas (Godfrey and Wooten 1979). Also found persisting in coastal South Carolina (Nelson 1993). Occurred in 68 public water bodies in Florida by 1982 and in 128 water bodies by 1989, but total abundance reduced by half over same time period as a result of a statewide management program (Schardt and Schmitz 1990).

Life History: Reproduces rapidly by vegetative offshoots formed on short, brittle stolons. Varies seasonally in density of rosettes, from less than 100 to over 1,000 per m² in south Florida (Dewald and Lounibos 1990). Seed production, once thought not to occur in North America, now considered important to reproduction and dispersal (Dray and Center 1989). Not cold tolerant (Holm *et al.* 1977). Can survive for extended periods of time on moist muck, sandbars, and banks (Holm *et al.* 1977).

KAL



Leaf rosette

RHOEO SPATHACEA (SW.) STEARN

Commelinaceae/Dayflower Family

Common Names: Oyster plant, boat lily, Moses-in-a-boat

Synonymy: *Tradescantia spathacea* Swartz, *Rhoeo discolor* (L'Hér.) Hance

Origin: West Indies, Mexico, Central America

Botanical Description: Perennial herb with short, stout stem nearly hidden by overlapping leaf bases. Forms clumps by offshoots from fleshy rootstock. Leaves spreading-erect, closely overlapping in spiral pattern. Blades broadly linear, sharp-tipped, waxy, stiff, somewhat fleshy, 15-30 cm (6-12 in) long and 2.5-8 cm (1-3 in) wide; upper surfaces dark green or green with pale yellow stripes; lower surfaces usually purple. Flowers small, white, clustered within a folded (boat-shaped) bract (spathe) 3-4 cm long, short-stalked from leaf axils. Three petals, 6 stamens with hairy stalks; fruit a 2-seeded capsule, in clusters within the bract.

Ecological Significance: Introduced from tropical America (Morton and Ledin 1952, Small 1933). A favorite garden plant in the tropics, noted in 1933 (Small) as naturalized in peninsular Florida, in cultivated grounds and pinelands. Also noted as naturalized in 1947 (Bailey and Bailey), in 1968 (Ward), and later as a rare escapee from cultivation in southwest Florida (Wunderlin 1982). Noted as spreading irrepressibly in south Florida, volunteering far from planting sites on rock walls and building roofs, and on trees (Morton 1976, 1982). Spreads readily from cultivation by both seed and self-propagation of offshoots (Watkins and Wolfe 1986). Forms dense ground cover and clumps quickly (Hunt 1977). Has escaped into coastal tropical hammocks, where the dense cover prevents seedling growth of native canopy tree species (D. F. Austin, Florida Atlantic University, 1996 personal communication).

AF



In Lake Wyman natural area, Palm Beach County

Distribution: Cultivated widely in the tropics and as a houseplant elsewhere (Small 1933). Reported from natural areas of Brevard, Broward, Dade, Lee, Martin, and Palm Beach counties, in scrub, hammocks, and slough edges (EPPC 1996). Naturalized populations documented by herbarium specimens from Broward, Dade, Lee, and Monroe counties (Wunderlin *et al.* 1995).

Life History: Roots renewed easily when pulled up or broken (Morton 1982). Sensitive to freezing; can grow in high or medium light (Broschat and Meerow 1991). Flowers all year (Wunderlin 1982), providing year-round availability of small, slender seeds. Cross-pollinated by insects, or self-pollinated (Zomlefer 1983). Dispersed by seed to aerial surfaces such as walls, but vector of transport uncertain, perhaps wind. Recent “dwarf” cultivars apparently sterile or limited in their seed production, spreading primarily by vegetative offshoots where planted (Steve Kent, Tree of Life Nursery, 1998 personal communication). Leaves eaten, or at least nibbled, by raccoons, ducks, and dogs (Morton 1982). Can cause in humans a stinging, itching, and/or rash from contact with plant surfaces or the copious astringent juice (Morton 1982).

KAL



Stout clumps

KAL



Flower, boat-shaped bract

TRADESCANTIA FLUMINENSIS VELL.

Commelinaceae/Dayflower Family

Common Names: Green, or white-flowered, wandering Jew

Synonymy: *T. albiflora* Kunth

Origin: Tropical South America

Botanical Description: Creeping, trailing, subsucculent perennial herb, much branched, with branch tips erect; often forming dense ground cover; prostrate stems rooting freely at nodes. Leaves parallel-veined, alternate, simple, all glossy green or tinged with purple below; leaf blades arising from short, closed sheaths (tops often ciliate); blades to 5 cm (2 in) long and 2 cm (0.75 in) wide, oblong to ovate, with tips pointed; glabrous or with ciliate margins. Flowers white, in small clusters at stem tips, subtended by 1-3 leaflike bracts similar in size and form to stem leaves; 3 sepals and petals, separate; sepals usually with a line of hairs; 6 stamens, white bearded (pilose); ovary 3-celled, 6-seeded. Fruits small, 3-parted capsules; seeds black, pitted.

Ecological Significance: Occurs most densely in partial or full shade of disturbed and undisturbed hammocks, particularly in moist or wet areas but also in well-drained woodlands and shady residential yards. Forms dense monocultural ground cover that can be 60 cm (2 ft) deep in overlapping leafy stems (Kelly and Skipworth 1984). Smothers native ground cover and seedlings of overstory species (K. C. Burks, Florida DEP, personal observation; Godfrey and Wooten 1979); acts similarly in remnant lowland forests of New Zealand (Kelly and Skipworth 1984), where it has become an important natural-area pest. Also a weed of disturbed areas in New South Wales, Australia (Reed 1977), and an agricultural weed in its native range, particularly Brazil (Kelly and Skipworth 1984). Recognized in 1947 (Bailey and Bailey 1947) as a common weed under benches in commercial greenhouses, and as naturalized in the Southeast (Bailey and Bailey 1976). Noted as naturalized in sandy woods and waste places from Florida to North Carolina (Small 1933), but in later works shown only for Florida (e.g., Radford *et al.* 1968, Godfrey and Wooten 1979). Still cultivated, most often as a house or patio plant. Once established, difficult to control without nontarget damage (J. Weimer, Paynes Prairie Preserve, 1996 personal communication).

KAL



Leaves

GREEN WANDERING JEW

Distribution: Found most abundantly naturalized in north central Florida, from Gainesville to Orlando, but documented by herbarium specimens for 10 counties, including Leon and Calhoun in the Panhandle, Flagler on the east coast, and Hillsborough on the west (Wunderlin *et al.* 1995). Reported by conservation-area managers primarily for Alachua and Marion counties (EPPC 1996), with several dense populations noted in bottomland forests.

Life History: Spreads successfully by vegetative means; stem fragments with just 1 node remaining viable and rooting freely (Kelly and Skipworth 1984). May have main stems averaging 1.5 m (5 ft) long, with an additional 1.5 m of branches; a dense square meter of cover potentially supporting a standing crop of 900 m (2,880 ft) of plant (Kelly and Skipworth 1984). Flowers in spring and fall in north Florida; level of seed viability not known. Resists cold to -4°C (25°F) in laboratory experiments (Bannister 1986). Cultivars with variegated leaves apparently revert to full green in shade (IMP 1985). Can be used as larval host for native noctuid moth, *Mouralia tinctoides* (Guenè), a species related to cabbage and soybean loopers but not reported as a pest itself (Landolt 1993).

KAL



Flowers

KAL



In Greenway natural area, Alachua County

DIOSCOREA ALATA L.

Dioscoreaceae/Yam Family

Common Names: Greater, water, white, or winged yam
Synonymy: *D. atropurpurea* Roxb., *D. purpurea* Roxb., *D. sativa* Del.
Origin: Southeast Asia

Botanical Description: Vigorously twining herbaceous vine, from massive underground tuber. Stems to 10 m (30 ft) or more in length, freely branching above; internodes square in cross section, with corners compressed into “wings,” these often red-purple tinged. Aerial tubers (bulbils) formed in leaf axils (not as freely as in *D. bulbifera*), elongate, to 10 cm (4 in) x 3 cm (1.2 in), with rough, bumpy surfaces. Leaves long petioled, opposite (often with only 1 leaf persistent); blades to 20 cm (8 in) or more long, narrowly heart shaped, with basal lobes often angular. Flowers small, occasional, male and female arising from leaf axils on separate plants (i.e., a dioecious species), male flowers in panicles to 30 cm (1 ft) long, female flowers in smaller spikes. Fruit a 3-parted capsule; seeds winged.

NOTE: May be confused with *D. bulbifera* L., which has small or absent underground tubers, more numerous aerial tubers, and alternate leaves (see next pages). Native wild yams, *D. floridana* Bartl. and *D. quarternata* (Walt.) Gmel., infrequent in hammocks and floodplains of north and west Florida, never forming aerial tubers, leaf blades rarely to 15 cm (6 in) long.

Ecological Significance: Introduced to the Americas by Portuguese and Spanish traders in the 1500s (Coursey 1967). Apparently a recent introduction to Florida, not reported in earlier floristic works (Small 1933, Ward 1968). Noted by Ward (1977) as cultivated and sparingly escaped in Escambia, Leon, Alachua, Lee, and Dade counties, and elsewhere. Noted by Wunderlin (1982) as rare in scattered localities of central Florida and by Clewell (1985) as “introduced for ornament” and escaping from cultivation. Naturalized populations increasing in number and size in north Florida, with some stands forming blankets of shingled leaves over native vegetation and able to cover even mature trees (D. Ward, University of Florida, 1997 personal communication). So far reported as disrupting natural-area plant communities, particularly coastal hammocks, in south Florida: Broward, Dade, and Lee counties (EPPC 1996).

Distribution: Cultivated throughout the tropics for its edible underground tuber, and



Winged stem

unknown in the wild state (Coursey 1967, Purseglove 1975). In Florida, herbarium records now reported for naturalized populations in 7 counties: Escambia, Gadsden, Leon, Levy, Charlotte, Lee, and Dade (Wunderlin *et al.* 1996).

Life History: Normally grows for 8-10 months, then goes dormant for 3-4 months, with aerial stems dying back during dormancy (Martin and Rhodes 1977). Grown commercially as far north as southern Japan, a latitude similar to south Georgia's (Okagami 1986). Said to survive winters in France if planted deep enough (Coursey 1967). Fertile seeds rarely produced; spread by aerial tubers and fragments of underground tuber (Coursey 1967).

KAL



Capsules

KAL



**In disturbed area,
University of Florida**

KAL



Bulbils

DIOSCOREA BULBIFERA L.

Dioscoreaceae/Yam Family

- Common Names:** Air potato, potato yam, air yam
Synonymy: *D. anthropogagum* Chev., *D. hoffa* Cordemoy, *D. sativa* Thunb., *D. sylvestris* de Wild., *Helmia bulbifera* Kunth.
Origin: Tropical Asia

Botanical Description: Vigorously twining herbaceous vine, with small or absent underground tubers. Stems to 20 m (66 ft) or more in length, freely branching above; internodes round or slightly angled in cross section, not winged (as in *D. alata*). Aerial tubers (bulbils) freely formed in leaf axils, usually roundish, to 12 cm (5 in) x 10 cm (4 in), with mostly smooth surfaces. Leaves long petioled, alternate; blades to 20 cm (8 in) or more long, broadly heart shaped, with basal lobes usually rounded. Flowers rare (in Florida), small, fragrant, male and female arising from leaf axils on separate plants (i.e., a dioecious species), in panicles or spikes to 11 cm (4 in) long. Fruit a capsule; seeds partially winged.

NOTE: May be confused with *D. alata* L. or native wild yams (see note under *D. alata*).

Ecological Significance: Listed by Holm *et al.* (1979) as a serious weed in west Polynesia. Introduced to the Americas from Africa during the slave trade (Coursey 1967). Apparently introduced to Florida in 1905 as a USDA sample sent to an Orange County horticulturist, Henry Nehrling, who found that it “soon formed impenetrable masses,” adding that except for kudzu vine, he had “never seen a more aggressive and dangerous vine in Florida” (Morton 1976). Described in 1971 (Long and Lakela) as being grown ornamentally but “an unwanted plant in central and south Florida.” Noted as “becoming extensively naturalized” in 1977 (Ward) and well established in Dade and Broward counties (Austin 1978). By 1982 (Bell and Taylor, Wunderlin), invading a variety of habitats including pinelands and hammocks. Considered “rampant on undeveloped land” in Hillsborough County (Martinez 1993). Can quickly engulf native vegetation, climbing high into mature tree canopies. Produces large numbers of aerial tubers, which accelerate its spread. Reported from natural areas in 23 Florida counties, from Duval County south throughout the peninsula to Collier and Dade counties (EPPC 1996).

KAL



Flowers

Distribution: Widely distributed in Asia and Africa in the wild state (Coursey 1967) and widely naturalized elsewhere in the tropics and subtropics, including Central and South America (Schultz 1993). In Florida, herbarium records now reported for naturalized populations in 17 counties, from Jackson and Franklin counties in the Panhandle, and Alachua and Marion counties in the north-central peninsula, south to Dade County (Wunderlin *et al.* 1996).

Life History: Has a dormant period (like *D. alata*), even in south Florida, with aerial stems dying back during winter months (Schultz 1993). Aerial tubers considered the main storage organ (Coursey 1967), but underground tubers found in Florida populations, to 25 cm in diameter (Schultz 1993). Tubers known to float, aiding in dispersal (Coursey 1967), but plants slowed in growth under flooded conditions (K. Burks, Florida Department of Environmental Protection, unpublished data). Once thought not to flower in Florida (e.g., Long and Lakela 1971), but flowers observed in north Florida, and flowers and fruits in south Florida (Schultz 1993). Cultivated in Oceania and West Indies, but wild-form tubers usually bitter and often poisonous (Martin 1974).

KAL



Bulbil

RH



**Matheson Hammock,
Miami-Dade County**

KAL



Rounded stem

HYDRILLA VERTICILLATA (L.F.) ROYLE

Hydrocharitaceae/Frog's-Bit Family

Common Names: Hydrilla, water thyme, Florida elodea, waterweed

Synonymy: None

Origin: Warmer regions of Old World

Botanical Description: Submersed, usually rooted, aquatic perennial herb with slender ascending stems to 9m (30 ft) long, heavily branched. Stems from slender rhizomes, these often tipped with a small tuber. Leaves whorled, 3-8 per whorl, 2-4 mm (0.1-0.2 in) wide and 6-20 mm (0.2-0.8 in) long, bearing coarse (visible) teeth along the margins and usually 1-4 small conical bumps along underside of midrib, which is often red. Fleshy axillary buds (turions) often formed at leaf axils, to 5 cm (2 in) long, with 3 sepals and 3 petals, each about 4 mm (0.3 in) long, whitish or translucent, floating at water surface. Male flowers detached and free floating at maturity, with 3 sepals and 3 petals, white to reddish brown, about 2mm long, releasing floating pollen from stamens when flower pops open at water surface.

NOTE: May be confused with another invasive non-native submersed aquatic, *Egeria densa* Planch., Brazilian waterweed, which has close whorls of 3-6 leaves usually 2-3 cm long, with minute teeth on margins and no conical bumps on midrib below.

Ecological Significance: Introduced in Florida waters in 1960 and spreading to all drainage basins in the state by the early 1970's (Langeland 1996). By 1991, found in 41% of Florida's public water bodies (Schmitz *et al.* 1993); by 1994, found in 43% (182), with an estimated coverage of 38,500 ha (95,000 acres) (Schardt 1997). Competitively displaces native submersed plant communities (Haller and Sutton 1975, Bowes *et al.* 1977). In dense stands, alters fisheries populations (Colle and Shireman 1980), causes shifts in zooplankton communities (Schmitz and Osborne 1984), and affects water chemistry (Canfield *et al.* 1983).

KAL



Tubers

Distribution: Found on every continent except Antarctica (Cook and Lüönd 1982). In the United States, dioecious plants (fortunately just 1 sex, female) found in Florida, Georgia, Alabama, Tennessee, Mississippi, Louisiana, Texas, California, and Connecticut; monoecious plants found in Maryland, Delaware, Washington, and Washington, D.C.; both types found in the Carolinas and Virginia (Netherland 1997).

Life History: Readily dispersed by movement of plant fragments (Langeland and Sutton 1980). Can produce up to 6,000 tubers per m² (Sutton *et al.* 1992). Tubers viable for several days out of water (Basiouny *et al.* 1978), for over 4 years in undisturbed sediment (Van and Steward 1990), and after ingestion and regurgitation by waterfowl (Joyce *et al.* 1980). Can produce nearly 3,000 turions per m² (Thullen 1990). Viable seed produced by monoecious plants, but their importance to dispersal not known (Langeland and Smith 1984). Female dioecious plants from Florida found able to cross with monoecious strains and produce viable seed under laboratory conditions (Steward 1993).

WH



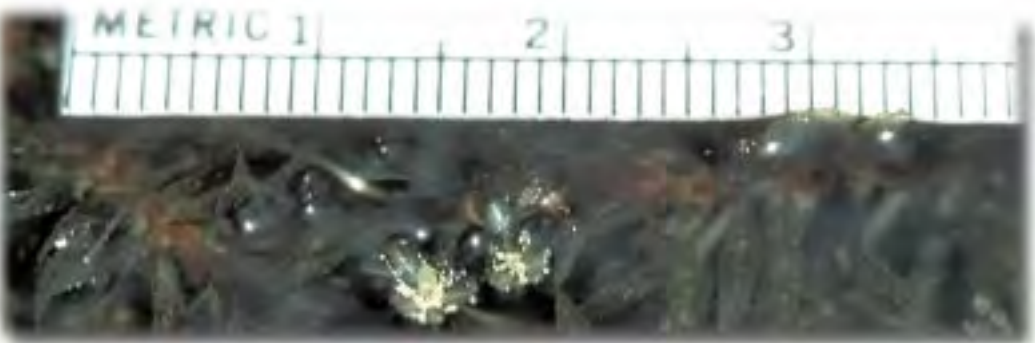
In Lake Trafford, Collier County

TKV



Turions

KAL



Female flowers

ASPARAGUS DENSIFLORUS (KUNTH) JESSOP

Liliaceae/Lily Family

Common Names: Asparagus fern, Sprenger's asparagus fern, emerald fern

Synonymy: *Asparagus sprengeri* Regel

Origin: South Africa

Botanical Description: Evergreen perennial herb from a crown of tuberous roots, to 60 cm (2 ft) in height, with stems stiff or spreading-arching to 2 m (6 ft) long. Larger branches usually bearing minute axillary spines. Branchlets (cladophylls) flat, needle-like, light bright green, to 2.5 cm (1 in) long, clustered at branch nodes. Leaves tiny, scale-like, at bases of branchlets. Flowers small, white or pinkish white, and fragrant. Fruit a bright red berry about 8 mm (< 1 in) in diameter; 3 seeds per fruit.

Ecological Significance: Widely planted as a ground cover (Stresau 1986). Escaped from cultivation (Long and Lakela 1971, Wunderlin 1982). Found in large colonies on several scrub sites in Palm Beach County, displacing native ground cover and understory shrubs (Austin *et al.* 1992), and in Dade County, found in 7 local parks (R. Hammer, Miami-Dade County Parks Department, 1997 personal communication). Has escaped as well into tropical hammocks in Palm Beach County, overtopping young native plants such as wild coffee, *Psychotria nervosa* (A. Zahorcak, Florida Department of Environmental Protection, 1998 personal communication). Naturalized in barrier-island habitats of Sarasota County (K. A. Langeland, University of Florida, personal observation). Also reported from natural areas in Citrus, Lake, and Lee counties (EPPC 1996).

RRR



Fruit, cladophylls

ASPARAGUS FERN

Distribution: Native to South Africa and long cultivated in the United States and elsewhere as a potted plant (Bailey and Bailey 1947, 1976). In Florida, herbarium specimens of naturalized populations recorded from Hillsborough, Manatee, Pinellas, Lee, Polk, and Monroe counties (Wunderlin *et al.* 1995).

Life History: Cold hardy to -1°C (30°F) (Broschat and Meerow 1991). Thrives in any well-drained soil (Stresau 1986). Grows in low to high light conditions, has low nutrient requirements, and tolerates drought (Broschat and Meerow 1991). Also noted as having “good” salt tolerance (Hunt 1977). Propagated by division of tuberous crowns or by seed (Bailey and Bailey 1976). Flowers and fruits through summer and fall (Hunt 1977). Seeds spread by birds (Austin *et al.* 1992).

KAL



In scrub habitat, Palm Beach County

KAL



Flowers

HYMENACHNE AMPLEXICAULIS (RUDGE) NEES

Poaceae (Gramineae)/Grass Family

Common Names: West Indian marsh grass, trompetilla
Synonymy: *Panicum amplexicaulis* Rudge
Origin: West Indies, tropical Central and South America

Botanical Description: Robust perennial grass from stolons. Stems floating, creeping, or ascending to 1 m (3 ft) or more in height, sparingly branched, rooting at the lower nodes; stems pithy, not hollow. Leaf sheaths glabrous but with hairs on upper margins; ligule a membrane. Leaf blades flat, to 35 cm (14 in) long and to 4 cm (1.6 in) wide, cordate at the base and clasping the stem (amplexicaul); glabrous but with long hairs on lower margins. Inflorescence a terminal panicle, dense and spike-like, about 8 mm (0.3 in) wide and to 50 cm (20 in) long; spikelets short stalked, 3.3-4.3 mm long, scabrous on the veins, often opened slightly at the apex.

NOTE: May be confused with the native *Sacciolepis striata* (L.) Nash, American cupscale, which has a similar inflorescence, or with other marsh grasses of similar form, but *Hymenachne* stems distinctive in containing white pith (most grass stems are hollow) (Pohl and Lersten 1975).

Ecological Significance: First noted in botanical works for Florida in 1968 (Ward); described by Hall (1978) as “rare” in “low wet pastures” of south Florida. Possibly a natural introduction by migratory birds; can form extensive colonies in its natural habitats (Hill 1996). Has become, along with pará grass, the dominant species in much of the Myakka River basin’s native maidencane marsh, occurring primarily in the deeper water along the river channel while pará grass dominates the shallower zones near the uplands (J. Huffman 1992). Observed in 1993 as “common” in ditches, marshes, and mucky wet areas south of Clewiston, and in “large stands” in nearby detention ponds (E. C. Watson, U.S. Sugar Corp., 1993 personal communication). Dense populations also reported for the Ringling MacArthur tract in Sarasota County and for Mountain Lake in Hernando County (EPPC 1996), and for marsh areas along Fisheating Creek, near Lake Okeechobee, where it is displacing maidencane communities (Jackie Smith, Florida Department of Environmental Protection, 1995 personal communication). Scattered colonies reported for Collier Seminole State Park (EPPC 1996). Colonizing and becoming difficult to control along drainage canals of south central Florida (Mike Bodle, South Florida Water Management District, 1997 personal communication).

Distribution: Now found in tropics of both hemispheres (Howard 1979). In Florida, documented by herbarium specimens from Collier, Hendry, Lee, Palm Beach, and Sarasota counties (Wunderlin *et al.* 1995). Considered a principal agricultural weed in Surinam, a common weed in Indonesia, and present as a weed in Trinidad (Holm *et al.* 1979).

WEST INDIAN MARSH GRASS

Life History: Adapted to fluctuating water levels, i.e., cycles of flooding and drying, which allow massive regeneration by seed and ensure persistence after extensive drought periods (Wildin 1988). Observed as tolerating 40 weeks of flooding and maximum flooding depths of 1.2 m (4 ft) (Tejos 1980). Flowers in the fall (Wunderlin 1982), with observed germination rates variable, 0-86% (Hill 1996). Seed more widely dispersed during periods of high standing water (J. Mullahey, University of Florida, personal observations).

AMF



Along Fisheating Creek, Glades County

KCB



Spike-like panicle

IMPERATA CYLINDRICA (L.) RAEUSCHEL

Poaceae (Gramineae)/Grass Family

Common Name: Cogon grass
Synonymy: *Imperata cylindrica* (L.) Beauv.; *I. brasiliensis* Trinius misapplied
Origin: Southeast Asia

Botanical Description: Perennial grass, growing in loose or compact tufts, from stout, extensively creeping, scaly rhizomes with sharp-pointed tips. Leaf sheaths relatively short, glabrous or pubescent; ligule a membrane, 0.5-1 mm long. Leaf blades erect, narrow and pubescent at base, flat and glabrous above, to 1.2 m (4 ft) tall and to 2 cm (< 1 in) wide, with whitish midvein noticeably off-center; blade margins scabrous, blade tips sharp pointed. Inflorescence a narrow, dense terminal panicle, white silky and plume-like, to 21 cm (8 in) long and 3.5 cm (1.5 in) wide. Spikelets crowded, paired on unequal stalks, with each spikelet surrounded by long white hairs.

Ecological Significance: Considered one of the top 10 worst weeds in the world, reported by 73 countries as a pest in a total of 35 crops (Holm *et al.* 1977). Introduced to the United States in 1911 near Mobile, Alabama as packing material in a shipment of plants from Japan (Dickens 1974, Tabor 1949, Tabor 1952); and into Mississippi as a forage crop from the Philippines before 1920 (Dickens and Buchanan 1971, Patterson *et al.* 1979, Tabor 1949 and 1952, Tanner and Werner 1986). Replanted to Florida from Mississippi for forage and soil stabilization in Gainesville, Brooksville, and Withlacoochee (Hall 1983, Tabor 1949)—these areas now with high densities of naturalized populations (Dickens and Buchanan 1971, Willard 1988). By 1949, more than 405 ha (1,000 acres) of the grass established in central and northwest Florida (Dickens 1974). Now frequent along transportation and utility corridors throughout Florida. Has invaded dry to moist natural areas in over 20 counties (EPPC 1996), including habitats of federally listed endangered and threatened native plant species (K. C. Burks, Florida Department of Environmental Protection, 1997 personal communication).

SM



Leaf blade, off-center midvein

Distribution: Commonly found in humid tropics but has spread to warm temperate zones worldwide (Hubbard *et al.* 1944). Currently reported for all of Florida, plus parts of Alabama, Georgia, Louisiana, and Mississippi, along with an adventive (but perhaps not persistent) population in South Carolina (Allen and Thomas 1991, Elmore 1986, Bryson and Carter 1993).

Life History: Fast-growing; thrives in areas of minimal tillage, such as orchards, lawns, and roadsides (Patterson *et al.* 1979). Produces new rhizomes readily, facilitating the plant's spread at newly colonized sites; can propagate by rhizome fragments but does not survive well under regular deep tilling (Wilcut *et al.* 1988). Roots and rhizomes remarkably resistant to fire (Bryson and Carter 1993). Disperses over long distances into a variety of habitats by windborne seeds (Bryson and Carter 1993). Flowers in spring or fall, or year-round in central and south Florida (Willard 1988).

DI



In Everglades National Park (foreground)

SM



Dense panicle

NEYRAUDIA REYNAUDIANA (KUNTH) KENG EX HITCHC.

Poaceae (Gramineae)/Grass Family

Common Names: Silk reed, Burma reed, cane grass
Synonymy: None (*N. arundinacea* (L.) Henr. misapplied)
Origin: South Asia

Botanical Description: Robust, reed-like perennial to 3 m (10 ft) tall, forming clumps from short, coarse rhizomes. Stems often branched and filled with soft pith. Leaf sheaths 10-25 cm (4-10 in) long, smooth, shining, clasping, woolly at the top with a line of collar hairs and ligule of hairs. Leaf blades linear, flat or involute, 20-100 cm (8-39 in) long and 8-25 mm (0.3-1 in) wide, glabrous below, sparsely short-hairy above, with margins smooth or rough and midvein inconspicuous; blades often deciduous from sheaths. Inflorescence a large, feathery, silver-hairy terminal panicle, 30-60 cm (12-24 in) long, densely and finely branched, nodding. Spikelets 6-8 mm (0.2-0.3 in) long, 4- to 8-flowered, with lemmas long-hairy and slender-awned (awns often curved).

NOTE: May be confused with the common reed, *Phragmites australis* (Cav.) Trin. ex Steud., but its rhizomes long, often forming leafy stolons; its leaf sheaths without a hairy collar; and its spikelets without awns.

Ecological Significance: Introduced by USDA to its Plant Introduction Station in Coconut Grove in 1916 (Gordon and Thomas 1997). Reported as escaping in southeastern Florida by several authors (Hitchcock and Chase 1951, Ward 1968, Bailey and Bailey 1976, Morton 1976, Austin 1978, Hall 1978). By 1990, documented as a serious pest in Dade County and as naturalized in Collier County (Guala 1990). Able to colonize marginal and undisturbed habitats once established in an area (Guala 1990). Now well established in the globally rare pine rockland habitats of Dade County and viewed as a threat to rare species there, especially since its high flammability promotes frequent fires, enhancing its spread (Schmitz *et al.* 1997). By 1993, established in nearly 75% of Dade County pine rocklands outside Everglades National Park, with high mortality of the native south Florida slash pine (*Pinus elliotii* var. *densa*) linked to fires involving this grass (Maguire 1993). In its native range, reported to grow gregariously by roadsides and in old clearings, bogs, and agricultural fields, often on infertile and rocky soils (Lazarides 1980).



Hairs at sheath/blade joint

Distribution: Occurs in a wide variety of habitats to 2,000 m (6,500 ft) in elevation in its native range (Bor 1960, Lazarides 1980). Reported as introduced in the Bahamas (Correll and Correll 1982). In Florida, currently found in Collier, Monroe (including the Florida Keys), Dade, Broward, and Palm Beach counties (Schmitz 1994, Wunderlin *et al.* 1996), and possibly in Highlands County, where it was once cultivated (Guala 1990). Has been cultivated as far north as southern Georgia (Schmitz *et al.* 1997, Guala 1990).

Life History: Tolerant of a wide range of soil, light, and water regimes, including marshy areas, but appears to prefer open, sunny, dry sites, usually disturbed ones (Guala 1990). Aerial stems usually killed by freezing temperatures, but observed to vigorously resprout from rhizomes after hard frosts (Guala 1990). Flowers nearly year-round, seeds dispersed by wind.

KAL



In natural area, Miami-Dade County

ID



Panicles

PANICUM REPENS L.

Poaceae (Gramineae)/Grass Family

Common Names: Torpedo grass, quack grass, bullet grass

Synonymy: *Panicum littorale* Mohr ex Vasey

Origin: Old World

Botanical Description: Perennial grass to 1 m (3 ft) tall, from sturdy, vigorous, widely creeping or floating rhizomes with overlapping brownish to white scales and rigid sharp-pointed (torpedo-like) growing tips. Aerial stems erect or leaning, lower portions often wrapped in bladeless sheaths. Upper leaf sheaths glabrous or hairy, usually at least with hairs on upper margins; ligule a short-ciliate membrane; leaf blades stiff, linear, flat or folded, to 26 cm (10 in) long and 5.3 mm (0.3 in) wide, glabrous or sparsely hairy below, usually long-hairy above, especially near base behind ligule; blade surfaces often with a whitish waxy coating (“bloom”). Inflorescence a loose open terminal panicle, 7-22 cm (3-9 in) long, with branches erect or ascending. Spikelets 2-3 mm long and about 1 mm wide, glabrous, the first glume (outermost spikelet bract) short, truncate, loose, nearly encircling the base of the other spikelet bracts.

Ecological Significance: Reported as a weed of 17 crops in 27 countries, considered one of the most serious grass weeds (Holm *et al.* 1977). Introduced into Gulf Coast of United States before 1876, being first collected that year near Mobile, Alabama (Beal 1896). Seed introduced for forage crops in the South from 1926 (Tarver 1979). By 1950, planted in nearly every southern Florida county and in a few central and north-central counties (Hodges and Jones 1950). Quickly forms monocultures that displace native vegetation, particularly in or near shallow waters (Shilling and Haller 1989). Occurred in 70% of Florida’s public waters by 1992, with the largest infestation in Lake Okeechobee, displacing nearly 5,670 ha (14,000 acres) of native marsh (Schardt 1994). Also reported from parks and preserves throughout Florida (EPPC 1996). Has cost an estimated \$2 million a year for its management in flood control systems (Schardt and Schmitz 1991). Has seriously infested citrus groves and golf courses throughout Florida (Baird *et al.* 1983, Fleming *et al.* 1978).



Rhizome

Distribution: Now found in the tropics and subtropics from approximately 43° North latitude to 35° South latitude (Holm *et al.* 1977). Occurs from Florida to Texas in the Southeast (Godfrey and Wooten 1979), northward along the Atlantic Coast to North Carolina (C. Jacono, U.S. Geological Survey, 1998 personal communication), and in California (Small 1933) and Hawaii, where it is a pest in sugarcane (Holm *et al.* 1977). Occurs naturalized in 75% of Florida's 67 counties (Wunderlin *et al.* 1995).

Life History: Tolerant of drought and partial shade, and can grow on heavy upland soils, but thrives in moist to wet sandy or organic soil (Hodges and Jones 1950, Holm *et al.* 1977). Stimulated in its spread by tilling and fertilization (Hodges and Jones 1950). Reproduces principally by rhizome extension and fragmentation (Holm *et al.* 1977). Flowers nearly year-round, but variable in its seed abundance and viability (Whyte *et al.* 1959, Peng and Twu 1979, Wilcut *et al.* 1988).

KAL



Panicle

KAL



Ligule, hairs on blade

KAL



Monoculture in St. Johns Marsh

PENNISETUM PURPUREUM SCHUMACH.

Poaceae (Gramineae)/Grass Family

Common Names: Napier grass, elephant grass, Merker grass

Synonymy: None

Origin: Africa

Botanical Description: Robust perennial to 4 m (13 ft) tall, forming thick clumps or colonies from basal offshoots or short rhizomes. Stems often branched above; internodes more or less bluish glaucous; young nodes with white hairs, later becoming smooth, glabrous. Leaf sheaths glabrous, usually shorter than the internodes; ligule a narrow rim densely fringed with long white hairs. Leaf blades linear to tapering, flat, often bluish green, to 1 m (39 in) long and 3 cm (1 in) wide, pilose near the base, especially on margins; blade margins generally rough; midvein stout, whitish above, strongly keeled below. Inflorescence a dense terminal panicle, spike-like, bristly, tawny to purple-tinged, to about 20 cm (8 in) long and 2 cm (0.8 in) across. Spikelets 4-6 mm long, solitary or in clusters of 2-6 on hairy axis, surrounded by sparsely plumose bristles to 2 cm long that fall with the spikelets at maturity; outermost glume minute or absent.

NOTE: May be confused with the larger native foxtails (*Setaria* spp., also called bristle grasses), but their spikelet bristles persistent on the flowering stalks, not falling with mature spikelets. Distinguished from other *Pennisetum* species in Florida by long leaf blades, sparsely plumose bristles, and minute or absent first glumes.

Ecological Significance: Reported as a weed in 19 crops in 25 countries, including the United States (Holm *et al.* 1977). In dense growth, prevents regeneration of native species (Cronk and Fuller 1995). Can dominate fire-adapted savanna communities (Holm *et al.* 1977). Introduced to the United States in 1913 as a forage crop (Thompson 1919, Hoover *et al.* 1948). Noted as escaping in 1968 (Ward 1968), and as established in glades in south Florida by 1971 (Long and Lakela 1971). Now commonly naturalized in central and south Florida, infrequently in north and west Florida, most often in disturbed areas such as roadsides, canal banks, and fields, but also in scrub, pine rockland, hammock, sink, lake shore, swamp, and prairie habitats (Hall 1978). Reported in colonies on the shores of 11 public water bodies by 1992 (Schardt 1994). Has also created problems in flood-control systems by blocking access to canals, reducing water flows, and overgrowing pump stations (Schardt and Schmitz 1991). Still the subject of research for improved cultivars and hybrids as forage and silage in Florida and elsewhere (e.g., Diz *et al.* 1994, Philips *et al.* 1993, Spitaleri *et al.* 1994, Williams and Hanna 1995).

KAL



Spike-like panicle

NAPIER GRASS

Distribution: Throughout the tropics and subtropics, Old and New World (Archer and Bunch 1953). Currently found in 29 Florida counties (Wunderlin *et al.* 1995). Reported from 10 preserves in south Florida (EPPC 1996). Also naturalized and weedy in California, Hawaii, Puerto Rico, and the Virgin Islands (Holm *et al.* 1979, USDA 1997).

Life History: Grows well on a wide range of soils and in many habitats; very drought resistant; can form “reed jungles” in rich, moist soils (Holm *et al.* 1977). Forms dense clumps by extensive tillering; propagated vegetatively by root crown divisions or rhizome and stem fragments (Holm *et al.* 1977). Resprouts easily from small rhizomes left after mechanical control (Cunningham 1991). Able to persist in changing conditions from extensive, deep, fibrous root system, but can be injured by freezes (Holm *et al.* 1977). Flowers July through February. Does not readily produce viable seed in many countries, but good seed crops reported in El Salvador (Holm *et al.* 1977).

JN



Habit

RER



Along roadside near Indiantown

KAL



Sheath tops, blade bases

UROCHLOA MUTICA (FORSK.) NGUYEN

Poaceae (Gramineae)/Grass Family

Common Names: Pará grass, California grass, buffalo grass, water grass, Scotch grass, Carib grass

Synonymy: *Brachiaria mutica* (Forsk.) Stapf, *Brachiaria purpurescens* (Raddi) Henr., *Panicum muticum* Forsk., *Panicum purpurescens* Raddi

Origin: Africa

Botanical Description: Perennial grass from widely creeping stolons. Stems reclining at base, rooting at the lower nodes, to 1 m (3 ft) tall when erect, to 3 m (15 ft) long when creeping; nodes swollen, densely hairy. Leaf sheaths with dense stiff hairs below, slightly hairy above; ligule a densely ciliate membrane; leaf blades flat, 10-15 mm (0.4-0.6 in) wide and 25-30 cm (10-12 in) long, glabrous but often with small fine hairs at base above and below. Inflorescence a terminal panicle to 20 cm (8 in) long, with 8-20 ascending, alternate branches; spikelets (reduced flowers) dense on the branches, paired, each about 3 mm long, glabrous, often purple tinged.

Ecological Significance: Introduced in most tropical and subtropical regions of the world as a fodder grass, but also considered one of the world's worst weeds; reported as an agricultural pest in 23 crops in 34 countries, including the United States (Holm *et al.* 1977). Competes aggressively with other plants, with fast growth, high productivity, and allelopathic abilities that allow it to form dense monocultural stands (Chang-Hung 1977, Handley *et al.* 1989). Probably introduced into the Americas via Brazil "at an early date" (Hitchcock and Chase 1951); may have been introduced into Florida as early as the late 1870s (Austin 1978); recommended for pasturage here in 1919 (Thompson 1919b). Invades disturbed low areas such as canals, but also displaces native vegetation along river and lake shorelines and in marshes and swamps. Found in 51 public water bodies in 1982 and 183 water bodies by 1994—down from a 1986 high of 207, or 52% of Florida's public waters (Schardt and Schmitz 1991, Schardt 1997).

KAL



In Myakka River basin, Sarasota County

Distribution: Now commonly escaped from cultivation in central and south Florida. Documented by herbarium specimens from 15 counties, from Pinellas on the west to Brevard on the east and south to the Florida Keys (Wunderlin *et al.* 1995). Also reported from wetland natural areas in Sarasota, Hillsborough, Martin, and Palm Beach counties (EPPC 1996).

Life History: Flourishes in wet conditions, able to form a stolon mat 1 m (3 ft) or more in depth (Holm *et al.* 1977) and send floating stems of 6 m (18 ft) or more in length across slow-moving water (Handley and Ekern 1981). Also tolerant of drought and of brackish water, but susceptible to frost (Holm *et al.* 1977). Reproduces and spreads primarily by stem fragments (Sainty and Jacobs 1981). Flowers from September through December in Florida (Hall 1978), but production of fertile seeds apparently low (Thompson 1919b).

KAL



Panicle

KAL



Hairy node and sheath

EICHHORNIA CRASSIPES (MART.) SOLMS-LAUB.

Pontederiaceae/Pickerelweed Family

Common Names: Waterhyacinth, water-orchid
Synonymy: *Piaropus crassipes* (Mart.) Britt.
Origin: Amazon basin

Botanical Description: Floating aquatic herb, rooting in mud if stranded, usually in dense mats with new plantlets attached on floating green stolons. Submersed roots blue-black to dark purple, feathery, dense near root crown, tips with long dark root caps. Leaves formed in rosettes; petioles to 30 cm (12 in) or more, spongy, usually inflated or bulbous, especially near base; leaf blades roundish or broadly elliptic, glossy green, to 15 cm (6 in) wide. Inflorescence a showy spike above rosette, to 30 cm (12 in) long. Flowers lavender-blue with a yellow blotch, to 5 cm (2 in) wide, somewhat 2-lipped; 6 petals, 6 stamens. Fruit a 3-celled capsule with many seeds.

NOTE: May be confused with emergent form of the native frog's bit (*Limnobium spongia* (Bosc) Steud.), but its petioles not inflated and its flowers small, white, single in leaf axils.

Ecological Significance: Reported as a weed in 56 countries (Holm *et al.* 1979). Introduced to the United States in 1884 at an exposition in New Orleans, reaching Florida in 1890 (Gopal and Sharma 1981). By late 1950s, occupied about 51,000 ha (126,000 acres) of Florida's waterways (Schmitz *et al.* 1993). Grows at explosive rates exceeding any other tested vascular plant (Wolverton and McDonald 1979); doubles its populations in as little as 6-18 days (Mitchell 1976). In large mats, degrades water quality and dramatically alters native plant and animal communities (Gowanloch 1944, Penfound and Earle 1948).

KAL



Leaf rosettes, flowers

Distribution: Now occurs globally in the tropics and subtropics, and further north and south where it can escape severe cold (Holm *et al.* 1977). Found throughout Florida, north to Virginia (and New York) and west to California and Hawaii, 16 states in all (USDA 1997).

Life History: Reproduces both vegetatively and sexually (Penfound and Earle 1948, Gopal and Sharma 1981). Quickly forms new rosettes on floating stolons, with stolons easily broken; plants and mats transported by wind and water. Leaves killed back by moderate freezes, but quickly regrows from stem tip protected beneath water surface. Flowers year-round in mild climates, producing abundant seeds in developed mats (Penfound and Earle 1948). Numerous seedlings seen in conjunction with lake draw-downs (K. A. Langeland, University of Florida, personal observations).

IS



Crowding out bulrush community

DICOTS

Like all flowering plants, dicots produce flowers and form seeds within fruits. The common name of this class of plants derives from the trait of producing 2 seed leaves (cotyledons) at germination. These plants may be herbaceous or truly woody in growth form; their roots may be fibrous or may include a persistent taproot. Dicot leaves usually have netted, or branched, venation. Their flower parts (sepals, petals, etc.) are usually in fours or fives, or multiples of 4 or 5.

HYGROPHILA POLYSPERMA (ROXB.) T. ANDERS.

Acanthaceae/Water-Willow Family

- Common Name:** Hygro, East Indian hygrophila, Miramar weed
Synonymy: *Justicia polysperma* Roxb., *Hemidelphis polysperma* (Roxb.) Nees in Wall.
Origin: India, Malaysia

Botanical Description: Perennial aquatic herb with squarish stems ascending to creeping, mostly submersed, usually rooted in substrate; also roots freely at floating nodes. Leaves opposite, to 8 cm (3 in) long (aerial leaves smaller) and to 2 cm (0.8 in) wide, usually broader toward tip; sessile, with bases joined at node by ciliated flanges of tissue, the cilia (hairs) easily observed, to 1.5 mm long. Flowers small, solitary in uppermost leaf axils, nearly hidden by leaves, calyx 5-lobed, corolla bluish white, 2-lipped; 2 fertile stamens. Fruit a narrow capsule, splitting lengthwise to release tiny round seeds.

NOTE: May be confused vegetatively with small, opposite-leaved natives sometimes found submersed, such as *Ludwigia repens* and *Diodia* spp., but these without flanges at nodes (*Ludwigia*) or with flat-bristled flanges (*Diodia*). The native marsh species, *Hygrophila lacustris* (Schlecht. & Cham.) Nees is larger (aerial leaves to 15 cm long) and erect in habit, with larger flowers in axillary clusters along upper stems.

Ecological Significance: Appeared in the aquarium trade in 1945 as “oriental ludwigia” (Innes 1947). First collected in Florida near Tampa as an escapee from cultivation in 1965, but naturalized populations on east coast, especially one near the town of Miramar in Broward County, first brought to public and scientific attention in the late 1970s (Vandiver 1980, Les and Wunderlin 1981). Reported as an expanding problem in south Florida canals in 1980 (Vandiver); now replacing the well-known hydrilla as the most serious weed in these waterways (Sutton 1995), clogging irrigation and flood-control systems and interfering with navigation (Woolfe 1995). Able to compete with hydrilla (Vandiver 1980, Les and Wunderlin 1981); able to expand a population rapidly, in one case from 0.04 ha (0.1 acre) to over 0.41 ha (10 acres) in 1 year (Vandiver 1980). Difficult to control (Schmitz 1985). Found in a dozen public lakes and rivers by 1990 (Schardt and Schmitz 1991), and in 18 public water bodies by 1994 (Schardt 1997).

KAL



Stem rooting at nodes

Distribution: Native to East Indies. Naturalized in Florida from Dade and Lee counties north into the Panhandle (Wunderlin *et al.* 1995, Schardt 1997). Also naturalized in Texas (Angerstein and Lemke 1994), and reported for the Richmond, Virginia area (Reams 1953).

Life History: Stems brittle, easily fragmenting, easily developing new stands from rooted nodes of even small fragments (Les and Wunderlin 1981). Able to form dense monocultural stands with emerged stem tips from depths as great as 3 m (10 ft) or more (Hall and Vandiver 1990). Able to photosynthesize in lower light than most native submersed species (Spencer and Bowes 1984). Tends to grow more vigorously in flowing water (Van Dijk *et al.* 1986). Flowers in fall and winter, with a high percentage of seed set in Florida populations (Les and Wunderlin 1981).

KAL



In canal, Indian River County

DS



Flower

SCHINUS TEREBINTHIFOLIUS RADDI

Anacardiaceae/Cashew Family

Common Names: Brazilian pepper, Florida holly, Christmas berry, pepper tree

Synonymy: None

Origin: Brazil, Argentina, Paraguay

Botanical Description: Evergreen shrub or tree to 13 m (43 ft) tall, often with multi-stemmed trunks and branches arching and crossing, forming tangled masses. Leaves alternate, odd-pinnately compound with 3-11 (usually 7-9) leaflets, these elliptic-oblong, 2.5-5 cm (1-2 in) long, with upper surfaces dark green (lateral veins obvious, lighter in color), lower surfaces paler, and leaflet margins often somewhat toothed. Leaves aromatic when crushed, smelling peppery or like turpentine. Flowers unisexual (dioecious), small, in short-branched clusters at leaf axils of current-season stems; 5 petals, white to 2 mm long. Fruit a small, bright-red spherical drupe.

Ecological Significance: Imported as an ornamental in the 1840s (Barkley 1944). Has invaded a variety of areas including, but not limited to, fallow farmland, pinelands, hardwood hammocks, roadsides, and mangrove forests, in areas with a high degree of disturbance and natural areas with little disturbance (Woodall 1982, Laroche 1994a). Forms dense thickets of tangled woody stems that completely shade out and displace native vegetation. Has displaced some populations of rare listed species, such as the Beach Jacquemontia (*Jacquemontia reclinata* House, U.S. and Fla. Endangered), and Beach Star (*Remirea maritima* Aubl., Fla. Endangered) (D. F. Austin, Florida Atlantic University, personal observations). Produces certain allelopathic agents, which appear to suppress other plants' growth (Mahendra *et al.* 1995). Seeds spread by consumption and deposition of the fruit by wildlife; spread enhanced by decorative use of branches and fruit (Morton 1978). Now estimated to occupy over 283,400 ha (700,000 acres) in central and south Florida (Ferriter 1997, Wunderlin *et al.* 1995).

KAL



Flowers

Distribution: Naturalized in most tropical and subtropical regions, including other South American countries, parts of Central America, Bermuda, the Bahama islands, the West Indies, Guam, Mediterranean Europe, North Africa, southern Asia, and South Africa. In the United States, occurs in Hawaii, California, southern Arizona, and Florida—in Florida as far north as Levy and St. Johns counties and as far west as Santa Rosa County (EPPC 1996).

Life History: Sprouts easily from the trunk and roots, even if the plant is undamaged. Seen in flower in every month of the year in Florida, with the most intense period of flowering in the fall season, September through November. Fruits profusely in southern and central Florida, with wildlife consumption of fruits contributing in large part to the spread of seeds (Ewel *et al.* 1982). Produces chemicals in leaves, flowers, and fruits that irritate human skin and respiratory passages (Ewel *et al.* 1982, Morton 1978).

KAL



In coastal strand, Sarasota County

JD



Compound leaves, mature fruit

SCHEFFLERA ACTINOPHYLLA (ENDL.) HARMS

Araliaceae/Aralia or Ginseng Family

Common Names: Schefflera, Queensland umbrella tree, octopus tree

Synonymy: *Brassaia actinophylla* Endl.

Origin: Northern Australia, New Guinea, Java

Botanical Description: Evergreen tree to 12 m (40 ft) tall, with single or multistemmed trunks and greenish bark. Leaves alternate with petioles to 61 cm (2 ft) long; palmately compound with mostly 7-16 leaflets, these shiny, light green, oblanceolate, to 30 cm (12 in) long, with margins entire (or sparsely toothed when young). Flowers 25 mm (1 in) across, borne in dense clusters that form a large, red, showy inflorescence at stem tips above foliage. Fruit a purplish black, round, fleshy drupe to 7 mm (1/4 in) in diameter.

Ecological Significance: A common indoor plant that reaches tree size and produces huge numbers of seeds outdoors in central and southern Florida (Maxwell 1984). Introduced to Florida landscaping in 1927 and noted as escaping cultivation in southern Florida in the late 1970s, often growing as seedlings in the boots of cabbage palms in the manner of strangler figs (Morton 1976). Noted as escaping in Pinellas County in 1982 (Wunderlin). Now naturalized and spreading in a variety of habitats, from cypress strands to sand pine scrub, from the full sun of beach dunes to the deep shade of hammocks (Thayer 1998). Invading endangered remnants of scrub habitat, where it is shading out listed rare plants such as the Florida-threatened scrub pinweed, *Lechua cernua* Sm. (D. F. Austin, Florida Atlantic University, and K. C. Burks, Florida Department of Environmental Protection, personal observations). Extremely invasive in undisturbed tropical hardwood hammocks of Dade County, growing on trees and rocks as well as in soil (R. Hammer, Miami-Dade County Natural Resources Department, 1996 personal communication). Difficult to control (Thayer 1998).

AF



Flowers

Distribution: Native to northern Queensland in Australia, New Guinea, and Java, becoming weedy where introduced in southern Queensland (Austin 1996). In Florida, now reported in 28 designated natural areas of Monroe, Dade, Broward, Palm Beach, Brevard, Collier, and Pinellas counties (EPPC 1996). Herbarium specimens collected from naturalized populations in Pinellas, Palm Beach, Broward, Dade, and Monroe counties (Wunderlin *et al.* 1995).

Life History: Restricted outdoors to warmer areas with minimum temperatures above 1.7°C (35°F) (Broschat and Meerow 1991). Grows on a variety of substrates. Flowers in summer and early fall, prolifically producing seeds. Seeds dispersed by birds, including crows, starlings, mockingbirds, and parrots (Austin 1996).

AF



In scrub habitat, Palm Beach County

KAL



Growing on native palm

NANDINA DOMESTICA THUNB.

Berberidaceae/Barberry Family

Common Name: Heavenly bamboo, nandina

Synonymy: None

Origin: India to east Asia

Botanical Description: Evergreen glabrous shrub to 1.8 m (6 ft) tall, growing in multi-stemmed clumps and perennating by rhizomes. Leaves alternate, large, 2-3 times odd-pinnately compound, i.e., usually with 3 primary divisions from petiole, having a somewhat lacy appearance and turning red in cool season. Leaflets 2-6 cm (1-2 in) long, narrowly ovate to lanceolate, tips with long acute taper, upper surfaces dark green (in growing season), sublustrous. Inflorescence a large, erect, stalked panicle, to 30 cm (1 ft) tall, from uppermost leaf axil of season; panicle branches usually purplish-red. Flowers small, bisexual, with petaloid parts pinkish white and anthers yellow. Fruit a bright red, 2-seeded globose berry, 6-12 mm in diameter.

Ecological Significance: Introduced to the United States for ornament in 1804 (Manks 1968). First noted as naturalized in woodlands of 3 counties in North Carolina (Radford *et al.* 1964). Noted for Florida in later works: in floodplains and secondary woods of Gadsden and Leon counties (Clewell 1985), in woodlands of northern Florida and adjacent Georgia and Alabama (Godfrey 1988). Presently reported for conservation areas in Jackson, Gadsden, Leon, Wakulla, and Citrus counties (EPPC 1996; E. Johnson, Florida Department of Environmental Protection, 1994 personal communication). Forms dense groves in habitats of Florida Caverns State Park, displacing native vegetation, including the Florida-endangered red columbine, *Aquilegia canadensis* L., and the rare (in the wild) oak-leaf hydrangea, *Hydrangea quercifolia* Bartr. (Ludlow 1995). Still available for cultivation, but newer cultivars being offered that do not produce the bird-dispersed fruit (Kellum 1997).

Distribution: Native to central China and Japan and west to India (Chongxi and Foster 1992). Introduced in the southeastern United States, with seedlings frequent near plantings and mature plants found far from areas of current cultivation (Whetstone *et al.* 1997). In Florida, herbarium specimens deposited from Escambia, Gadsden, and Leon counties (Wunderlin *et al.* 1995).



Compound leaves, fruits

Life History: Can survive temperatures throughout Panhandle and peninsular Florida (Broschat and Meerow 1991). Grows in full sun to shade; propagated by division of clumps and by seed (Hunt 1977, Bailey and Bailey 1976). Seeds may take many months to germinate (M. Zeller, Florida Department of Environmental Protection, 1997 personal communication) or 2 seasons, and difficult to induce germination under artificial conditions (Roger Newton, Hillsborough County Cooperative Extension Service, 1998 personal communication). Flowers in late spring; fruits in fall and winter. Fruits dispersed by birds, including mockingbirds, cedar waxwings, and robins (Kellum 1997) and cardinals (B. McCurnin, Tallahassee, 1997 personal communication); may be dispersed by small mammals as well, such as opossums and raccoons (Ludlow 1995). Cultivars Nana, Harbour Dwarf, and Firepower do not produce seed in nursery environment (Steve Kent, Tree of Life Nursery, 1998 personal communication).

KCB



In hammock, Leon County

KAL



Flowers

MACFADYENA UNGUIS-CATI (L.) A. GENTRY

Bignoniaceae/Bignonia Family

Common Name: Cat's-claw vine

Synonymy: *Doxantha unguis-cati* (L.) Rehd., *Bignonia unguis-cati* L., *Bignonia tweediana* Lindley

Origin: Tropical America

Botanical Description: High-climbing woody vine, with stems to 6 cm (2.4 in) in diameter and roots becoming elongate-tuberous with age. Branches and runners with adventitious aerial roots. Leaves opposite, compound, with 2 leaflets and a terminal 3-forked tendril; tips of tendril forks stiffly hooked, clawlike. Leaflets mostly 3-7 cm (1-3 in) long, oval to lance shaped, with margins entire. Flowers showy, trumpet shaped, to 7 cm (3 in) long and 10 cm (4 in) across, solitary or in few-flowered clusters at leaf axils; petals joined into yellow floral tube with orange lines in the throat. Fruit a linear, flat capsule, to 50 cm (20 in) long, with oblong, winged seeds.

NOTE: Distinguished from the native cross-vine, *Bignonia capreolata* L., by its yellow (rather than orange-red) floral tubes and clawlike tendril forks. From a distance, when flowering, may be confused with yellow trumpet-flowered native jessamines (*Gelsemium* spp.), but their leaves simple and without tendrils.

Ecological Significance: Introduced for ornament before 1947 and noted as grown outdoors in the South (Bailey and Bailey 1947). Persistent around former habitations in south Florida (Long and Lakela 1971). Cultivated in northern Florida and naturalized near human habitations (Godfrey 1988, Hall 1993). Rapidly becomes an obnoxious weed (Dickey 1968). Considered a pest in many places (Odenwald and Turner 1980); a "troublesome weed" in southern Florida, "not recommended" (Nelson 1996). Increasingly spreading into natural areas in northern Florida (D. B. Ward, University of Florida, 1994 personal communication). Has become dominant ground cover in undisturbed hammocks by Lake George; extremely difficult to control tuberous roots (L. Grant, St. Johns Water Management District, 1997 personal communication). Also reported as rapidly spreading in 4 hammock preserves in Dade County (EPPC 1996).



Tendrils, leaflets

Distribution: Native from West Indies and Mexico to Argentina (Bailey and Bailey 1976, Morton 1971a). Herbarium specimens now recorded for naturalized populations in Escambia, Leon, Alachua, Lake, Seminole, Brevard, Polk, Hillsborough, Hernando, Palm Beach, and Dade counties (Wunderlin *et al.* 1996). Also cultivated in Alabama, Louisiana, and South Carolina (Meyer *et al.* 1994).

Life History: Thrives in full sun or partial shade and in a wide variety of soils (Morton 1971a, Nelson 1996). Stays at seedling stage for some time, while enlarging roots into tuberlike storage organs; then rapidly elongates stems, forming long runners when no erect substrate is within reach (Godfrey 1988). Clings tenaciously to any substrate with adventitious roots and clawed tendrils (Godfrey 1988). Flowers in spring, with high seed production (Menninger 1970), but may not begin flowering until vine is well established (Odenwald and Turner 1980). Seeds dispersed by wind (Dickey 1968).

KAL



Linear capsules

KAL



On campus grounds, Alachua County

LONICERA JAPONICA THUNB.

Caprifoliaceae/Honeysuckle Family

Common Name: Japanese honeysuckle
Synonymy: *Ninтооа japonica* (Thunb.) Sweet
Origin: East Asia

Botanical Description: Twining or trailing woody vine with young stems pubescent. Leaves evergreen, opposite, simple, mostly 4-8 cm (1.6-3.2 in), with short pubescent petioles. Leaf blades ovate, elliptic, or oblong, usually with at least sparse pubescence on midrib above and below, entire except on vigorous spring shoots which often have blades pinnately lobed. Flowers fragrant, white turning to creamy yellow with age, occurring singly or more often in pairs, in leaf axils; corolla strongly bilabiate (2-lipped). Fruit a black, globose berry, 5-6 mm (0.25 in) long, with 2-3 seeds per berry.

NOTE: May be confused with the native coral honeysuckle (*Lonicera sempervirens* L.), but its young stems and leaves glabrous, its flowers red with yellow within.

Ecological Significance: Occurs most densely in open woodlands, prairies, thickets, fence rows, and old fields, but also invades mature forests (dry and moist), thriving in tree gaps created by natural or artificial disturbance and persisting in partially shaded areas. Interrupts plant succession in once-forested areas by overtopping and smothering young trees, preventing their recruitment to the overstory (Myster and Pickett 1992). Can disrupt understory structure in mature forests by eliminating smaller tree species important to birds (Sather 1987). Deemed in 1971 by the U.S. Department of Agriculture to be one of the worst nonagricultural weeds in the Southeast, able to colonize various habitats and eliminate native flora (Sasek and Strain 1991). More recently also found to serve as temporary host for a spider mite pest of corn and peanuts (Margolies and Kennedy 1985) and for the tobacco budworm and corn earworm in Georgia and Florida (Pair 1994). Introduced in 1806 for ornament and later for erosion control; by 1919 naturalized from the Gulf of Mexico to Massachusetts (Sather 1987). Reported by Florida land managers for conservation areas in 7 counties from Okaloosa to Marion County (EPPC 1996). Also reported elsewhere in the eastern U.S. as an important pest in managed forests (Dillenburg *et al.* 1993) and natural areas (e.g., Thomas 1980). Still available in the Southeast as an ornamental, and sometimes promoted as deer forage (Dyess *et al.* 1994).

KCB



Flowers

JAPANESE HONEYSUCKLE

Distribution: In Florida, found commonly in most Panhandle and northern counties, and south on the peninsula to Orange, Hillsborough, Sarasota, and Dade counties (Wunderlin *et al.* 1995). Now one of the most common vine species in the Southeast, and presently ranges in the U.S. from southern New England to Florida, west to Texas, Kansas, and Missouri, and north to Indiana, Illinois, and Michigan (Godfrey 1988).

Life History: With evergreen leaves, able to photosynthesize at a relatively high rate year-round, compared to woody deciduous natives (Schierenbeck and Marshall 1993). Twinning stems able to climb small-diameter tree trunks, and with numerous lateral runners, can form dense overtopping mats of vegetation (Sather 1987). Provides strong below-ground root competition as well (Dillenburg *et al.* 1993). Flowers and fruits from spring to fall. Fruits eaten by deer, rabbits, turkeys, quail (Dyess *et al.* 1994), with seed dispersed primarily by birds (Sather 1987).

KAL



Hairy young stems

KAL



Habit, over shrubs

CASUARINA EQUISETIFOLIA L.

Casuarinaceae/Beefwood Family

Common Names: Australian-pine, beefwood, ironwood, she-oak, horsetail tree

Synonymy: *Casuarina littorea* L. ex Fosberg & Sachet, *C. littorea* Rumpheus ex Stickman

Origin: Australia, south Pacific Islands, Southeast Asia

Botanical Description: Evergreen tree to 46 m (150 ft) tall, usually with single trunk and open, irregular crown. Bark reddish brown to gray, rough, brittle, peeling. Branchlets pine-needle-like, grayish green, jointed, thin (< 1 mm wide), 10-20 cm (4-8 in) long, minutely ridged, hairy in furrows. Leaves reduced to tiny scales, 6-8 in whorls encircling joints of branchlets. Flowers unisexual (monoecious), inconspicuous, female in small axillary clusters, male in small terminal spikes. Fruit a tiny, 1-seeded, winged nutlet (samara), formed in woody cone-like clusters (fruiting heads), these brown, to 2 cm (3/4 in) long and 1.3 cm (1/2 in) wide.

NOTE: May be confused with the related exotics, *C. glauca*, which has 10-17 leaf scales per whorl (see following pages), and *C. cunninghamiana* Miquel, which has 8-10 scales per whorl.

Ecological Significance: Introduced to Florida in the late 1800s (Morton 1980). Naturalized since the early 1900s along coastal dunes (Small 1927). Planted extensively in the southern half of the state as windbreaks and shade trees (Morton 1980). Seeds freely throughout the area and has spread rapidly (Long and Lakela 1971). Salt tolerant, growing even in front-line dunes (Watkins 1970). With rapid growth, dense shade, dense litter accumulation, and other competitive advantages, displacing and extremely destructive to native vegetation (Nelson 1994). Can encourage beach erosion by displacing deep-rooted native vegetation (Klukas 1969). Interferes with nesting of endangered sea turtles and the American crocodile (Klukas 1969).

TP



Coastal-strand monoculture

Distribution: Occurs throughout south Florida, from Orlando south, on sandy shores and in pinelands. Frequently colonizes disturbed sites, such as filled wetlands, road shoulders, cleared land, and undeveloped lots (Maxwell 1984). Occurs as far north as Dixie County on the west coast and Volusia County on the east (Wunderlin *et al.* 1995). Naturalized also in West Indies, Mexico, and elsewhere in tropical America (Long and Lakela 1971).

Life History: Not freeze tolerant; sensitive to fire (Morton 1980). Loses branches easily and topples easily in high winds (Morton 1980). Produces allelopathic compounds that inhibit growth of other vegetation (Morton 1980). Can colonize nutrient-poor soils easily by nitrogen-fixing microbial associations (Wilson 1997). Reproduces prolifically by seed, as many as 300,000 to the pound, with seeds dispersed by birds (especially exotic parrots and parakeets), water, and wind (Morton 1980). Fruiting heads float (Maxwell 1984).

KAL



Fruiting heads

KAL



Scale-like leaves at node

KAL



Branchlets

CASUARINA GLAUCA SIEBER EX SPRENG.

Casuarinaceae/Beefwood Family

Common Names: Suckering Australian-pine, swamp she-oak, Brazilian beefwood
Synonymy: *Casuarina lepidophloia* F. Muell. and *C. cristata* Miq. misapplied
Origin: Australia

Botanical Description: Evergreen tree to 20 m (70 ft) tall, with a dense, pyramidal shape. Bark gray-brown, finely fissured, scaly. Branchlets pine-needle-like, green, occasionally waxy, jointed, thin (< 1mm wide), 20-26 cm (8-10 in) long, minutely ridged, glabrous. Leaves reduced to tiny scales, in whorls of 10-17 at joints of branchlets. Flowers unisexual (dioecious), inconspicuous, female in small axillary clusters, male in small terminal spikes; female plants rare in Florida. Fruit a tiny, 1-seeded, winged nutlet (samara), formed in woody cone-like clusters (fruiting heads), these brown, to 1.8 cm (2/3 in) long and 0.9 cm (1/3 in) wide.

NOTE: Differs from *C. equisetifolia* (preceding pages) in having 10-17 leaf scales per whorl, glabrous branchlets, and separate male and female plants. *C. cunninghamiana* also dioecious, but with 8-10 leaf scales per whorl.

Ecological Significance: Introduced to Florida before 1924, and planted widely in southern Florida as windbreaks, roadside trees, and hedges (Morton 1980). Suckers aggressively from widely spreading roots, especially when pruned, creating “local jungles” of dense casuarina branches, excluding other vegetation (Long and Lakela 1971, Morton 1980). Displacing and extremely destructive to native plant communities, tending to completely take over areas it invades (Nelson 1994). Along with *C. equisetifolia*, has had devastating effect on native plant communities of barrier islands along southwest coast, such as Sanibel and Captiva (Morton 1980).

KAL



Scale-like leaves at nodes

SUCKERING AUSTRALIAN-PINE

Distribution: Herbarium specimens collected from naturalized populations in Seminole, Orange, Brevard, Polk, Hillsborough, Pinellas, Manatee, Desoto, Highlands, Indian River, Martin, Charlotte, Collier, Broward, Dade, and Monroe counties (Wunderlin *et al.* 1995). Recorded from natural areas in Dade, Lee, Martin, and Palm Beach counties (EPPC 1996).

Life History: Can colonize nutrient-poor soils easily by nitrogen-fixing microbial associations (Wilson 1997). Reproduces prolifically by root suckers; reported until recently as not producing fruit in Florida (Long and Lakela 1971, Morton 1980). Fruiting heads observed in Homestead area (R. Hammer, Miami-Dade Parks Department, 1995 personal communication) and in Fakahatchee Strand State Preserve (D. F. Austin, Florida Atlantic University, 1997 personal communication). Hybrids known to form in the wild in Florida among the 3 species of *Casuarina* mentioned above, which may bear cones (Bailey and Bailey 1976, Morton 1980, Wilson 1997).

KAL



Monoculture, Indian River County

CALOPHYLLUM ANTILLANUM BRITT.

Clusiaceae (Guttiferae)/Pitch-Apple Family

Common Names: Beauty leaf, Santa-maria

Synonymy: *Calophyllum brasiliense* Camb. var. *antillanum* (Britt.) Standl., *C. calaba* Jacq., non L., *C. jacquinii* Fawc. & Rendle

Origin: Caribbean, Cuba to Grenada

Botanical Description: Straight-trunked tree typically 12 m (40 ft) tall. Young stems green, 4-angled, minutely hairy, becoming gray with age. Leaves opposite, simple, petioled, elliptic, 10-15 cm (4-6 in) long; blades very shiny, with numerous parallel veins at right angles to midvein; margins entire; blade tips rounded to minutely notched. Flowers small, in few-flowered racemes at leaf axils, white, fragrant, with many yellow stamens. Fruit a 1-seeded, hard-shelled drupe, brown, globose, about 2.5 cm (1 in) wide.

NOTE: May be confused with mast-wood, *C. inophyllum* L., the Asian exotic also cultivated in south Florida and reported as naturalized (Wunderlin *et al.* 1996), but its trees often taller, its leaves larger, to 20 cm (8 in) long and 10 cm (4 in) wide, not as shiny; its flower clusters larger, showier; and its fruits to 4 cm (1.5 in) wide.

Ecological Significance: Noted as introduced in southern Florida in 1964 (Little and Wadsworth 1964). Widely planted in southern Florida as a landscape subject. Invades mangrove forests and other coastal areas (M. McMahon, Biological and Environmental Consulting, and R. Hammer, Miami-Dade County Parks Department, 1996 personal communications). Dense stands of seedlings and saplings observed along the fringes of coastal mangrove and buttonwood forests and occasionally in inland hardwood forests as well. Abundant in and around Matheson Hammock Park in south Dade County, and observed in other mangrove areas in Dade County, where it is a target of eradication by Miami-Dade County Parks and Recreation Department. Also reported from parks in Broward County (EPPC 1996). Listed as an invasive species in Hawaii (Wester 1992).

KAL



In Matheson Hammock, Miami-Dade County

Distribution: Locally naturalized in coastal regions of Dade, Broward, Palm Beach, and Martin counties (R. Hammer, Miami-Dade County Parks Department, and D. F. Austin, Florida Atlantic University, personal observations). Also naturalized in Bermuda (Little and Wadsworth 1964).

Life History: Limited to southernmost Florida where minimum temperatures are 4.4-1.7°C (40-35°F) (Broschat and Meerow 1991). Can withstand inundation and is resistant to brackish conditions (Stresau 1986). Flowers in summer. Fruits prolifically in southern Florida, and is spread by seed (R. Hammer, Miami-Dade County Parks Department, 1996 personal communication). Spontaneous seed germination common beneath mature landscape trees. Fruits inedible for humans, those of related *C. inophyllum* known to be poisonous (Morton 1971b).

KAL



Leaf with numerous lateral veins

DFA



Flowers

IPOMOEA AQUATICA FORSSKAL

Convolvulaceae/Morning-Glory Family

Common Names: Water-spinach, Chinese water-spinach or morning-glory, water bindweed

Synonymy: *Ipomoea repens* Roth, *I. reptans* Poirlet, *Convolvulus repens* Vahl

Origin: Central to south China

Botanical Description: Herbaceous trailing vine with milky sap. Stems hollow, to 3 m (9 ft) long or more, rooting at nodes, floating in aquatic situations. Leaves alternate, simple, with glabrous petioles 3-14 cm (1-6 in) long; leaf blades generally arrowhead shaped but variable, glabrous or rarely pilose, to 17 cm (7 in) long, with tips pointed; blades held above water when stems floating. Flowers showy, funnelform like morning-glory blooms, solitary or in few-flowered clusters at leaf axils; petals white or pink-lilac. Fruit an oval or spherical capsule, woody at maturity, about 1 cm (1/2 in) wide, holding 1-4 grayish seeds, these often short-hairy.

NOTE: Two basic forms (with many cultivars of each) recognized worldwide for this species: “red,” with red-purple tinged stems and pale pink to lilac flowers; and “green,” with fully green stems and white flowers—all “races” observed in Florida exhibiting the same growth habit.

Ecological Significance: Introduced repeatedly to Florida waters since 1979, despite its state and federal listing as a prohibited plant and noxious weed (R. Kipker, Florida Department of Environmental Protection, unpublished data). Popular among some recent immigrants as a common potherb from the homeland (T. Q. Ngo, Vietnamese Community of Florida, Pinellas Park, 1995 personal communication), and has been studied in Florida as a vegetable crop (e.g., Bruemmer and Roe 1979, Snyder *et al.* 1981). Recognized early as a threat to natural areas in Florida (Ochse 1951, Gilbert 1984). Has been found naturalized in Florida primarily in canals and ditches, but also invading shallows of more than a dozen natural lakes (R. Kipker, Florida Department of Environmental Protection, unpublished data). Forms dense floating mats of intertwined stems over water surfaces, shading out native submersed plants and competing with native emergents (K. C. Burks, Florida Department of Environmental Protection, personal observations). Under good conditions, can produce 190,000 kg fresh weight biomass per ha (84 tons per acre) in 9 months (Massal and Barrau 1956). Considered the second greatest problem plant in the Philippines, where it tends to overgrow freshwater marginal areas (Gangstadt 1976). A common to serious weed, or present as a weed in many areas of the tropics (Holm *et al.* 1979).

Distribution: Native to China, but widely cultivated and naturalized in Asia, Africa, Australia, Pacific Islands, and South America (Staples 1996). In Florida, naturalized populations found in scattered locations from Bay County in the Panhandle to Dade County in south Florida, with eradication attempts always made but not always successful (R. Kipker, Florida Department of Environmental Protection, 1997 personal communication). Herbarium specimens documented so far only from the Tampa Bay area (Wunderlin *et al.* 1995), where it may now be found cultivated under specially permitted quarantine conditions for out-of-state sale.

Life History: May root at every node, producing new plants when segmented (Edie and Ho 1969). Grows well in moist soil or in still to flowing waters (Payne 1956). Flowers in warm months (Dressler *et al.* 1987). Produces 175-245 seeds per plant during peak season (Patnaik 1976).

☪



Flowers

☪



Covering pond, Brevard County

BISCHOFIA JAVANICA BLUME

Euphorbiaceae/Spurge Family

Common Names: Bishopwood, javawood, toog
Synonymy: *Bischofia trifoliata* (Roxb.) Hook.
Origin: Tropical Asia, Pacific Islands

Botanical Description: Evergreen tree commonly 12-18 m (35-60 ft) in height, with dense, rounded head, smooth branches, and milky sap. Leaves alternate, long-petioled, trifoliolate (3 leaflets); leaflets shiny, bronze-toned, oval-elliptic, 15-20 cm (6-8 in) long, with margins small toothed. Flowers tiny, without petals, greenish-yellow, in many-flowered clusters (racemes) at leaf axils; male and female flowers on separate plants (dioecious). Fruit pea-sized, berrylike, fleshy, to 9 mm (0.33 in) in diameter, brown or reddish or blue-black, 3-celled.

Ecological Significance: Introduced to Florida for ornament earlier this century by a west coast nursery-grower (Morton 1976). Noted as sometimes planted in south Florida in 1947 (Bailey and Bailey). Reported as naturalized in Dade County near Homestead in 1971 (Long and Lakela), as becoming a “weed tree” in south Florida in 1974 (Morton), and as invading hammocks (Morton 1976). Now common in old fields and disturbed wetland sites, and invading intact cypress domes and tropical hardwood hammocks, where it displaces native vegetation and alters the structure of the plant community (personal observations of several veteran land managers in southeast counties). Used extensively in street landscaping throughout south Florida for many years. Its landscape use now discouraged by some horticulturists (Broschat and Meerow 1991).

Distribution: Naturalized populations in Florida documented by herbarium specimens from Dade, Broward, and Pinellas counties (Wunderlin *et al.* 1995). Reported for 21 natural areas in Lee, Collier, Palm Beach, Broward, and Dade counties (EPPC 1996). Cultivated near coasts from Sarasota to Cape Canaveral (Stresau 1986). Apparently not naturalized elsewhere in the Neotropics, but widespread in its native range of tropical Asia.

RH



Leaflets

Life History: Fast-growing from seed or cuttings, thriving best in moist soil (Morton 1974). Leaves deciduous in times of drought. Also root suckers. Limited to areas with average minimum temperatures of 1.6 to -1.1°C (35-30°F) (Broschat and Meerow 1991). Flowers in spring. Fruits copiously in Florida, with seeds dispersed by birds (Morton 1976). Seedlings can grow in sun or shade and adapt quickly if light conditions change (Kamaluddin and Grace 1992a, 1992b).

TP



In MacArthur Beach State Park

KAL



Mature fruits

SAPIUM SEBIFERUM (L.) ROXB.

Euphorbiaceae/Spurge Family

- Common Names:** Chinese tallow tree, popcorn tree
Synonymy: *Croton sebiferus* L., *Stillingia sebifera* Michx., *Triadica sebifera* (L.) Small
Origin: Eastern Asia

Botanical Description: Deciduous tree to 16 m (52 ft), commonly to 10 m (33 ft). Sap milky. Leaves simple, alternate; blades entire, broadly ovate, 3-6 cm (1-2.5 in) wide, with broadly rounded bases and abruptly acuminate (tapering to a slender point) tips; petioles slender, 2-5 cm (1-2 in) long. Flowers small, yellow, borne on spikes to 20 cm (8 in) long, with 2-3 sepals (petals absent), 2-3 stamens or 3 styles (plants monoecious). Fruit a 3-lobed capsule, 1 cm (0.5 in) wide, turning brown and splitting open at maturity to reveal 3 dull white seeds, which remain attached for a time.

Ecological Significance: Considered a common agricultural weed in Taiwan, requiring constant effort and expense to hold at bay (Holm *et al.* 1979). Introduced repeatedly to the United States as an ornamental and potential oil crop species (Jones and McLeod 1989). Considered an invasive pest plant in the Carolinas since the 1970s. Has expanded its range on the United States Gulf Coast in low-lying areas, becoming dominant and spreading along roadside ditches and into areas where the soil stays wet (Cameron and LaPoint 1978). Also thrives in upland, well-drained areas near human habitation and in undisturbed areas such as closed canopy forests, in bottomland hardwood forests, shores of waterbodies, and sometimes on floating islands (Godfrey 1988). Survives in both poorly drained freshwater and saline soils as well (Scheld and Cowles 1981). Tends to take over large areas (Bonner 1974).

KAL



Flowers

CHINESE TALLOW TREE

Distribution: Naturalized in outer coastal plain of South Carolina and adjacent North Carolina, also in Richmond County, North Carolina (Radford *et al.* 1968), south through Florida, and west to eastern Texas (Godfrey 1988). Found throughout Florida south to Manatee County on the Gulf coast and St. Lucie County on the Atlantic coast (Jubinsky 1993). Has potential range through southern Florida to the upper Florida Keys (Broschat and Meerow 1991). Recently found naturalized in Dade County (Wunderlin *et al.* 1995), and by 1996 (Jubinsky and Anderson), recorded as naturalized in 57% of Florida's counties.

Life History: Early growth rate very rapid with flowering and fruiting from the time the tree is about 1 m (3.3 ft) tall. Also suckers from stumps. Flowers in spring (Broschat and Meerow 1991), with fruit ripening August to November. Seeds primarily dispersed by birds and water (Jubinsky 1993).

KAL



Persisting white seeds

KAL



In Lake Jessup conservation area

ABRUS PRECATORIUS L.

Fabaceae (Leguminosae)/Pea Family

Common Names: Rosary pea, crab's eyes, precatory pea, licorice vine

Synonymy: *Abrus abrus* (L.) W. F. Wight

Origin: India, and perhaps other parts of tropical Asia

Botanical Description: High-climbing, twining, or trailing woody vine with slender herbaceous branches. Leaves alternate, petioled, 5-13 cm (2-5 in) long, even-pinnately compound with 5-15 pairs of leaflets, these oval to oblong, to 1.8 cm (< 1 in) long, with margins entire. Flowers shaped like pea flowers, white to pink or reddish, small, in short-stalked dense clusters at leaf axils. Fruit a short, oblong pod, splitting before falling to reveal 3-8 shiny hard seeds, 6-7 mm (< 1 in) long, scarlet with black bases.

Ecological Significance: Introduced to Florida for ornament before 1932 (Morton 1976). Noted as abundantly naturalized by Small (1933), Lakela and Craighead (1965), Long and Lakela (1971), Morton (1976), Austin (1978), Wunderlin (1982), and Isely (1990). Described by an early Florida horticulturist as quickly “taking full possession” of a young forest and impossible to remove after several years’ effort (Morton 1976). Has invaded undisturbed pinelands and hammocks, including the globally imperiled pine rocklands of Dade County (M. McMahon, Biological and Environmental Consulting, personal observation). Classified as an invasive weed in India, the Caribbean Islands, Belize, west Polynesia, and Hawaii (Holm *et al.* 1979, Wester 1992). Widely introduced and “has run wild in most warm climates” (Morton 1971b). Seeds used as beads in many countries (Isely 1990). Seeds extremely poisonous for humans, cattle, and horses—one ingested seed may prove fatal (Morton 1971b, Isely 1990).

Distribution: Now pantropical (Isely 1990). Common across central and south Florida; herbarium specimens of naturalized populations collected from 27 counties, from Hernando, Marion, Lake, and Volusia counties south to the Keys (Wunderlin *et al.* 1995). Reported from over 40 natural areas in Dade, Broward, Palm Beach, Martin, Indian River, Highlands, Collier, Lee, Sarasota, Manatee, Hillsborough, and Lake counties (EPPC 1996).

TP



Compound leaves

Life History: Roots deeply and tenaciously, difficult to eradicate (R. Moyroud, Mesozoic Landscapes, 1995 personal communication). Increases in population size following fire (Maithani *et al.* 1986). Flowers in summer, fruiting prolifically. Seeds dispersed by birds (Austin 1998). Has been investigated for various types of usable extracts, such as for insecticides (e.g., Khanna *et al.* 1989), antifertility drugs (e.g., Sinha 1990), other medicines (e.g., Wambebe and Amosun 1984), and sweetening agents (Jakimovich *et al.* 1990).

KAL



**Covering native scrub plants,
Palm Beach County**

KAL



Seeds

KAL



Immature pods

ACACIA AURICULIFORMIS A. CUNN. EX BENTH.

Fabaceae (Leguminosae)/Pea Family

Common Name: Earleaf acacia

Synonymy: None

Origin: Australia, Papua New Guinea, and Indonesia

Botanical Description: Evergreen, unarmed tree to 15 m (50 ft) tall, with compact spread, often multi-stemmed; young growth glaucous. Leaves alternate, simple, reduced to phyllodes (flattened leaf stalks), these blade-like, slightly curved, 11-20 cm (5-8 in) long, with 3-7 main parallel veins and a marginal gland near the base; surfaces dark green. Flowers in loose, yellow-orange spikes at leaf axils or in clusters of spikes at stem tips; flowers mimosa-like, with numerous free stamens. Fruit a flat, oblong pod, twisted at maturity, splitting to reveal flat black seeds attached by orange, string like arils.

Ecological Significance: Introduced to Florida for ornament before 1932 (Gordon and Thomas 1997). Used extensively in street landscaping in southern Florida for many years. Noted as escaping cultivation by Morton (1976, 1985), Austin (1978), and Isely (1990). Now common in disturbed areas, but also has invaded pinelands, scrub, and hammocks in south Florida, with significant populations in many of the globally imperiled pine rocklands of Dade County (M. McMahon, Biological and Environmental Consulting, personal observations). Displacing native vegetation and threatening to shade out rare plants, such as the listed scrub pinweed, *Lechea cernua* Sm., in remnant scrub areas (K. C. Burks, Florida Department of Environmental Protection, personal observations). Adapted to nutrient-poor soils in humid tropics, including areas subject to periodic fires (Shukor 1993, Moran *et al.* 1989, Bowman *et al.* 1990), a description that fits many of Florida's natural habitats.

Distribution: Planted widely in the Old World for pulp and fuelwood, particularly in India and Southeast Asia; undergoing forestry trials in Africa and Central and South America (Pinyopusarerk 1990, Boland *et al.* 1991). In Florida, now reported from over 24 natural areas in Dade, Broward, Palm Beach, Martin, Collier, and Lee counties (EPPC 1996). Naturalized populations documented by herbarium specimens from Monroe, Dade, Palm Beach, Martin, and Collier counties (Wunderlin *et al.* 1995).

RH



Mature pods, leaves

EARLEAF ACACIA

Life History: Grows in zones with average minimum temperatures of -1.2 to -6.6°C (30 to 20°F) and above (Broschat and Meerow 1991). Particularly drought resistant, but also tolerates seasonally waterlogged soils; grows in a wide range of soil types and soil pH; and able to withstand competition from cogon grass (see *Imperata cylindrica*) (Boland *et al.* 1991). Aided in drought resistance and low-nutrient tolerance by mycorrhizal and nitrogen-fixing bacterial associations of the roots (Osonubi *et al.* 1991, MacDicken and Brewbaker 1989). Found in its native range from dune ridges to river banks (Boland *et al.* 1991). Flowers in Florida from spring through fall, fruiting prolifically. Seeds dispersed by several bird species, including the introduced European starling (D. F. Austin, Florida Atlantic University, 1997 personal communication). Seed germination hastened by placing seeds in hot ashes (Bailey and Bailey 1947).

AF



Flowers

MB



Sapling in scrub preserve,
Palm Beach County

ALBIZIA LEBBECK (L.) BENTHAM

Fabaceae (Leguminosae)/Pea Family

Common Names: Woman's tongue, Tibet lebeck, singer-tree, shack-shack

Synonymy: *Mimosa lebeck* L., *M. speciosa* (Jacq.) Willd.

Origin: Tropical Asia, northern Australia

Botanical Description: Deciduous, unarmed tree to 20 m (65 ft) tall, with a rounded, spreading crown and pale bark. Leaves alternate, twice compound, with 2-5 pairs of pinnae, each pinna with 3-10 pairs of leaflets (even-pinnate); leaflets elliptic-oblong, 2-4 cm (1-2 in) long, usually asymmetrical at base, dull green above, paler green below; petiole with a sessile, elliptic gland near the base above. Flowers mimosa-like, in showy, rounded clusters near stem tips, 5-6 cm (2-2.5 in) across, cream or yellowish-white, each flower with numerous long stamens. Fruit a flat, linear pod, to 30 cm (1 ft) long, with many seeds; dried pods persistent after leaf-fall, often heard rattling in the wind.

NOTE: In Florida, distinguished from other unarmed leguminous trees with twice-compound leaves by its number of leaflets (usually 20+) and the leaflets' larger size (usually > 2 cm long).

Ecological Significance: Introduced to Florida for ornament in 1880s (Gordon and Thomas 1997). By 1933 (Small 1933), recognized as invading tropical hammocks in the Florida Keys. Known by 1990 (Isely 1990) as a fast-growing colonizer of disturbed areas, becoming common in central and south Florida through the Keys (Nelson 1994). Seedlings now occurring in great numbers throughout Big Cypress National Preserve (T. Pernas, National Park Service, 1996 personal communication). Invading somewhat disturbed pinelands of Everglades National Park (D. Jones, National Park Service, 1996 personal communication). Invading pine rocklands and canopy gaps in rockland hammocks in Dade County (R. Hammer, Miami-Dade Parks Department, 1996 personal communication). Also naturalized on moist and dry coastal hillsides in Puerto Rico, in pastures in the U.S. Virgin Islands, and elsewhere in the Caribbean and Central and South America (Little and Wadsworth 1964, Watkins 1970).

KAL



Flower heads

Distribution: Presently pantropical in occurrence, widely planted and naturalized (Little and Wadsworth 1964). In Florida, now reported from more than 20 natural areas in Monroe, Dade, Collier, Palm Beach, Martin, and Lee counties (EPPC 1996). Naturalized populations documented by herbarium specimens from Broward, Collier, Dade, Indian River, Lee, Marion, Polk, and St. Lucie counties (Wunderlin *et al.* 1996).

Life History: Fast-growing from seed (Morton 1971a). Will not tolerate freezing temperatures, but naturally grows in the Himalayas to altitudes of 1,600 m (5,200 ft) above MSL (Lowry *et al.* 1994). Grows well with average annual rainfalls of 400-2,500 mm (16-98 in), and in soils that are saline or alkaline, but not waterlogged soils (Lowry *et al.* 1994). A nitrogen-fixing, mycorrhizal-associating legume (Osonubi *et al.* 1991). Tolerates coastal salt spray, with some protection (Menninger 1964, Little and Wadsworth 1964). Flowers from April to September, but primarily in spring (or onset of rainy season), with pods held nearly throughout the year (Little and Wadsworth 1964, Wunderlin 1982, Barneby and Grimes 1996). Produces massive quantities of seeds, with seedlings appearing in great numbers (Watkins 1970). Crows and squirrels observed feeding on seeds in India (Natarajan *et al.* 1994).

KAL



In Everglades National Park

KAL



Pods, compound leaf

Distribution: Presently pantropical in occurrence, widely planted and naturalized (Little and Wadsworth 1964). In Florida, now reported from more than 20 natural areas in Monroe, Dade, Collier, Palm Beach, Martin, and Lee counties (EPPC 1996). Naturalized populations documented by herbarium specimens from Broward, Collier, Dade, Indian River, Lee, Marion, Polk, and St. Lucie counties (Wunderlin *et al.* 1996).

Life History: Fast-growing from seed (Morton 1971a). Will not tolerate freezing temperatures, but naturally grows in the Himalayas to altitudes of 1,600 m (5,200 ft) above MSL (Lowry *et al.* 1994). Grows well with average annual rainfalls of 400-2,500 mm (16-98 in), and in soils that are saline or alkaline, but not waterlogged soils (Lowry *et al.* 1994). A nitrogen-fixing, mycorrhizal-associating legume (Osonubi *et al.* 1991). Tolerates coastal salt spray, with some protection (Menninger 1964, Little and Wadsworth 1964). Flowers from April to September, but primarily in spring (or onset of rainy season), with pods held nearly throughout the year (Little and Wadsworth 1964, Wunderlin 1982, Barneby and Grimes 1996). Produces massive quantities of seeds, with seedlings appearing in great numbers (Watkins 1970). Crows and squirrels observed feeding on seeds in India (Natarajan *et al.* 1994).

KAL



In Everglades National Park

KAL



Pods, compound leaf

BAUHINIA VARIEGATA L.

Fabaceae (Leguminosae)/Pea Family

Common Names: Orchid-tree, poor-man's orchid, mountain-ebony, Buddhist bauhinia

Synonymy: *Phanera variegata* (L.) Benth.

Origin: Eastern Asia (India, China)

Botanical Description: Semideciduous tree to 15 m (50 ft) tall, with a spreading crown. Leaves alternate, long petioled (to 3 cm [1.25 in] long), thin-leathery, simple but deeply cleft at apex, forming 2 large rounded lobes; lower surfaces downy, especially at top of petiole; blades with 11-13 veins extending from heart-shaped or rounded base. Flowers showy, fragrant, in few-flowered clusters near stem tips, appearing during leaf fall (early spring); 5 petals, clawed, overlapping, pale magenta to indigo (occasionally white), with dark red and yellow also on upper petal; 5 stamens (rarely 6). Fruit a flat, oblong pod, to 30 cm (1 ft) long, 10-15-seeded.

NOTE: May be confused with another naturalized exotic *Bauhinia purpurea* L., which flowers in the fall with leaves on the tree, and has many-flowered clusters, 3 (rarely 4) stamens, and petals not overlapping.

Ecological Significance: Introduced into Florida before 1900 (Ledin 1956). Noted as a common escape, abundantly invading disturbed areas in particular (Morton 1976). Noted as occasional across south Florida (Lakela and Wunderlin 1980, Tomlinson 1980, Wunderlin 1982). Naturalized in the Caribbean and elsewhere in the Neotropics as well (Morton 1976, Correll and Correll 1982, Little *et al.* 1974). Spreading from sites where previously planted in Big Cypress National Preserve (T. Pernas, National Park Service, 1996 personal communication). Found in 10 conservation areas in Dade County; displacing native vegetation in hammock margins and occasionally in globally imperiled pine rocklands (R. Hammer, Miami-Dade Parks Department, 1996 personal communication). Reported now from natural areas in four counties: Pinellas, Lee, Dade, and Palm Beach, including the Loxahatchee National Wildlife Refuge and Everglades National Park (EPPC 1996).

Distribution: Widely planted in the tropics and warm regions of the world, including the southern margin of the United States from Florida to California; probably also naturalized in Louisiana and perhaps Texas (Isely 1990). In Florida, herbarium specimens deposited from Brevard, Polk, Lee, and Dade counties (Wunderlin *et al.* 1996).

Life History: Grows best in full sun or partial shade; propagates easily from seed and by air layering (Hunt 1977). Tolerates a wide range of well-drained soils (Watkins 1970), but prefers acidic soils (Hunt 1977). Not salt tolerant (Watkins 1970), or mildly so (Hunt 1977). May be eliminated from a site by controlled burning (Maithani *et al.* 1986). Flowers in January and February (early spring). A fast-growing tree with seeds that remain viable for more than a year (Morton 1971a).

□



Flowers

KAL



Seedling

MIMOSA PIGRA L.

Common Names: Catclaw mimosa, giant sensitive-plant, shamebush

Synonymy: None

Origin: Central America

Botanical Description: Sprawling, often thicket-forming shrub to 6 m (20 ft) tall, with hairy stems bearing numerous recurved prickles to 7 mm (0.3 in) long. Leaves alternate, twice compound, sensitive to touch; leaf petiole and rachis to 20 cm (8 in) long, with prickles at junctions with 5-12 pairs of pinnae; each pinna with 24-31 pairs of leaflets, these to 8 mm (0.3 in) long, often with threadlike hairs on margins. Flowers small, mauve to pink, in stalked, dense, spherical heads, about 1 cm (0.5 in) across, with about 100 flowers per head; 8 stamens. Fruit a brown-bristly, segmented, flat pod to 8 cm (3 in) long and 1.4 cm (0.5 in) wide, with the 9-24 segments breaking free individually, each containing a seed; pods in clusters, or “hands” of usually 7, at stem tips.

Ecological Significance: Emerged as a serious weed of wetlands in the 1970s in Australia and Thailand (Lonsdale 1992). By the late 1980s in Australia, had formed dense thickets covering some 800 km² (over 300 mi²) in floodplains and swamp forests, with infestations doubling in size each year (Braithewaite *et al.* 1989). Introduced into Florida before 1953; first collected that year in Palm Beach and Okeechobee counties as apparent escapees from cultivation; possibly brought to Florida as a botanical curiosity or as an accidental contaminant in imported nursery stock (R. Kipker, Florida Department of Environmental Protection, 1997 personal communication). Large infestations in Florida first noted in 1985 (Nall *et al.* 1986). Infested natural areas now totaling nearly 400 ha (1,000 acres) in Broward, Palm Beach, Martin, St. Lucie, and Highlands counties, including shoreline of the Loxahatchee River (Sutton *et al.* 1994). In Australia, has formed dense understories in swamps, shading out native tree seedlings and altering bird, reptile, and vegetation communities (Braithewaite *et al.* 1989, Lonsdale 1992). Similar stands found among south Florida cypress (R. Kipker, Florida Department of Environmental Protection, personal observations).

8



Touch-sensitive leaves

Distribution: Widespread throughout the tropics (Lonsdale 1992). In Florida, so far eradicated just in 2 small sites, both disturbed urbanized areas (R. Kipker, Florida Department of Environmental Protection, 1997 personal communication).

Life History: Forms dense, impenetrable thickets in wet areas, but will also grow in drier habitats (Miller and Tjitrosoedirdjo 1992). Flowers all year in Florida, with seed set within 5 weeks from flowering (Sutton and Langeland 1993). Spread primarily by seed floating away on water (Lonsdale 1992); observed to sink within 10 days in Florida (Sutton and Langeland 1993). Germinates best on damp, not dry or saturated soil; will germinate under water but remains slow in its growth until emersed. Germinates year-round (Sutton and Langeland 1993), with a small percentage (6.8% in Florida studies) of seed crop not germinating but remaining viable as a long-term seed bank (Lonsdale 1992, Sutton and Langeland 1992).

DS



Pod cluster ("hand")

DS



Leaves, prickles

DS



Flower head, young leaves

PUERARIA MONTANA (LOUR.) MERR. VAR. **LOBATA**

Fabaceae (Leguminosae)/Pea Family

(WILLD.) MAESEN AND ALMEIDA

Common Names: Kudzu vine, foot-a-night vine, vine-that-ate-the-South, Ko-hemp

Synonymy: *Pueraria lobata* (Willd.) Ohwi, *P. thunbergiana* (Sieb. & Zucc.) Benth.

Origin: Eastern Asia

Botanical Description: High-climbing, trailing, twining deciduous woody vine, with tuberous roots and rope-like, dark brown stems to 20 m (65 ft) long; herbaceous stems markedly hairy. Leaves alternate, long petioled, with 3 leaflets (trifoliolate); leaflets dark green, hairy on both surfaces, to 15 cm (5.4 in) long; lateral leaflets unequal at base, 1- or 2-lobed; terminal leaflet usually equal at base and 3-lobed. Flowers pea-like, reddish-purple, fragrant, 2-2.5 cm (0.7-0.9 in) across, in short-stalked, elongate clusters at leaf axils, to 20 cm (7.3 in) long. Fruit a dark brown pod, flat but bulging over seeds, densely covered in long golden-brown hairs, to 8 cm (3 in) long and 0.8 cm (0.3 in) wide.

Ecological Significance: Introduced in 1876 at the Centennial Exposition in Philadelphia as an ornamental (Bell and Wilson 1989, Shores 1997). Developed for use as a forage in the 1920s, in Florida; promoted in the 1930s by the U.S. Soil Conservation Service for erosion control (Bell and Wilson 1989). From early 1950s, no longer advocated by U.S. Department of Agriculture, and declared a weed in 1972 (Shores 1997). Forms large impenetrable masses, growing over woody vegetation and able to completely engulf unwooded areas (Godfrey 1988). Can completely envelop a tree, killing it by shutting out all light (Bell and Wilson 1989). A serious or widespread invader of seminatural or natural habitat (Cronk and Fuller 1995). Reported from Florida natural areas in Alachua, Putnam, and Dade counties (EPPC 1996), and from Everglades conservation areas in Broward County (Bodle 1994).

Distribution: Widely naturalized in the United States, throughout the Southeast, north to Illinois and Massachusetts and west to Texas and Oklahoma; estimated to cover 810,000 ha (2,000,000 acres) of forest land in the South (Bell and Wilson 1989). Documented by herbarium specimens from 14 Florida counties, from Escambia to Dade (Wunderlin *et al.* 1995). Has also invaded South Africa, Malaysia, and western Pacific Islands (Cronk and Fuller 1995).

Life History: Drought tolerant; only aboveground portions damaged by frost (Cronk and Fuller 1995). Forms new perennial root crowns from stem nodes touching the ground, with thick storage roots growing as deep as 1 m (3 ft); can take 3-10 years of repeated herbicide treatment to deplete root reserves (Moorhead and Johnson 1996). Flowers in late summer and early fall, with high production of seeds, which are dispersed by mammals and birds (Cronk and Fuller 1995).

AMF



Compound leaf

RH



Flowers

SENNA PENDULA (WILLD.) IRWIN & BARN. VAR. *GLABRATA*

Fabaceae (Leguminosae)/Pea Family

(VOGEL) IRWIN & BARN.

Common Names: Climbing cassia, Christmas cassia, Christmas senna, cassia shrub

Synonymy: *Cassia coluteoides* Coll.; *C. bicapsularis* L. and *C. surattensis* Burm. f. misapplied

Origin: South America

Botanical Description: Sprawling evergreen shrub to 4 m (13 ft) tall (or wide), with somewhat zigzag, sparsely hairy stems. Leaves alternate, stalked, even-pinnately compound, with 3-6 pairs of leaflets, larger ones at leaf tip; leaflets to 4 cm (1.6 in) long, oblong with rounded tips; petioles with gland above, between lowermost leaflets (and occasionally between others). Flowers yellow or yellow-green, 3-4 cm (1.2-1.6 in) across, in 3- to 12-flowered racemes near stem tips; stamens with prominent, curved filaments. Fruit a brown slender pod, cylindrical, glabrous, 7-12 cm (3-5 in) long.

Ecological Significance: Briefly noted by Small (1933) as seen in south Florida. Commonly cultivated for ornament in Florida at least since the 1940s (Bailey and Bailey 1947). Described as fast and rank in its growth (Maxwell and Maxwell 1961). Observed in the wild in south Florida since the early 1970s (D. F. Austin, Florida Atlantic University, 1995 personal communication). Noted as naturalized in south Florida, and becoming weedy in the Bahamas and disturbed areas in South America (Irwin and Barneby 1982) and as moderately established outside cultivation in Florida by 1990 (Isely). Displaces native vegetation in disturbed and undisturbed areas of Florida's tropical hammocks, coastal strands, and canal banks (M. Renda, The Nature Conservancy, 1996 personal communication). Often becomes established in sunny openings and then clambers over adjacent canopy (Austin 1998). Reported from scrub and forest natural areas in Palm Beach County and from the edge of Lake Okeechobee in Hendry County (EPPC 1996).

Distribution: Native to Brazil, Peru, through Bolivia and south to Paraguay and Argentina; naturalized in the Bahamas and Florida, and probably also in southern Alabama, Louisiana, and Mississippi (Isely 1990). Cultivated in all regions of Florida (Hunt 1977, Nelson 1996). Often sold as *C. bicapsularis* (Isely 1990). Documented by herbarium records from peninsular Florida, from Hillsborough and Brevard south to Dade and Collier counties (Wunderlin *et al.* 1995).

KAL



In Lake Jessup conservation area

CLIMBING CASSIA

Life History: Hardy north of the frost line; will come back if tops killed by freezing (Maxwell and Maxwell 1961). Grows easily once established (Nelson 1996). Quite salt tolerant; does well in sandy soil; needs pruning regularly to contain sprawl (Maxwell and Maxwell 1961). Flowers in late fall to early winter, producing numerous seeds in each pod (Isely 1990).

KAL



Immature pod

KAL



Flower

JMH



In Blowing Rocks Preserve

SCAEVOLA SERICEA VAHL

Goodeniaceae/Goodenia Family

Common Names: Beach naupaka, Hawaiian half-flower, hailstones
Synonymy: *Scaevola frutescens* Krause, *S. taccada* (Gaertn.) Roxb.
Origin: East Africa to India, Southeast Asia, Australia, Pacific Islands

Botanical Description: Large, bushy shrub to 5 m (16 ft) tall, often forming dense hemispherical mounds. Leaves simple, closely alternate, crowded at stem tips; blades thick, shiny green, wider near tips, to 21 cm (8.3 in) long, glabrous to hairy on both sides, margins revolute, light green becoming yellow with age; leaf axils with tufts of pale hairs. Flowers white to pale lilac, several in short clusters at leaf axils; 5 petals, partially fused, split to base on upper side so that petal lobes spread fanlike into a lower lip. Fruit a fleshy, subspherical drupe, green then white, 8-12 mm (0.3-0.5 in) long, with sepal lobes persistent at tip.

NOTE: Often confused with the threatened Florida native half-flower, or inkberry, *Scaevola plumieri* (L.) Vahl, but its leaves shorter (to 10 cm, or 4 in, long), more succulent, with margins entire—and its mature fruit black, not white.

Ecological Significance: Apparently a recent introduction (Thieret and Brandenburg 1986), probably from Hawaii. Not mentioned in earlier works on Florida, but noted by Bailey and Bailey (1976) as occasionally planted in south Florida. Reported as escaped from cultivation in Lee County in 1982 (Wunderlin). Promoted in the early 1980s for use in beach stabilization projects—now discouraged (P. Flood, Florida Department of Environmental Protection, 1995 personal communication). Has escaped and become established on many south Florida beach dunes, coastal berms, coastal rock barrens, coastal strands, along saline shores, and in coastal hammocks (Nelson 1996). Appears to be supplanting native coastal vegetation in some Florida areas (Nellis 1994). Has begun to displace rare native beach plants, such as the inkberry, *S. plumieri*, and the Florida-endangered sea lavender, *Tournefortia gnaphalodes* (L.) R. Br. Ex Roem. & Schult., (J. Duquesnel, Florida Park Service, 1995 personal communication). Reported from parks and preserves in Monroe, Dade, Palm Beach, Martin, Collier, Lee, and Sarasota counties (EPPC 1996).

AF



Flower

Distribution: Native to coasts around the Indian and western Pacific oceans; common on seashores, sandy sites behind the shore, and on rocky shoreside cliffs, often forming dense thickets (Brizicky 1966, Whistler 1992, Wong 1995). Naturalized in Florida, the Bahamas, and perhaps elsewhere in tropical America (Thieret and Brandenburg 1986). In Florida, occurs on coasts from Sarasota and Martin counties south through the Keys to the Dry Tortugas.

Life History: Salt and wind tolerant on coasts, easy to grow, but sensitive to frost (Bar-Zvi 1996). Forms adventitious roots where stems contact soil. Sensitive to fire (Smith and Tunison 1992) and heavy shade (Herbst and Wagner 1992). Flowers and fruits year-round, but mostly from late spring to early fall. Fruits buoyant, with a corky outer layer, adapted to dispersal by ocean currents (Thieret and Brandenburg 1986). Fruits also eaten by pigeons and sea birds (Whistler 1992), and moved by ghost crabs and raccoons (R. Hammer, Miami-Dade County Natural Resources Department, 1998 personal communication). Seeds long viable in sea water, up to a year or more (Brizicky 1966), but will germinate only with fresh water, such as when washed ashore on a rainy day (Lesko and Walker 1969).

JD



In Bahia Honda State Park

RH



Leaves, flowers

CINNAMOMUM CAMPHORA (L.) J. PRESL

Lauraceae/Laurel Family

Common Name: Camphor tree

Synonymy: *Cinnamomum camphora* (L.) Nees & Eberm., *Camphora camphora* (L.) H. Karst.

Origin: Eastern Asia (China, Taiwan, Korea)

Botanical Description: Evergreen tree potentially to 20 m (65 ft). Twigs green or reddish green; all vegetative parts glabrous; cut stems and bruised leaves giving off a strong aroma of camphor. Leaves simple, alternate; blades entire but may have wavy margins, mostly ovate, 4-10 cm (1.5-4 in) long and 2-5 cm (0.8-2 in) broad, glossy green above, duller green below, with impressed glands below at major veins. Flowers small, greenish-white to cream, in loose panicles on branchlets of season; 6 petaloid parts; 12 stamen parts, usually 5-9 fertile stamens plus smaller sterile staminodes. Fruits small, subglobose drupes, black, seated on persistent floral tubes.

Ecological Significance: Occurs primarily in drier disturbed areas such as roadsides and fencerows, but has invaded natural areas such as mesic hammocks, upland pine woods, and scrubland (e.g., taking over space in Polk County scrub inhabited by the federally endangered native plant, *Ziziphus celata*, or Florida jujube). Reported by natural-area managers as infesting particular parks in 14 counties (EPPC 1996). Introduced to Florida in 1875 and later established in plantations to promote camphor production, but the venture proved unprofitable (Lakela and Wunderlin 1980). Still sold as a shade tree and for windbreaks.

Distribution: Most commonly naturalized in north and central Florida, but also escapes cultivation in southern peninsula (Godfrey 1988, Long and Lakela 1971, Wunderlin 1982). Naturalized also in Georgia and west to Texas (Small 1933). Cultivated as well in other southern states: Alabama, Mississippi, Georgia, and the Carolinas (Meyer *et al.* 1994), and in southern California (Bailey and Bailey 1976). By 1997, documented as locally common in the flora from Texas to the Carolinas (van der Werff 1997).



Leaf, mature fruit

Life History: Main trunk often stout with several secondary trunks arising from it, all supporting a dense evergreen canopy. National co-champion trees found in Florida (in cultivation), in Hardee and Pasco counties, with heights of 22 m (72 ft) and main trunk circumferences of about 9 m (31 ft) (NRBT 1994). Fruits normally abundant on mature trees, with birds often seen to “frolic and feast” on them particularly during late winter (Kurz and Godfrey 1962). For extraction of camphor (an ethereal oil), young shoots distilled; old trees felled, chipped, and the wood steam-distilled (Willis 1973). Wood also used for cabinetwork (Bailey and Bailey 1976).

KAL



In hammock, Lake Jessup conservation area

LCA



Flowers

THESPESIA POPULNEA (L.) SOL. EX CORREA

Malvaceae/Mallow Family

Common Names: Seaside mahoe, portia tree

Synonymy: None

Origin: Old World tropics

Botanical Description: Evergreen shrubby tree, commonly to 13 m (40 ft) tall, with young branches minutely brown-scaly. Leaves alternate, simple, with petioles 5-10 cm (2-4 in) long; blades entire, heart shaped (poplar-like), shiny dark green above, 5-20 cm (2-8 in) long, with usually 5 main veins from base. Flowers showy, hibiscus-like, single at upper leaf axils, to 8 cm (3 in) across; corolla yellow with a red center, turning maroon by nightfall; stamens united into a column shorter than petals. Fruit a leathery, flattened-globose, 5-parted capsule, 4 cm (1.5 in) wide, yellow turning black, persisting unopened for a time and bearing several brown hairy seeds.

NOTE: May be confused with another naturalized exotic, sea hibiscus (*Hibiscus tiliaceus* L.), but its leaves wider, with dense star-shaped hairs on lower surfaces; and with the endangered Florida native, wild cotton (*Gossypium hirsutum* L.), but its leaves opposite. Other mallow family members in Florida rarely reach tree stature (Nelson 1994).

Ecological Significance: Introduced for ornament in or before 1928, when importation by U.S. Department of Agriculture was noted at Miami (Gordon and Thomas 1997). Naturalized in Florida shore hammocks and sand dunes by 1933 (Small 1933), with spreading lower branches making “almost impenetrable thickets” and large fruit crops continuously increasing its dense growth. Noted as commonly naturalized in coastal areas of south Florida and the Keys (Watkins 1970, Nelson 1994). Now a common constituent of mangrove communities and low wave-action beaches (D. F. Austin, Florida Atlantic University, 1995 personal communication). Sometimes forms forests of seedlings at the high-tide line (Nellis 1994). Reported from natural areas, including Everglades National Park, in Monroe, Dade, Collier, Lee, Palm Beach, and Martin counties (EPPC 1996). Also weedy in cultivated landscapes (Broschat and Meerow 1991).

KAL



Immature fruits

Distribution: Originating in India (Nelson 1996), but a common plant of coastal strands across Old World tropics (Willis 1973). Naturalized in Florida and West Indies; also cultivated occasionally in Central and South America and probably naturalized (Little and Wadsworth 1964). Has taken over beaches used by nesting sea turtles on St. John, U.S. Virgin Islands (Austin 1993). In Florida, documented by herbarium specimens from southernmost counties and from Brevard County on the central east coast (Wunderlin *et al.* 1995).

Life History: Cold-sensitive, restricted to areas with minimum temperatures above 1.7°C (35°F) (Broschat and Meerow 1991). Resists salt spray and wind action (Rao *et al.* 1983). Grows “luxuriantly on shores of bays and inlets” (Small 1933); able to thrive in low silty land and coral and sand berms (Nellis 1994). Shifts into the more efficient C_4 -type of photosynthesis under saline conditions (Kotmire and Bhosale 1985). Flowers and fruits nearly year-round. Fruits and seeds buoyant, adapted to long-distance dispersal by tides and ocean currents (Nellis 1994).

KAL



**In Matheson Hammock,
Miami-Dade County**

KAL



Flower

JD



Leaves

MELIA AZEDERACH L.

Meliaceae/Mahogany Family

Common Names: Chinaberry, pride-of-India

Synonymy: *M. australis* Sweet; *M. japonica* G. Don; *M. sempervirens* Sw.

Origin: Asia

Botanical Description: Deciduous tree to 15 m (50 ft) tall. Twigs stout with purplish bark, dotted with buff-colored lenticels. Leaves alternate, large, long-petioled, 2 or 3 times compound (odd-pinnate), up to 0.5 m (1.5 ft) long; leaflets pungent when crushed, dark green above, often with sparse pubescence along veins; lighter green below, generally glabrous; margins serrate; blade bases often oblique. Inflorescences showy, loose, stalked panicles from leaf axils. Flowers small, fragrant, with 5 lilac petals; stalks of stamens united into dark purple tube. Fruit a stalked, thinly fleshy, subglobose, single-seeded drupe, yellow or yellowish green at maturity.

Ecological Significance: Introduced around 1830 as an ornamental in South Carolina and Georgia (Gordon and Thomas 1997) and widely planted in southern states. Occurs primarily in disturbed areas such as road right-of-ways and fencerows, but has also invaded floodplain hammocks and marshes and upland woods, particularly in north Florida (Clewell 1985, Godfrey 1988). Reported by land managers as infesting parks in 23 counties (EPPC 1996).

Distribution: Most abundantly naturalized in north and west Florida, but often escaping cultivation in peninsular counties, south to the Keys (Nelson 1994, Wunderlin 1982). Naturalized also in tropical America and planted in temperate and subtemperate areas around the world (Bailey and Bailey 1976). Reported as a prominent roadside and shoreline weed in Cape Province, South Africa (Henderson 1991). In the U.S., naturalized from eastern Virginia, southward to south Florida, and westward to eastern half of Texas and Oklahoma (Godfrey 1988).

LCA



Flowers

Life History: Often shrubby and root-suckering, forming thickets. Frequently flowers and fruits at shrub size. Produces flowers in spring, usually March and April; its fruits long-maturing, prolific, and commonly persistent after leaf fall. Fruits poisonous to humans and some other mammals, but seeds dispersed by a variety of songbirds, who relish the drupes and sometimes gorge themselves to the point of temporary intoxication (Nelson 1994).

KAL



Compound leaf

KAL



Fruits

FICUS MICROCARPA L. F.

Moraceae/Fig Family

- Common Names:** Laurel fig, Indian laurel, laurel rubber
Synonymy: *Ficus nitida* Thunb. and *F. retusa* L. misapplied
Origin: India, Malaysia

Botanical Description: Evergreen tree to 15 m (50 ft) or more in height, with a rounded dense crown, smooth gray bark, milky sap, and long, thin, dangling aerial roots. Leaves alternate, simple, leathery, deep glossy green, oval-elliptic to diamond-shaped, to 13 cm (5 in) long, with short pointed, ridged tips. Flowers tiny, unisexual, numerous, hidden within the “fig,” a fleshy, specialized receptacle that develops into a multiple fruit (syconium), this green turning to yellow or dark red when ripe, sessile, in pairs at leaf axils, small, to 1 cm (0.5 in) in diameter.

Ecological Significance: Introduced for ornament before 1912 (Fairchild 1938), and popular as a street tree in south Florida for decades. Began spreading by seed in the 1970s, following apparently accidental introduction of species-specific pollinating wasps (McKey 1991, Nadel *et al.* 1992), probably via importation of plants from Hawaii, where wasps were successfully introduced in 1921 (Stange and Knight 1987). By 1980s, seedlings seen naturalized on both the west and east coasts of south Florida (Nadel *et al.* 1992). Found in Big Cypress National Preserve as seedlings on palm tree trunks, limestone rocks, and in building crevices (T. Pernas, National Park Service, 1995 personal communication). Also found in various tropical hammocks (S. V. Wells, Miami-Dade Parks Department, 1995 personal communication). Now reported from about 18 natural areas in Monroe, Dade, Collier, Palm Beach, and Martin counties, including Loxahatchee National Wildlife Refuge (EPPC 1996).

TP



Related leaf shapes

TP



Growing on limestone

Distribution: Native to Asia but widely planted in the tropics (Little and Wadsworth 1964). Perhaps naturalized in Bermuda, where the pollinating wasp has also been found (Stange and Knight 1987). Found on Florida's west coast also in Lee County (Nadel *et al.* 1992), and found naturalized as far north as Hillsborough County (Wunderlin *et al.* 1996). May presently be naturalized throughout its cultivated range in Florida (Nadel *et al.* 1992).

Life History: Fast-growing, able to survive in little or no soil when young; seedlings and saplings found in rain gutters, building crevices, sidewalk cracks, and on rocks, as well as in "boots" of sabal palm trunks. Found on high-rise buildings in Singapore (Wee 1992). Has a complex mode of sexual reproduction requiring pollination by specific tiny wasps that in turn use the shelter and food of the specific fig to carry out their life cycle (a mutualistic relationship). Seeds dispersed primarily by birds and other vertebrates, with evidence of further dispersal by ants (Kaufmann *et al.* 1991). Unlikely to naturalize and persist above the frost line in Florida (H. Gramling, Tampa Bay Wholesale Growers, 1998 personal communication).

TP



Mature tree, Monroe Station

TP



Growing on native palm

ARDISIA CRENATA SIMS

Myrsinaceae/Myrsine Family

Common Name: Coral ardisia, coral berry, spice berry

Synonymy: *Ardisia crenulata* Vent.

Origin: Japan to northern India

Botanical Description: Evergreen subshrub to 1.8 m (6 ft) tall (more commonly 0.5-1 m in height), growing in multi-stemmed clumps. Leaves alternate, to 21 cm (8.3 in) long, dark green above, waxy, glabrous, with crenate (scalloped) margins and calluses in the margin notches. Flowers white to pink in stalked axillary clusters, usually drooping below the foliage. Flowers small, bisexual, with petaloid parts pinkish white and anthers yellow. Fruit a bright red, globose, 1-seeded drupe, to 8 mm in diameter.

Ecological Significance: Introduced into Florida for ornament near the beginning of this century (Royal Palm Nurseries 1900). Noted as escaping into moist woods in 1982 (Wunderlin). Seen naturalized in hardwood hammocks across USDA Plant Hardiness Zone 9, including several areas in northern Florida (H. Dozier, University of Florida, personal observations). Recently reported as new to Texas flora, dominating understories in portions of two reserves (Singhurst *et al.* 1997). May reach densities of greater than 100 plants per m² (H. Dozier, University of Florida, unpublished data). Native plant species richness substantially lower in its presence, regardless of its density or the site history; also reduces the already dim light of forest understories by an additional 70%, potentially shading out native seedlings (H. Dozier, University of Florida, unpublished data). Mature naturalized plants usually surrounded by a carpet of seedlings, displacing small native ground cover such as violets, *Viola* spp., and wakerobins, *Trillium* spp., (M. Zeller and K. C. Burks, Florida Department of Environmental Protection, personal observations).



In park floodplain, Leon County

Distribution: Most widely distributed *Ardisia* worldwide (Watkins and Wolfe 1956, Watkins 1969). Naturalized on 2 islands in Hawaii (C. Smith, University of Hawaii, 1995 personal communication), and noted as an escapee in wet forest remnants in Mauritius over 60 years ago (Lorence and Sussman 1986; Vaughan and Wiehe 1937, 1941). Reported from Florida natural areas in Alachua, Flagler, Gadsden, Highlands, Hillsborough, Leon, Liberty, Marion, Martin, and Orange counties (EPPC 1996). Recorded by herbarium specimens from Alachua, Citrus, Franklin, Gadsden, Hernando, Highlands, Leon, Marion, Orange, and Pasco counties (Wunderlin *et al.* 1996).

Life History: Prefers moist soil (Chabot 1952, Odenwald and Turner 1980), but may succumb to fungal rot in flooded soil (J. Tea, University of Florida, 1996 personal communication). Resprouts vigorously after cutting; propagated by cuttings for compact growth (Chabot 1952). Does not carry fire well through its thick foliage and resprouts following fire (F. E. Putz, University of Florida, 1996 personal communication). Produces fruit within 2 years from seed (Odenwald and Turner 1980). Fruit crop usually heavy, with viable seed retained year-round on plants (H. Dozier, University of Florida, personal observations). Seeds dispersed by birds, including mockingbirds and cedar waxwings (K. Brady, Birdsong Nature Center, 1997 personal communication) and by raccoons (H. Dozier, University of Florida, personal observations). Seeds able to germinate in a range of soil pH, from pH 4 (acid) to pH 10 (alkaline), with germination rates of 84 to 98% within 40 days (M. Zeller, Florida Department of Environmental Protection, unpublished data).

KAL



Leaves

KAL



Mature fruits

ARDISIA ELLIPTICA THUNB.

Myrsinaceae/Myrsine Family

Common Names: Shoebuttan ardisia

Synonymy: *Ardisia polycephala* Wall., *A. solanacea* Roxb., *A. humilis* Vahl.

Origin: India, China, Southeast Asia

Botanical Description: Evergreen, glabrous shrub or small tree to 5 m (17 ft) tall, with smooth stems and new foliage often reddish. Leaves alternate, to 20 cm (8 in) long, oblong to oval, fleshy, leathery, gland-dotted below, with margins entire. Flowers in axillary clusters, star shaped, 13 mm (0.5 in) wide, with mauve-colored petals. Fruit a rounded drupe, 6 mm (< 1 in) wide, red turning to black when ripe, with white juicy flesh.

NOTE: Differs from the native marlberry, *Ardisia escallonioides* Schlecht. & Cham., and native myrsine, *Rapanea punctata* (Lam.) Lundell (*Myrsine floridana* A. DC.), by its larger growth habit and conspicuous axillary clusters of mauve flowers.

Ecological Significance: Classified as a common weed in Hawaii (Holm *et al.* 1979). Naturalized in Jamaica, forming secondary thickets in moderately wet places (Adams 1972). Introduced to Florida for ornament by 1900 (Gordon and Thomas 1997). Noted as escaping cultivation in south Florida (Small 1933, Morton 1976, Austin 1978). In Miami-Dade County, now abundant in hammocks, old fields, disturbed wetlands, and tree islands in marshes, forming dense single-species stands in forest understories and crowding out native plants (R. Hammer, Miami-Dade County Natural Resources Department, 1996 personal communication). Also invading cypress and mangrove areas along the New River in Broward County (e.g., Secret Woods preserve). Has become a target of eradication by natural resource managers for Miami-Dade and Broward County Parks and Everglades National Park (M. McMahon, Biological and Environmental Consulting, 1996 personal communication).

RH



Young flower clusters

SHOEBUTTON ARDISIA

Distribution: Common in East Indies, naturalized in Hawaii, the Caribbean, and Florida. Reported only for Dade County in 1965 (Lakela and Craighead 1965). Herbarium specimens now recorded for naturalized populations in Dade, Monroe, and St. Lucie counties (Wunderlin *et al.* 1995). Reported as sight records from a dozen parks in Dade, Palm Beach, and Broward counties (EPPC 1996).

Life History: Flowers and fruits all year (Long and Lakela 1971). Seed dispersal aided by bird consumption of fruits (R. Hammer, Miami-Dade County Parks, 1996 personal communication). Berries edible (Morton 1974).



Fruits



Young leaves



Thicket in Everglades National Park

EUGENIA UNIFLORA L.

Myrtaceae/Myrtle family

Common Names: Surinam cherry, cayenne cherry

Synonymy: *Eugenia michelii* Lam.

Origin: Brazil

Botanical Description: Evergreen, multibranched shrub or small tree to 10 m (30 ft) tall, usually shrub size in Florida; young stems often with red hairs and dark red new foliage. Leaves opposite, simple, short petioled, oval to lance shaped, 2.5-8 cm (1-3 in) long, shiny dark green above, paler below; margins entire. Flowers white, fragrant, about 13 mm (0.5 in) across, with many stamens; occurring solitary or in clusters of 2 or 3 at leaf axils. Fruit a fleshy, juicy, orange-red berry to 4 cm (1.5 in) wide, depressed-globose, conspicuously 8-ribbed, with 1-3 seeds.

NOTE: Differs from native *Eugenia* spp. (stoppers) by having relatively larger fruit and at least some flowers solitary at the leaf axils.

Ecological Significance: Introduced for ornament and edible fruit before 1931 (Stennis 1931, Gordon and Thomas 1997). Widely planted in central and south Florida, especially for hedges (Maxwell and Maxwell 1961, Watkins 1970). Noted as escaping cultivation and invading hammocks in south-central and south Florida (Long and Lakela 1971, Tomlinson 1980, Wunderlin 1982). Has invaded Dade and Broward County hammocks in high numbers, becoming a target of eradication by park managers (M. McMahon, Biological and Environmental Consulting, 1995 personal communication). Forms thickets in hammocks in the Bahamas (Correll and Correll 1982). Also listed as invasive in Hawaii (Wester 1992). Considered weedy in cultivated landscapes (Broschat and Meerow 1991), not recommended (Nelson 1996). Now reported from over 20 Florida natural areas, including national wildlife refuges and rare scrub habitat, in Dade, Broward, Palm Beach, Martin, Highlands, Lee, Sarasota, Hillsborough, and Pinellas counties (EPPC 1996).

KAL



Leaves

Distribution: Widely grown in tropical regions (Bailey and Bailey 1976). Escaped from cultivation also in U.S. Virgin Islands (Little and Wadsworth 1964). Commonly naturalized in Dade County (Lakela and Craighead 1965). Herbarium specimens of Florida naturalized populations collected from as far north as St. Lucie and Brevard counties on the east coast, Polk County on the central ridge, and Pinellas County on the west coast (Wunderlin *et al.* 1995).

Life History: Hardy into central Florida and adaptable to all soil conditions not subject to flooding (Sturrock 1959). Freezes at about -1°C (30°F); grows moderately fast; can be easily pruned; has “fair” salt tolerance (Maxwell and Maxwell 1961). Flowers and fruits primarily in spring, with sometimes a second crop in the fall. Fruits eaten fresh or used in preserves (Stennis 1931). Plants visited daily by birds during the fruiting season (Stresau 1986). Fruits probably also eaten by small mammals. Propagated for cultivation by seed (Broschat and Meerow 1991). Also known as a general host for the Mediterranean fruit fly (Weems 1981).

EI



Fruits

EI



Flowers

MELALEUCA QUINQUENERVIA (CAV.) BLAKE

Myrtaceae/Myrtle family

Common Names: Melaleuca, paper-bark, cajeput, punk tree, white bottlebrush tree

Synonymy: *Melaleuca leucadendron* (L.) L. misapplied

Origin: Australia, New Guinea, and Solomon Islands

Botanical Description: Evergreen tree to 33 m (100 ft) tall, with a slender crown and soft, whitish, many-layered, peeling bark. Leaves alternate, simple, grayish green, narrowly lance shaped, to 10 cm (4 in) long and 2 cm (3/4 in) wide, with a smell of camphor when crushed. Flowers in creamy white “bottle brush” spikes to 16 cm (6 in) long. Fruit a round, woody capsule, about 3 mm (3/8 in) wide, in clusters surrounding young stems, each capsule holding 200-300 tiny seeds.

Ecological Significance: Introduced to Florida for ornament in 1906 (Laroche 1994b). Scattered aerially over the Everglades in the 1930s to create forests (Austin 1978). Widely planted, and recommended as late as 1970 as “one of Florida’s best landscape trees” (Watkins 1970). Now recognized internationally as a threat to the Florida Everglades, a World Heritage Site and International Biosphere Reserve (D. C. Schmitz, 1994 Congressional testimony). Grows extremely fast, producing dense stands that displace native plants, diminish animal habitat, and provide little food for wildlife (Laroche 1994b). Has become abundant in pine flatwoods, sawgrass marshes, and cypress swamps of south Florida (Nelson 1994). By 1994, estimated to infest nearly 200,000 ha (490,000 acres) in south Florida, with extensive stands in the Everglades, Big Cypress, and Loxahatchee Slough (Laroche 1994b). Infested acreage since reduced by an estimated 40,470 ha (100,000 acres) through regional control efforts (F. Laroche, South Florida Water Management District, 1998 personal communication). First insect biological control agent released in Everglades by U.S. Department of Agriculture in 1997 (Cox News Service).

Distribution: Found naturalized in Florida as far north as Hernando, Lake, and Brevard counties (Wunderlin *et al.* 1995, Mason 1997). Reported from natural areas in 16 central and south Florida counties (EPPC 1996).

RB



Old capsules

Life History: Prefers seasonally wet sites, but also flourishes in standing water and well-drained uplands (Laroche 1994b). Saplings often killed by fire, but not mature trees. Can survive severe frost damage (Woodall 1981). Grows 1-2 m (3-6 ft) per year; resprouts easily from stumps and roots; capable of flowering within 2 years from seed (Laroche 1994b). Flowers and fruits all year, producing up to 20 million windborne seeds per year per tree, and able to hold viable seed for massive all-at-once release when stressed (Woodall 1983). Releases volatile oils into air, especially when blooming, that cause respiratory irritation, asthma attacks, headaches, and/or rashes in some people (Morton 1971b).

TP



In Big Cypress National Preserve

JRS



Flowers, leaves

PSIDIUM CATTLEIANUM SABINE

Myrtaceae/Myrtle Family

Common Names: Strawberry guava, Cattley guava
Synonymy: *Psidium littorale* Raddi var. *longipes* (O. Berg) Fosb.
Origin: Brazil

Botanical Description: Evergreen shrub or small tree to 8 m (25 ft) tall, with gray to reddish-brown peeling bark and young branches round, pubescent. Leaves opposite, simple, entire, glabrous, elliptic to oblong, to 8 cm (3 in) long. Flowers to 2.5 cm (1.2 in) wide, borne singly at leaf axils, with white petals and a mass of white and yellow stamens. Fruit a globose berry, 3-6 cm (1.2-2.4 in) long, purple-red, with whitish flesh usually sweet-tasting when ripe; seeds numerous.

NOTE: May be confused with the common guava (*P. guajava*, on following pages), which has 4-angled branches and larger leaves with the veins prominently raised below.

Ecological Significance: Introduced to Florida in the 1880s for ornament and as a fruit crop (Gordon and Thomas 1997), and since planted extensively (Watkins 1970, Broschat and Meerow 1991). Noted as “often growing wild” by 1950s (Barrett 1956). Forms thickets and shades out native vegetation in forests and open woodlands (Cronk and Fuller 1995). Has had catastrophic effect on native habitats of Mauritius, and considered the worst pest plant in Hawaii, where it has invaded a variety of natural areas (Cronk and Fuller 1995). Has become dominant in some native forests of Hawaii, including in 2 national parks, where its clonal spread is enhanced by activities of feral pigs (Huenneke and Vitousek 1990). Reported from Florida parks and preserves in Pinellas, Hillsborough, Martin, and Palm Beach counties (EPPC 1996). Along with the common guava and the Surinam cherry, also serves as a major host for the naturalized Caribbean fruit fly, *Anastrepha suspensa* (Loew), which occasionally spreads to commercial citrus crops (Nguyen *et al.* 1993).

KAL



Young stem

STRAWBERRY GUAVA

Distribution: Native to Brazil, naturalized in Florida, Hawaii, tropical Polynesia, Norfolk Island, and Mauritius (Cronk and Fuller 1995). Naturalized across peninsular Florida, with herbarium specimens documented from Seminole, Orange, Osceola, Pinellas, Hillsborough, Indian River, St. Lucie, Martin, Highlands, Glades, Hardee, and DeSoto counties (Wunderlin *et al.* 1995).

Life History: Grows rapidly, tolerates shade, and produces root suckers (Cronk and Fuller 1995). Root-suckering ability important to its dominance in natural habitats (Hueneke and Vitousek 1990). Has good salt tolerance (Maxwell and Maxwell 1961). Flowers and fruits all year (Wunderlin 1982). Has high seed production, early seed maturity, and seed dispersal by both birds and mammals (Cronk and Fuller 1995).

AF



Bark

KAL



Immature fruits

PSIDIUM GUAJAVA L.

Myrtaceae/Myrtle Family

Common Names: Common guava, apple guava

Synonymy: None

Origin: Tropical America

Botanical Description: Evergreen shrub or small tree to 9 m (30 ft) tall, with scaly greenish-brown bark and young branches 4-angled, pubescent. Leaves opposite, simple, short stalked, entire, oval to oblong-elliptic, to 15 cm (6 in) long, pubescent below, with veins impressed above and conspicuously raised below. Flowers white, fragrant, to 4 cm (1.6 in) wide, borne singly or a few together at leaf axils; many stamens. Fruit an oval or pear-shaped berry, 3-10 cm (1-4 in) long, yellow at maturity, with yellow or dark pink flesh somewhat dull in taste; seeds numerous.

NOTE: May be confused with the strawberry guava (see preceding pages).

Ecological Significance: Introduced early to Florida, naturalized by 1765 (DeBrahm 1773). Planted extensively for edible fruit and ornament; weedy in landscaping (Broschat and Meerow 1991); spreading into hammocks and pinelands (Long and Lakela 1971, Morton 1976). Has become dominant in the understory of some cypress strands (D. F. Austin, Florida Atlantic University, 1997 personal communication). Forms thickets and has a serious impact in native forests and open woodlands (Cronk and Fuller 1995). Present as a weed in 27 countries; a common to serious pest in 9 of these (Holm *et al.* 1979). Now a common element of coastal moist forests in Puerto Rico (Little and Wadsworth 1964). Reported from Florida parks and preserves in Broward, Collier, Dade, Highlands, Lee, Martin, Osceola, Palm Beach, and Sarasota counties (EPPC 1996). Along with the strawberry guava and the Surinam cherry, also serves as a major host for the naturalized Caribbean fruit fly, *Anastrepha suspensa* (Loew), which occasionally spreads to commercial citrus crops (Nguyen *et al.* 1993).

KAL



**Along roadside,
Indian River County**

KAL



Leaves

COMMON GUAVA

Distribution: Native to tropical America, probably from southern Mexico south to South America, but its distribution greatly extended through cultivation (Little and Wadsworth 1964). Frequently naturalized (Bailey and Bailey 1976). Naturalized in Old World tropics, in Florida and the West Indies (Cronk and Fuller 1995). Found in Florida from Pinellas and Brevard counties south to the Keys (Nelson 1994).

Life History: Forms dense thickets (Scurlock 1987). Grows rapidly and tolerates shade (Cronk and Fuller 1995). Young plants more tolerant of cold, to -7°C (20°F), if water stressed (Utsunomiya 1988). Flowers and fruits all year (Wunderlin 1982). Has high seed production, early seed maturity, and seed dispersal by both birds and mammals (Cronk and Fuller 1995).

KAL



Bark

KAL



Young stem

RHODOMYRTUS TOMENTOSA (AIT.) HASSK.

Myrtaceae/Myrtle Family

Common Names: Downy rose myrtle, downy myrtle, hill gooseberry, hill guava

Synonymy: *Rhodomyrtus tomentosa* (Ait.) Wight, *R. parviflora* Alston

Origin: Tropical Asia

Botanical Description: Evergreen shrub to 2 m (6 ft) tall, with dense, short, soft hairs on young stems. Leaves opposite, simple, entire, elliptic-oval, to 7 cm (3 in) long, glossy green above, densely soft-hairy below (tomentose), with 3 main veins from blade base. Flowers rose-pink, to 2.5 cm (1 in) across, in one- to few-flowered clusters at leaf axils; 5 sepals, hairy; 5 petals; many stamens, with pink filaments. Fruit a globose, few-seeded berry to 1.3 cm (0.5 in) across, dark purple, with sweet, aromatic flesh.

Ecological Significance: A principal weed in Hawaii and Malaysia, and a common weed in Thailand (Holm *et al.* 1979). Introduced to Hawaii around 1920 (Degener 1963), where it formed impenetrable thickets on Kauai and Hilo by the 1950s (Hosaka and Thistle 1954). Introduced to Florida before 1924 for ornament and edible fruit (Gordon and Thomas 1997). An early escapee from cultivation, forming extensive thickets near Orlando, Bradenton, Oneco, Bonita Springs, Naples, and Estero (Morton 1976). Readily invades pinelands, displacing native vegetation with dense one-species thickets in the understory (T. Pernas, National Park Service, and D. F. Austin, Florida Atlantic University, 1995 personal communications). Threatens to become worse than Brazilian pepper in central Florida (J. Layne, Archbold Biological Station, 1996 personal communication to D. F. Austin). Reported now from natural areas in Sarasota, Lee, Collier, Highlands, Palm Beach, and Martin counties (EPPC 1996).

Distribution: Found in Florida as far north as Pasco County on the west coast; documented by herbarium specimens from the counties already mentioned plus Hillsborough, Manatee, Charlotte, and DeSoto counties (Wunderlin *et al.* 1995). Native from India to China, south to the Phillipines (Bailey and Bailey 1976). By 1950s, widespread in tropics and subtropics to 2,400 m (8,000 ft) elevations (Hosaka and Thistle 1954).

RER



Fruit, leaves

DOWNY ROSE MYRTLE

Life History: Will withstand several degrees of frost; is not particular as to soil (Bailey and Bailey 1976). Thrives in moist soil when young (Morton 1971a). Will tolerate salt of coastal soils, but sensitive to heavy salt spray and overwash (Menninger 1964). Blooms profusely, abundantly in spring (Morton 1971a, Menninger 1964). Fruits likened to huckleberries, but with thicker, richer juice, good for jelly (Stennis 1931). Seeds probably dispersed by birds and mammals.

RER



Flowers

KAL



In pineland, Charlotte County

SYZYGIUM CUMINI (L.) SKEELS

Myrtaceae/Myrtle Family

Common Names: Java plum, jambolan, jamun, duhat

Synonymy: *Syzygium jambolana* (Lam.) DC., *Eugenia cumini* (L.) Druce, *E. jambolana* Lam.

Origin: Southeast Asia, India

Botanical Description: Evergreen tree to 25 m (80 ft) tall, with young stems grayish white and lower bark coarse and discolored. Leaves opposite, simple, entire, elliptic to broadly oblong, smooth, glossy, somewhat leathery, 5-10 cm (2-5 in) long, short pointed at tips; petioles to 3 cm (1.2 in) long; leaf midrib prominent, yellowish; blades with many lateral veins closely parallel. Flowers white to pinkish, about 1 cm (0.5 in) across, in branched clusters at stem tips; calyx cuplike; 4 petals, fused into a cap; many stamens. Fruit an ovoid, 1-seeded berry to 2 cm (0.8 in) long, dark purplish red, shiny, with white to lavender flesh.

NOTE: May be confused with another naturalized non-native, the rose apple, *Syzygium jambos* Alston, but its habit smaller, to 15 m (50 ft) in height; its leaves longer, to 25 cm (10 in) long; its petals free, not fused into a cap; and its fruits cream-yellow.

Ecological Significance: Introduced into Florida for ornament and edible fruit by the U.S. Department of Agriculture, with seeds from the Philippines in 1911 and 1920, and from Java and Zanzibar in 1912 (Popenoe 1939). Long recommended as a shade tree but considered messy (Broschat and Meerow 1991). Noted as naturalized in southern Florida by 1982 (Wunderlin). Now one of the more rapidly spreading non-native species, forming dense canopies that shade out young native trees in wet pinelands, hammocks, and well drained uplands (Duever *et al.* 1986). Reported from 17 natural areas in Pinellas, Lee, Collier, Dade, Palm Beach, and Martin counties (EPPC 1996). Naturalized on all islands of Hawaii, where it excludes native as well as introduced plants, such as *Schinus terebinthifolius* (Wagner *et al.* 1990).

AF



Leaves

Distribution: Found in peninsular Florida, mostly in southernmost counties; documented by herbarium specimens from Palm Beach, Collier, and Lee counties (Wunderlin *et al.* 1995). Native from India to Myanmar and East Indies, but widely cultivated in tropics (Bailey and Bailey 1976). Naturalized in Hawaii (Wagner *et al.* 1990), Australia (Oommachan 1977, Morton 1987), the Philippines, Zanzibar, Pemba, Mombassa, and Kenya (Morton 1987).

Life History: Restricted to areas with minimum temperatures above 1.7°C (35°F) (Broschat and Meerow 1991). Thrives in low wet areas as well as higher well-drained land, including loam, sand, or oolitic limestone (Morton 1987). Observed most often in Big Cypress National Preserve on damp pineland sites but also on regularly inundated but relatively high spots in cypress strands and sawgrass marshes (Duever *et al.* 1986). Does well in its native range in areas with as much as 1,000 cm (400 in) of annual rainfall and withstands prolonged flooding (Morton 1987). Common in the dry zone of its native range, in all forms of forest but especially along margins of streams and ponds (Dassanayke and Forsberg 1981). Resistant to coastal high winds, but not to heavy salt spray and overwash (Menninger 1964). Does not do well in highly saline, or sodic, soils (Gill and Abrol 1991). Produces fruit in 5-6 years when grown from seeds (Burkill 1935). Flowers year-round (Wunderlin 1982), but mostly in the spring. Seeds dispersed by birds and mammals, including raccoons and wild hogs. Dispersed in Hawaii primarily by myna birds (Morton 1987). Used in fruit preserves, but fruit considered “rarely worth eating” by some (Menninger 1964). Closely related to *S. aromaticum* (L.) Merr., the dried flower buds of which form the spice known as “cloves” (Willis 1973).



Fruits



Flowers, fruits, and leaves

JASMINUM DICHOTOMUM VAHL

Oleaceae/Olive Family

Common Name: Gold Coast jasmine
Synonymy: None
Origin: Tropical west Africa

Botanical Description: Scrambling shrub or woody climber, evergreen, to 8 m (26 ft) tall, with climbing stems longer; stems glabrous. Leaves opposite, appearing simple (unifoliolate), oval to roundish oblong, glossy, leathery, 5-7 cm (2-4 in) long, with short-pointed tips. Flowers white (pink in bud), quite fragrant, opening at night, in clusters at leaf axils; petals fused into a narrow tube to 2.5 cm (1 in) long, with 5-9 terminal lobes about 1.3 cm (0.5 in) long, spreading in star-shaped fashion. Fruit a small, fleshy, roundish, black, 2-lobed berry.

NOTE: Without flowers or fruits present, may be confused with the native snowberry, *Chiococca alba* (L.) A. Hitchc., but its opposite leaves joined at the nodes by a stipular line scar.

Ecological Significance: Introduced into Florida for ornament in the late 1920s (Hammer 1996). As an ornamental, considered “promising in South Florida” in 1947 (Bailey and Bailey 1947). More recently considered weedy in cultivated landscapes (Broschat and Meerow 1991) and not recommended (Nelson 1996). Recognized as spreading from cultivation not only in disturbed areas but in hammocks by 1970s (Long and Lakela 1971, Morton 1976, Austin 1978). Vigorously invades intact, undisturbed hardwood forests; can climb high into the tree canopy of mature forests, completely enshrouding native vegetation and reducing native plant diversity (Hammer 1996). Reported from 7 natural areas in Dade County (EPPC 1996). Difficult to control (Nelson 1996).

Distribution: One of 7 species of non-native jasmines naturalized in Florida. Naturalized populations of *J. dichotomum* documented by herbarium specimens from Dade, Monroe, Collier, and Highlands counties (Wunderlin *et al.* 1996).



Opposite leaves

GOLD COAST JASMINE

Life History: Restricted to areas with average minimum temperatures above 1.7°C (35°F) (Broschat and Meerow 1991). Easy to grow; propagated in cultivation from cuttings; may not tolerate soggy root zones (Chabot 1952). Will grow near coasts where protected from salt spray (Menninger 1964). Flowers all year, most abundantly in spring; ripe fruit found from early summer into early winter (Hammer 1996). Seeds dispersed by birds and raccoons, with dense plots of seedlings often seen arising from raccoon droppings (Hammer 1996).

RH



Habit

KAL



**Climbing in Greynolds Park,
Miami-Dade County**

JASMINUM FLUMINENSE VELL.

Oleaceae/Olive family

Common Name: Brazilian jasmine, Azores jasmine
Synonymy: *Jasminum bahiense* DC.; *J. azoricum* L. misapplied
Origin: Tropical west Africa

Botanical Description: Evergreen, climbing, woody vine, with young stems densely hairy and mature stems glabrous. Leaves opposite, trifoliolate, leaf and leaflets stalked; terminal leaflet larger, to 7 cm (4 in) long, with a stalk to 5 cm (2 in) long; leaflets broadly ovate, pubescent above and below, with pointed tips. Flowers white, quite fragrant, opening at night, in broad, branched clusters at leaf axils; petals fused into a narrow, slightly curved tube to 2.5 cm (1 in) long, with 5-7 terminal lobes shorter than the tube, spreading in star-shaped fashion. Fruit a small, fleshy, roundish, black, 2-lobed berry.

Ecological Significance: Introduced into Florida for ornament in the early 1920s; first described from Brazil, but actually introduced there from Africa by Portuguese explorers (Hammer 1996). Commonly escaped and weedy by 1960s (Lakela and Craighead 1965, Long and Lakela 1971, Morton 1974). Abounds on fences, power poles, hedges, and other disturbed sites (Morton 1976). Has spread extensively and become a major pest, in Florida and in Puerto Rico (Morton 1974). Self-sowing and weedy in cultivated landscapes (Broschat and Meerow 1991). An aggressive, troublesome, difficult-to-control weed (Nelson 1996). Has vigorously invaded intact, undisturbed hardwood forests in south Florida; can climb high into the tree canopy of mature forests, completely enshrouding native vegetation and reducing native plant diversity (Hammer 1996). Reported from 11 natural areas, including rare scrub habitat, in Dade and Palm Beach counties (EPPC 1996).

KAL



Flowers

Distribution: One of 7 species of non-native jasmines naturalized in Florida. Naturalized populations of *J. fluminense* documented by herbarium specimens from Dade, Monroe, St. Lucie, and Highlands counties (Wunderlin *et al.* 1996). Listed as a common weed in Puerto Rico and as a weed in the Dominican Republic (Holm *et al.* 1979). Noted as locally common in Jamaica (Adams 1972). Naturalized in the Bahamas as well, and elsewhere in the New World tropics and subtropics (Correll and Correll 1982).

Life History: Restricted to areas with average minimum temperatures above 1.7°C (35°F) (Broschat and Meerow 1991). Easy to grow; propagated in cultivation from cuttings; may not tolerate soggy root zones (Chabot 1952). Will grow near coasts where protected from salt spray (Menninger 1964). Flowers all year, most abundantly in spring; ripe fruit found from early summer into early winter (Hammer 1996). Seeds dispersed by birds and raccoons, with dense plots of seedlings often seen arising from raccoon droppings (Hammer 1996).

KAL



Compound leaves

KAL



Along roadside near Homestead

LIGUSTRUM SINENSE LOUR.

Oleaceae/Olive Family

Common Names: Chinese ligustrum, Chinese privet, variegated ligustrum (in cultivation)

Synonymy: None, but includes cultivars labeled *stauntonii*, *nanum*, *pendulum*

Origin: China

Botanical Description: Semideciduous shrub or small tree to 4 m (12 ft) tall or more; twigs densely pubescent. Leaves opposite, simple (on long twigs, at first glance, may appear compound), all green (in cultivation usually variegated, cream-white and green); leaf blades to 4 cm (1.5 in) long and 2 cm (0.75 in) wide, elliptic to elliptic-oblong, with tips blunt, margins entire, and pubescence persistent on midvein below; petioles short, pubescent. Flowers many, white, small, somewhat unpleasantly fragrant, on slender pubescent stalks in narrow, conical panicles, terminal on branchlets. Fruits dark blue or bluish-black drupes, ellipsoid to subglobose, mostly 4-5 mm (0.2 in) long.

NOTE: May be confused with native privets (*Foresteria* spp.), but their leaves with small marginal teeth or their leaves without petioles; and the native Walter's viburnum (*Viburnum obovatum* Walt.), but its young stem tips covered with rust-colored scales.

Ecological Significance: Occurs most densely in open disturbed areas, especially low wet places, but also invades less disturbed upland hammocks and pinelands, river and stream floodplains, lake shores, and edges of swamps and marshes, often becoming locally abundant even in deep shade. Has moved into undisturbed relict slope hammock, threatening to displace the globally endangered Miccosukee gooseberry, *Ribes echinellum* (K. C. Burks, Fl. Department of Environmental Protection, personal observations). Considered a "troublesome exotic" or "noxious weed" in much of the Southeast (Dirr 1983, Nelson 1996). Often unrecognized, however, because naturalized populations revert to all-green leaf color following sexual reproduction and seed dispersal by birds, while vegetatively propagated cultivars generally sold with variegated leaves (Dirr 1983). Difficult to control once established in wetlands such as floodplains (Nelson 1996). Also a natural-area weed in bushlands of Australia (Burrows and Kohen 1986) and relict subtropical forests of Argentina (Montaldo 1993). Introduced in the South as an ornamental in 1852 (Dirr 1983) and noted as naturalized as early as 1933 (Small 1933); noted as widely spread in later floristic works (Radford *et al.* 1968, Godfrey and Wooten 1981, Clewell 1985). Still cultivated in 10 southern states (Meyer *et al.* 1994).

KAL



Young fruits

Distribution: In Florida, most abundantly naturalized in Panhandle and northern counties, but also documented by herbarium specimens south on the peninsula in Hernando, Hillsborough, and Dade counties (Wunderlin *et al.* 1995). Reported by managers for Florida conservation areas in 9 counties from Santa Rosa to Citrus counties (EPPC 1996). Also widely naturalized elsewhere in the South, from the Carolinas to Texas, and north to Kentucky and Tennessee (Radford *et al.* 1968, Correll and Johnston 1970).

Life History: Readily escapes cultivation (Nelson 1996). Can form impenetrable thickets and thrive in sunny concrete crevices as well as in fully shaded floodplains—“found about everywhere that birds fly” (Dirr 1983). Dispersal by birds important to new colonizations (Montaldo 1993) and higher seed germination (Burrows and Kohen 1986). Flowers and fruits prolifically in late spring, an average square meter of canopy producing about 1,300 fruits (Burrows and Kohen 1986). Pure variegated form not known to produce viable seed (H. Gramling, Tampa Bay Wholesale Growers, 1998 personal communication). Can handle frequent pruning (Yeager and Ingram 1986). Occasionally susceptible in cultivation to infestation by whiteflies (Dickey and Mowry 1969).

KAL



Leaves, hairy twigs

KAL



Mixed leaf colors in cultivation

COLUBRINA ASIATICA (L.) BRONGN.

Rhamnaceae/Buckthorn Family

Common Names: Latherleaf, Asiatic or common colubrina, hoop withe, Asian snakeroot

Synonymy: None

Origin: Old World

Botanical Description: Glabrous, evergreen, scrambling shrub with diffuse, slender branches to 5 m (16 ft) long; in older plants, stems to 15 m (49 ft) long. Leaves alternate, with slender petioles to 2 cm (3/4 in) long; blades oval, shiny dark green above, 4-9 cm (1.6-3.5 in) long and 2.5-5 cm (1-2 in) wide, with toothed margins and producing a thin lather when crushed and rubbed in water. Flowers small, greenish white, in short branched, few-flowered clusters at leaf axils; each with a nectar disc, 5 sepals, 5 hooded petals, and 5 stamens. Fruit a globose capsule, green and fleshy at first and turning brown upon drying, about 8 mm (1/3 in) wide, with 3 grayish seeds.

NOTE: Distinguished from the native colubrinas by its sprawling habit, glabrous stems, dull gray seeds, leaf blades with serrate margins, and 3 main veins from blade bases.

Ecological Significance: Thought to have been brought to Jamaica in 1850s by East Asian immigrants for traditional use as medicine, food, fish poison, and soap substitute (Burkill 1935, Perry 1980). Noted as naturalized in the Florida Keys and Everglades by Small (1933), and as aggressively spreading along these coasts by Morton (1976) and Austin (1978). Invades marly coastal ridges just above the mean high tide line (Russell *et al.* 1982), in tropical hammocks, buttonwood and mangrove forests, and tidal marshes (Schultz 1992). Also forms thickets on disturbed coastal roadsides. Can invade disturbed and undisturbed forest sites (Olmsted *et al.* 1981, Jones 1996). Forms a thick mat of entangled stems up to several feet deep, growing over and shading out native vegetation, including trees (Langeland 1990, Jones 1996). Of particular concern in Florida's coastal hammocks, where it threatens a number of rare, listed native plant species, such as mahogany, thatch palm, wild cinnamon, manchineel, cacti, bromeliads, and orchids (Jones 1996). Also found now in every park in the Keys, where it threatens rare natives such as bay cedar and beach star, and covers several acres in Blowing Rocks Preserve on Jupiter Island in Martin County (J. Duquesnel, Florida Park Service, 1994 personal communication).



Flowers

Distribution: Found naturally from eastern Africa to India, Southeast Asia, tropical Australia, and the Pacific Islands, including Hawaii, where it typically occurs as scattered plants on sandy and rock seashores (Brizicky 1964, Johnston 1971, Tomlinson 1980). From Jamaica, has spread in New World to other Caribbean islands, Mexico, and Florida, with the aid of ocean currents and storm tides (Russell *et al.* 1982). In Florida, now naturalized in coastal areas from Key West north to Hutchinson Island in St. Lucie County (Schultz 1992) and in Everglades National Park, including the Ten Thousand Islands northwest into Collier County (EPPC 1996).

Life History: Requires considerable light, with seedling growth rate increasing where shade removed; stems may grow 10 m (32 ft) in a single year (Schultz 1992). Forms adventitious roots where branches touch the ground. Vigorously resprouts from cut or injured stems. May reach seed-producing maturity within a year (Russell *et al.* 1982, Schultz 1992). Flowers in Florida most often in July, with fruits mature in September (Jones 1996), but reported as flowering year-round (Long and Lakela 1971, Wunderlin 1982). For germination, loose soil usually required, with seeds able to retain viability in soil for at least several years (Russell *et al.* 1982). Long-distance dispersal aided primarily by storms and extreme tides, which allow ocean currents to carry away the buoyant, salt-tolerant fruits and seeds (Carlquist 1966).

DI



Thickets (darker green) in coastal ridge, Everglades National Park (aerial view)

ID



Leaves, flowers, fruit

PAEDERIA FOETIDA L.

Rubiaceae/Madder Family

Common Names: Skunk vine, Chinese fever vine

Synonymy: *Paederia scandens* Lour., *P. chinensis* Hance, *P. tomentosa* Blume

Origin: Eastern and southern Asia

Botanical Description: Perennial twining vine from woody rootstock; stems to 7 m (23 ft) or more, climbing, or prostrate and rooting at the nodes. Leaves opposite (rarely in whorls of 3), with conspicuous stipules; petioles commonly to 6 cm (2.4 in) long; blades entire, oval to linear-lanceolate, 2-11 cm (1-4.3 in) long, hairy or glabrous, often lobed at base; leaves and stems with disagreeable odor, especially when crushed. Flowers small, grayish pink or lilac, in broad or long, “leafy,” curving clusters, terminal or at leaf axils; corolla densely hairy, tubular with 5 (usually) spreading lobes. Fruit a shiny brown, nearly globose capsule, to 0.7 cm (0.3 in) wide, with 2 black, roundish seeds, these often dotted with white raphides.

NOTE: May be confused with the closely related, also naturalized, sewer vine, *P. cruddasiana* Prain, but its fruits oval, flattened, with distinctly winged seeds.

Ecological Significance: Introduced by the U.S. Department of Agriculture before 1897 as a potential fiber plant; by 1916 already “a troublesome weed” around the Brooksville Field Station (Morton 1976). Noted as escaping to thickets and fence rows in peninsular Florida by Small (1933). Considered an economically important weed by 1977 (Reed 1977). Occurs most often in tree gaps and other disturbed areas in its native range (Puff 1991). In Florida, invades various native plant communities, including sandhill, floodplain, and upland mixed forest. Can create dense canopies leading to damage or death of native vegetation (Gann and Gordon 1998). In Orange County, found in relatively wet areas, growing on wetland natives such as dahoon holly (*Ilex cassine* L.). Has smothered out portions of one of the few remaining populations of the endemic, federally endangered Cooley’s water willow (*Justicia cooleyi* Monachino & Leonard) (S. Bowman, Native Plant Society, and D. Martin, U.S. Fish and Wildlife Service, 1995 personal communications). Reported from nearly 20 natural areas in Hillsborough, Hernando, Pasco, Citrus, Marion, Sumter, Lake, Orange, and Polk counties (EPPC 1996).

KAL



Flowers, leaves

Distribution: Occurs most commonly in west central Florida, but also documented northward to Suwannee and Gadsden counties by herbarium specimens (Wunderlin *et al.* 1996) and by sight records for Duval County (Martin 1995) and Franklin County (W. Miley, Apalachicola National Estuarine Reserve, 1996 personal communication). Also naturalized in Louisiana and South Carolina, although perhaps not persisting there (Gann-Matzen 1994). A principal or common weed in Hawaii, present as a weed in Brazil; in its native range, a serious weed in New Guinea (Holm *et al.* 1979).

Life History: Fast-growing; shows wide-ranging adaptability to different light, soil, and salt conditions (Puff 1991). Able to establish and grow above the frost line, though some leaves may turn yellow-red or drop following a freeze (G. Greger, City of Winter Park, and K. C. Burks, Florida Department of Environmental Protection, personal observations). Sensitive to fire (Gann and Gordon 1998). Flowers and fruits mostly in summer and fall; seeds may be dispersed by birds (Gann-Matzen 1994). May also be spread by accidental transport of rooted fragments.

KAL



Mature fruits

KAL



**Growing over native vegetation,
Pasco County**

CUPANIOPSIS ANACARDIOIDES (A. RICH.) REDKF.

Sapindaceae/Soapberry Family

Common Names: Carrotwood, tuckeroo tree
Synonymy: *Cupania anacardioides* A. Rich.
Origin: Australia

Botanical Description: Slender evergreen tree, usually single trunked, to 10 m (33 ft) tall, with dark gray outer bark and often orange inner bark (hence the common name). Leaves alternate, once compound (usually even-pinnate), with petioles swollen at the base; 4-12 leaflets, stalked, oblong, leathery, shiny yellowish green, to 20 cm (8 in) long and 7.5 cm (3 in) wide, with margins entire and tips rounded or slightly indented. Flowers numerous, white to greenish yellow, up to 0.8 cm (0.4 in) wide, in branched clusters to 35 cm (14 in) long, at leaf axils; 5 petals; 6-8 stamens. Fruit a short-stalked, woody capsule, to 2.2 cm (0.9 in) across, with 3 distinctly ridged segments, yellow-orange when ripe, drying to brown and splitting open to expose 3 shiny oval black seeds covered by a yellow-red crust (aril).

Ecological Significance: Introduced for landscaping in the 1960s, quickly becoming popular in southern Florida for its fast growth, ease of propagation, and adaptability to coastal conditions (Lockhart *et al.* 1997). Even earliest plantings noted as freely seeding (Menninger 1964). By 1990, seedlings found established in various habitats, disturbed and undisturbed, on both coasts (Oliver 1992). Invades spoil islands, beach dunes, marshes, tropical hammocks, pinelands, mangrove and cypress swamps, scrub habitats, and coastal strands (Lockhart *et al.* 1997). Now found in natural areas of 14 coastal counties in central and south Florida, with reproducing wild populations established already in Brevard, Martin, and Sarasota counties (EPPC 1996, Lockhart *et al.* 1997). Appears able to compete well with even other aggressive non-native plants such as Brazilian pepper (Lockhart *et al.* 1997). Greatest densities of seedlings and saplings, to 24 stems per m², found so far in mangrove forests, where they greatly alter the understory habitat (Lockhart *et al.* 1997). In recent years, ornamental use of carrotwood discouraged or restricted by local ordinance in several counties and 1 municipality (G. Jubinsky, Florida Department of Environmental Protection, 1997 personal communication).

KAL



Fruits, seeds

Distribution: Occurs naturally along north and east coasts of Australia on rocky beaches, sand dunes, and in hilly scrub and riverine and monsoon forests (Reynolds 1985). Cultivated in various subtropical areas, including California (Oliver 1992). In Florida, naturalized in coastal counties from Brevard and Hillsborough south to Dade and Collier (EPPC 1996).

Life History: Tolerant of salt, full sun, full shade, poor soils, poor drainage, and dry areas (Oliver 1992). Older trees able to withstand cold to about -6°C (22°F) (Stresau 1986). Flowers in Florida in late winter/early spring, January and February, with fruits maturing in April and May (Lockhart *et al.* 1997). Seeds dispersed by birds, including mocking-birds and fish-eating crows (Austin 1996).

KAL



Bird dispersal of seeds

AF



**Sapling in mangrove community,
Palm Beach County**

CL



Flowers

CESTRUM DIURNUM L.

Solanaceae/Nightshade Family

Common Name: Day jessamine
Synonymy: *Cestrum diurnum* var. *venenatum* (Mill.) O. E. Schultz
Origin: Tropical America

Botanical Description: Evergreen shrub to 2 m (6.5 ft) tall, with multiple trunks, often densely branched and branches arching. Leaves alternate, simple, short petioled (to 1.2 cm, or 0.5 in); blades smooth, leathery, entire, shiny green, oval to oblong, 5-11 cm (2-4 in) long, 2-4.5 cm (0.8-1.8 in) wide. Flowers fragrant in daytime, creamy white, trumpet-shaped, in several-flowered, stalked clusters at upper leaf axils; corolla tube to 1.8 cm (0.7 in) long, with tiny petal lobes curled back. Fruit an oval berry, to 7 mm (0.3 in) long, green ripening through violet to shiny blue-black, with 4-14 seeds.

NOTE: May be confused with the native marlberry, *Ardisia escallonioides* Schlecht. & Cham., but its leaves larger, 10-15 cm (4-6 in) long, and its flower clusters terminal.

Ecological Significance: Introduced to Florida before the 1930s, when Small recognized it as naturalized in hammocks and disturbed areas of the Florida Keys (Small 1933). Perhaps a natural introduction (R. D'Arcy, Missouri Botanical Garden, 1997 personal communication), but long cultivated for its fragrant flowers (e.g., Chabot 1952), widely cultivated outdoors in warm regions (Menninger 1964, Watkins and Sheehan 1975), and escaped from cultivation (Long and Lakela 1971, Tomlinson 1980, Morton 1982, Wunderlin 1982, Nelson 1996). Frequently planted in the far South (Bailey and Bailey 1947, Kingsbury 1964); also naturalized as an escapee from cultivation in south Texas (Small 1933, Kingsbury 1964, Correll and Johnston 1970) and Hawaii (Morton 1982). "Abounds as a weed in the wild areas of Florida and Hawaii" (Morton 1982). Abundant in hammocks and open disturbed areas; considered a "serious threat" to natural areas in south Florida (Morton 1976). Established in natural areas of Broward and Palm Beach counties by 1978 (Austin). Invades coastal strand hammocks; can form dense thickets at the margins (L. Carter, Florida Park Service, 1997 personal communication).

KAL



Mature fruits

Distribution: Reported from 4 preserves, including Biscayne National Park, and in Dade, Broward, and Hillsborough counties (EPPC 1966). Naturalized populations documented by herbarium specimens from Hillsborough, DeSoto, Glades, Palm Beach, Broward, Dade, and Monroe counties (Wunderlin *et al.* 1995). Probably introduced to Florida from the West Indies. Commonly naturalized on 3 islands of the Bahamas (Correll and Correll 1982).

Life History: Found most often in dry soils (Long and Lakela 1971). Can tolerate shade and dense allelopathic litter under Australian pines (J. Duquesnel, Florida Park Service, 1997 personal communication). Salt tolerant (Morton 1982, Watkins and Sheehan 1975) if protected from heavy salt spray and overwash of storms (Menninger 1964). Flowers and fruits year-round (Morton 1982, Wunderlin 1982). Seeds dispersed by birds (Morton 1982). Fruits poisonous to humans and other mammals, affecting the nervous system (Kingsbury 1964, Krook *et al.* 1975, Morton 1982).



Flowers, immature fruits, leaves

SOLANUM TAMPICENSE DUNAL

Solanaceae/Nightshade Family

Common Name: Wetland nightshade, aquatic soda apple
Synonymy: *Solanum houstonii* Martyn, *S. quercifolium* Miller
Origin: Mexico, West Indies, Belize

Botanical Description: Straggly and sprawling prickly shrub, woody below, herbaceous above, with prickly green stems to 5 m (16 ft) long and 1.5 cm (0.5 in) in diameter; branches often interlocking; stem prickles white to tan, recurved, broad-based, to 0.5 cm (0.2 in) long; stems also sparsely hairy with star-shaped (stellate) hairs. Leaves alternate, simple, with petioles to 3 cm (1.5 in) long; blades longer than wide, to 25 cm (10 in) long and 7 cm (3 in) wide, with deeply round-indenting (sinuate) margins, recurved or straight prickles on veins, and stellate hairs. Flowers small, 3-11 in stalked, branched clusters at leaf axils; petals white, mostly free (fused only at base), spreading or often recurved; stamens with yellow anthers held closely and erect in center of flower. Fruit a small, spherical, tomato-like berry to 1 cm (0.4 in) wide, shiny solid green turning orange then bright red at maturity, with 10-60 yellowish, flat-round seeds.

NOTE: Distinguished from other prickly *Solanum* spp. in Florida, native and exotic, by its clusters of up to 11 pea-sized red berries (with no dark markings when green); its petioled, longer-than-wide, deeply sinuate leaves; its pubescence of stellate hairs only (no straight or glandular hairs); and its clambering, almost vinelike habit.

Ecological Significance: Not known from cultivation; apparently a recent accidental or natural introduction to Florida. Most species of the genus known to be bird-dispersed (D'Arcy 1974). First recorded for Florida in 1974 in the Dry Tortugas, where it has filled available wet habitat (confined by brick walls) (D. Jones, National Park Service, and others, personal observations to 1997). First noted on the mainland in 1983 in a small hammock in south Charlotte County (A. Shuey, Florida Department of Environmental Protection, specimen at University of South Florida Herbarium). Found through various surveys of the 1990s in 3 other areas in southwest Florida: the Peace River, Fisheating Creek, and Six-Mile Slough basins. Occurs in relatively undisturbed wetlands, typically cypress swamps or along river margins; capable of forming large, tangled, monocultural stands of many acres by invading sparsely vegetated areas or clambering over native vegetation; can dominate the understory of cypress heads, growing over and covering even large plants such as fire flag (*Thalia geniculata* L.) and pickerelweed (*Pontederia cordata* L.) (A. Fox, University of Florida, personal observations).



Fruits

WETLAND NIGHTSHADE

Distribution: Native to West Indies and Central America. Occurs in Florida along at least 40 km (25 mi) of Fisheating Creek (Highlands and Glades counties); along at least 40 km (25 mi) of the Peace River (DeSoto County), including 2 tributaries; and in the Six-Mile Slough natural area (Lee County). In Charlotte County, found in open marsh near original hammock location (K. C. Burks, A. Nielsen, Florida Department of Environmental Protection, personal observations).

Life History: Grows in full shade to full sun. New green stems produced annually from woody base. Can form adventitious roots at leaf axils. Sheds leaves at high water, producing new ones when flooding recedes; apparently not tolerant of permanent flooding. Susceptible to frost, but may regrow from crowns. Flowers and fruits in May (in sun), or early fall (in shade), prolifically in the sun (247 recorded on 1 stem) and far less in the shade (10% as many). Seeds tolerant of freezing and drying, viable for at least 12 months; fresh seeds showing over 90% germination. Dispersal of seeds and stem fragments possible, especially downstream (Fox and Wigginton 1996).

AMF



Flowers

AMF



Prickles, leaves

AMF



Thicket along Peace River

SOLANUM TORVUM SW.

Solanaceae/Nightshade Family

Common Names: Turkey berry, susumber, gully-bean, Thai eggplant, devil's fig

Synonymy: *Solanum ferrugineum* Jacq., *S. ficifolium* Ort.

Origin: Tropical America

Botanical Description: Evergreen, widely branched, prickly shrub or small tree, to 5 m (16 ft) tall; twigs stellate tomentose; stems armed with stout, flattened prickles, straight (usually) or slightly curved. Leaves alternate, simple, clearly petioled; blades oval to elliptic, unlobed to strongly lobed, to 25 cm (10 in) long; bases unequal, tips pointed; surfaces densely stellate hairy below, less dense above, with usually a few long prickles on midveins (especially above). Flowers many, in large branched clusters, with simple, mostly glandular hairs on axes; corolla bright white, to 2.5 cm (1 in) across, lobed about 1/3 of its length; lobes not recurved; stamens with prominent anthers. Fruit an erect, subglobose berry, to 1.5 cm (0.6 in) wide, yellow when ripe.

NOTE: Distinguished in Florida from other prickly *Solanum* spp., and other prickly shrubs, by its treelike habit, stout prickles, clearly petioled leaves with dense stellate hairs below, numerous bright white flowers followed by yellow grape-sized berries, and glandular hairs on flower stalks.

Ecological Significance: Cultivated in the tropics for its sharp-tasting immature fruits (Morton 1981). Has been found cultivated in Florida, though it is a federally listed noxious weed (Coile 1993). Considered a weed in 32 countries, a serious or principal weed in 7 of these (Holm *et al.* 1979). Noted as naturalized in peninsular Florida by Small (1933), in disturbed uplands and in swamps. Collected "only a few times" in south Florida by 1974 (D'Arcy 1974). Has been documented now by herbarium specimens in 6 south Florida counties plus Hillsborough and Columbia counties (Wunderlin *et al.* 1996). Reported so far from 3 natural areas in Broward and Collier counties (EPPC 1996; D. F. Austin, Fl. Atlantic University, 1998 personal communication).

NC



Immature fruits

Distribution: A pantropical weed (D'Arcy 1974). Very common and weedy in the Pacific lowlands of Guatemala and other parts of the country (Gentry and Standley 1974). Considered weedy elsewhere in its native range as well (Holm *et al.* 1979, Correll and Correll 1982). Native from Mexico to Peru and Venezuela, and in West Indies and Bermuda (Morton 1981). Brought to Florida at least once before 1900 for cultivation trials (Westbrooks and Eplee 1989).

Life History: Sprouts from roots, forming thickets (N. Coile, Florida Department of Agriculture and Consumer Services, 1997 personal communication). In its native range, grows in wet thickets, dry brushy plains, woodland clearings, and rocky hillsides (Standley 1938, Adams 1972, Gentry and Standley 1974). Flowers and fruits all year (Adams 1972). As with most species of the genus, seeds probably dispersed by birds (D'Arcy 1974).

NC



Flowers, leaves

MB



Habit (light green shrub)

SOLANUM VIARUM DUNAL

Solanaceae/Nightshade Family

Common Names: Tropical soda apple, Sodom apple
Synonymy: *Solanum khasianum* var. *chatterjeeanum* Sen Gupta
Origin: Brazil, Paraguay, Argentina

Botanical Description: Bushy, prickly herbaceous perennial, to 2 m (6 ft) tall, more commonly 1 m (3 ft) tall; stems armed with broad-based, straight or downward-pointing prickles and clothed in a mixture of stellate and simple glandular or nonglandular hairs (viscid-pubescent). Leaves alternate, simple, clearly petioled (these also prickly); blades oval-triangular, nearly as broad as long, to 20 cm (8 in) long and 15 cm (6 in) wide, angular-lobed; surfaces dense with fine soft hairs giving blades a velvety sheen (hairs a mix of types as on stems); veins prickly. Flowers white, in small terminal clusters; 5 petals white, recurved; stamens with prominent cream-colored anthers. Fruit a globose berry, 2-3 cm (0.8-1.2 in) wide, green with dark veining, like a tiny watermelon, when immature, dull medium yellow when ripe; seeds about 400 per berry.

NOTE: Distinguished in Florida from other prickly *Solanum* spp. by its straight prickles, mixture of stellate and simple hairs with and without glands, clearly petioled leaves with a velvety sheen, terminal flower clusters, and yellow berries that are dark-veined when young.

Ecological Significance: A recent accidental introduction, exact means unknown; first collected in Florida in 1988; found in pastures and other open disturbed sites of Glades, Okeechobee, and Polk counties (Wunderlin *et al.* 1993). From 1990 to 1996, Florida's infestation estimated to have increased from 10,000 ha (25,000 acres) to 200,000 ha (500,000 acres), becoming a major concern of agriculture and a serious threat to Florida natural areas (J. Mullahey, University of Florida, 1997 personal communication). Reported from over 20 natural areas, including local, state, and federal preserves, from as far north as Alachua County (EPPC 1996). Outcompetes native plants, crowding or shading them out (observations of several natural-area managers).



Flower

TROPICAL SODA APPLE

Distribution: Has spread north in Florida to the Panhandle, with herbarium specimens recorded for 17 counties (Wunderlin *et al.* 1995). Now a common weed in fields and groves, a frequent one along roadsides, and turning up more often at pineland and hammock edges. Also present now in adjoining states (Mullahey *et al.* 1996). Naturalized also in the West Indies, Mexico, Africa, and India (Wunderlin *et al.* 1993).

Life History: Reaches maturity from seed within 105 days (Mullahey and Cornell 1994). Green stems persist in mild winter temperatures (Coile 1993). Less productive or may die in summer when standing in water (Mullahey and Colvin 1993). Can regenerate shoots from extensive root system; difficult to eradicate (Akanda *et al.* 1996). Flowers and fruits primarily from September through May, with few fruits produced in summer. Produces 40,000 to 50,000 seeds per plant, with a tested germination rate of 30-100% (Mullahey *et al.* 1993). Seeds dispersed by birds and other animals, including cattle, deer, feral pigs, and raccoons (Akanda *et al.* 1996). Also spread by seed-contaminated hay, sod, and machinery.

JM



In rangeland

JM



Leaves

JM



Fruits

LANTANA CAMARA L.

Verbenaceae/Vervain Family

Common Names: Lantana, shrub verbena

Synonymy: *Lantana aculeata* L.

Origin: West Indies

Botanical Description: Rank-growing, multistemmed, deciduous shrub, to 2 m (6 ft) or more, with stems square, covered with bristly hairs when green, often armed as well with scattered small prickles. Leaves opposite, simple, with petioles to 2 cm (0.8 in) long; blades oval, rough hairy, to 15 cm (6 in) long and 6 cm (2.4 in) wide, with margins blunt-toothed and blade bases broad, squared off (truncate); leaves strongly aromatic. Flowers small, multicolored, in stalked, dense, flat-topped clusters to 4 cm (1.5 in) across; corolla a narrow tube with 4 short spreading lobes; flowers in a single cluster may be white to pink or lavender, yellow to orange or red, changing color over time. Fruit a round, fleshy, 2-seeded drupe, about 5 mm (0.2 in) wide, green turning purple then blue-black.

NOTE: May be confused with the endangered endemic native, Florida lantana (*Lantana depressa* Small), with which it has extensively hybridized, but bases of the native's leaf blades are tapered (cuneate), not truncate. Blade bases of the more common native, wild sage (*L. involucrata* L.), also cuneate, its flowers yellow-centered white, its leaves rounder.

Ecological Significance: A serious to common weed in 25 countries and present as a weed in another 22 countries (Holm *et al.* 1979). A serious, worldwide invader that in some areas has altered habitats and threatens to eliminate populations of native plants and animals (Cronk and Fuller 1995). Can become the dominant understory in open forests (Holm *et al.* 1977). In Florida, often forms thickets in sunny open areas; commonly invades disturbed sites such as roadsides, spoil islands, pastures, citrus groves, and cultivated woodlands. Also frequent in well-drained undisturbed habitats such as native pinelands, hammocks, and beach dunes. Reported from over 40 natural areas from Dade County to Okaloosa County (EPPC 1996). Widely promoted for ornamental cultivation since the early 1800s (Mack 1991), with wild plants in Florida representing tetraploid cultivars (Hammer 1997). Has extensively hybridized with all 3 distinct varieties of *L. depressa* (Sanders 1987), contaminating the endemic gene pool.

KAL



Immature and mature fruits

Distribution: Naturalized in tropical and warm regions worldwide (Sanders 1987). Found on the southern Atlantic Coastal Plain from Florida and Georgia to Texas (Small 1933), and in California and Hawaii as a serious pest (Holm *et al.* 1979, Kingsbury 1964). Common throughout Florida, including the Keys. Widely cultivated in Florida, with over 100 forms, cultivars, and hybrids available; some of the newer ones considered sterile (Hammer 1997).

Life History: Long recognized as highly toxic to grazing animals; has caused death in children when a quantity of unripe berries was eaten (Morton 1971b). Produces allelopathic substances in the roots and shoots, increasing its competitive ability (Smith 1985, Sahid and Sugau 1993). Strongly resists herbivory, contributing to its pest-plant status outside its natural range (Janzen *et al.* 1983). Can tolerate fire by regenerating from basal shoots (Smith 1985). Flowers year-round (or May to December in northernmost Florida). Seed dispersed by songbirds (Janzen *et al.* 1983). 'Gold Mound', 'New Gold', 'Alba', and 'Patriot' cultivars not known to produce viable seed in nursery or landscape plantings (S. Kent, Tree of Life Nursery, 1998 personal communication).

KAL



In Lake Jessup conservation area

KAL



Fruits and multicolored flowers

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GLOSSARY

Abaxial. Facing away from the axis, such as the underside of a leaf.

Adaxial. Facing toward the axis, such as the upper side of a leaf.

Acuminate. Tapering gradually to a slender point; sharply acute.

Adventitious. Said of buds and roots that grow in irregular or unusual places.

Allelopathic. Able to suppress growth of nearby plants by secretion of toxic substances.

Alternate. Borne one at a node, as in leaves, appearing on one side of the axis and then the other.

Anther. Pollen-bearing portion of stamen (at apex of filament).

Aril. A fleshy expansion of the seed stalk, partially or wholly enveloping the seed.

Auricle. Earlobe shaped; a margin or surface that bulges in the shape of an earlobe.

Awn. A stiff, bristlelike appendage at the end of a structure.

Axil. Angle formed where two parts join, as a leaf and stem or branch and stem.

Axillary. In the axil.

Basiscopic. Pointing downward.

Berry. A fleshy fruit with at least 2 seeds (no stone, usually many seeds) and with a skin not splitting along regular suture lines (i.e., indehiscent).

Bilabiate. Two lipped, often applied to a corolla or calyx.

Bisexual. An individual flower that has both male and female parts.

Bract. A scalelike, leaflike, or petallike structure, often of a different size and color, associated with a flower head or flower.

Bulbil. Small bulb (enlarged, shortened stem), borne on a stem or in an inflorescence.

Calyx. The sepals of a flower; the outermost whorl of flower parts, usually green, or at least a different size and shape from the petals.

Capsule. A dry fruit formed from 2 or more fused ovaries, splitting along regular sutures lines when mature (i.e., dehiscent).

Ciliate. Bearing cilia, often said of leaf or petal margins that bear more or less short, stiff hairs.

Cladophyll. A branch modified to function as a leaf.

Claw. The narrowed base of a sepal or petal.

Collar. Outer side of a grass leaf where the blade joins the sheath.

Compound. Composed of 2 or more similar and united parts, as a leaf with 2 leaflets.

Cordate. With an indentation and rounded lobes at the base; heart shaped.

Corm. Shortened, enlarged underground stem, often globe or cone shaped.

Corolla. The petals of a flower; the inner, usually colorful whorl of flower parts.

Crenate. Shallowly round toothed; scalloped.

Cuneate. Wedge shaped, tapering, said of leaf-blade bases.

Deciduous. Falling after completion of their normal function.

Decumbent. Prostrate, but with branches ascending at the ends.

Dehiscent. Splitting open along definite regions or suture zones.

Dioecious. Said of plants bearing only male or only female flowers; bearing unisexual flowers, with male and female on separate plants.

Drupe. A more or less fleshy, indehiscent fruit, with a stone, a hard inner layer enclosing a seed.

Elliptic. An outline narrowed to rounded at the ends and widest at about the middle.

Entire. A margin, as a leaf's, without teeth, lobes, or divisions.

Epilithic. Growing on rocks.

Epiphytic. Growing on another plant, but not parasitic.

Even-pinnate. Said of pinnately compound leaves with no terminal leaflet, so the total number of leaflets is even.

Evergreen. Said of species that retain their leaves for more than a single growing season, hence are never without leaves.

Filament. The stalk bearing the anther (filament and anther together form the stamen).

Glabrous. Without hairs.

Gland. A depression or protuberance, usually small, that secretes a substance from a plant surface.

Glandular hairs. Hairs with glands at the tips.

Glaucous. Covered with a whitish bloom that rubs off.

Globose. Spherical or rounded.

Glume. One of the outermost bracts of a grass spikelet.

Hirsute. Covered with short, erect hairs.

Indehiscent. Said of fruits that do not open along regular, preformed suture lines.

Indusium. A papery, thin covering of the sorus in some ferns. (False indusium: a covering derived from the leaf margin rather than from midleaf epidermis.)

Inflorescence. The characteristic cluster of flowers of a plant.

Internode. The interval or part between 2 nodes of a stem or other axis.

Involute. Said of margins that are rolled upward and inward from the edges.

Keel. A projected longitudinal ridge, such as that made by a folded leaf, bract, sepal, or petal. In some legume flowers, the 2 lower petals are fused and folded into the "keel."

Lanceolate. An outline longer than broad, widest below the middle and tapered above to a point.

Lemma. An inner bract enclosing reproductive parts in the spikelet of grasses.

Lenticels. Pits, slits, or corky openings on young bark.

Ligule. In grasses and sedges, an outgrowth (membrane or hairs) at the adaxial junction of leaf blade and sheath.

Linear. Long and narrow, with sides more or less parallel.

Monoecious. Said of plants bearing unisexual flowers with both male and female flowers occurring on the same plant.

Node. Place on a stem or other axis where a leaf, branch, or other organ arises.

Oblanceolate. An outline broadest above the middle, long tapered to the base.

Oblique. Slanting or unequal sided, such as a leaf base unequal in size on either side of midvein.

Oblong. Longer than broad, with more or less parallel sides.

Obtuse. Bluntly pointed.

Odd-pinnate. Said of pinnately compound leaves with a terminal leaflet; thus the total number of leaflets is odd.

Opposite. With 2 leaves (or other parts) at the same node, one on each side.

Ovate. An outline broadest near the base, not greatly longer than broad; egg shaped.

Ovoid. A 3-dimensional object with an ovate outline.

Palmate. Arising or radiating from a common point, as with veins, lobes, or segments; hand shaped (with fingers held apart).

Panicle. An inflorescence that is a compound (further-branched) raceme.

Pedicel. Stalk of a single flower.

Peltate. Said of leaf blades or other structures that have stalks attached interior to the structure's margin, as in a thumbtack (i.e., not at the edge of the blade, scale, etc).

Perfect. Said of flowers that have both male and female parts; bisexual.

Petal. A lobe or segment of a flower's corolla, often colored and showy.

Petiolate. Having a petiole.

Petiole. Stalk of a leaf (not always present).

Phyllode. A flattened, expanded petiole that functions as a whole leaf (no blade present).

Pilose. With long, soft, somewhat shaggy hairs.

Pinna. Leaflet in a once-compound leaf; a primary division of a twice-compound leaf, the branch axis with its leaflets.

Pinnate. Divided into more or less similar units (e.g., leaflets) along an elongated axis (rachis).

Pinnule. Secondary axis or leaflet in a twice-compound leaf.

Pistil. The female part of a flower, consisting of ovary, style, and stigma.

Pith. Storage tissue, often whitish and soft, filling the center of stems and some roots.

Plumose. Resembling a feather.

Prickle. A sharp-pointed, usually stiff and hard, protuberance from the epidermis of a plant.

Pubescent. Hairy (noun: pubescence—the hairs of a plant).

Raceme. An inflorescence with stalked flowers arranged along an elongate axis (lower flowers opening first).

Rachis. The main axis above the petiole of a pinnately compound leaf.

Raphide. A needle-shaped crystal, usually of calcium oxalate, occurring in bundles in some stems and leaves, often irritating to mucous membranes of animals.

Receptacle. More or less enlarged end of a stalk bearing a flower or specialized flower cluster.

Recurved. Bent or curved downward or backward.

Reticulate. Netlike, often referring to leaf vein patterns with complex branching.

Revolute. Bent under and inward from the edge, often said of leaf margins.

Rhizome. Elongate, prostrate stem, typically underground, but may be at surface as in some epiphytes.

Samara. A winged, 1-seeded, dry fruit.

Scabrous. Rough and harsh to the touch, like a cat's tongue.

Semievergreen (semideciduous). With leaves persisting through part or most of the winter; if dropping leaves in a mass, quickly replacing them.

Sepal. A lobe or segment of a flower's calyx.

Serrate. Toothed with the teeth pointing toward the blade tip; saw toothed.

Sessile. Without a stalk, attached directly.

Simple. Not compound, as in leaves not divided into leaflets.

Sorus. A discrete, usually dense, cluster of sporangia in ferns. (Plural: sori.)

Spathe. A usually conspicuous, leaflike bract enclosing an inflorescence.

Spike. A raceme with the flowers sessile on the main axis.

Sporangium. Spore case; a sac or body in which reproductive spores are borne. (Plural: sporangia.)

Spikelet. In grasses and sedges, the basic unit of an inflorescence—a short axis bearing 1 or more flowers (florets) with their sepals/petals usually reduced in number and size to specialized bracts.

Stamen. The male part of a flower, consisting of a filament (sometimes absent) and a pollen-bearing anther.

Staminode. A sterile stamen, sometimes petallike and showy.

Stellate. Star shaped, as in plant hairs with radiating branches.

Stigma. Part of a pistil receptive to pollen, usually located at tip of the style.

Stipule. Basal appendage of a leaf on some species, usually small; may be leaflike, spine-like, membranous, hairlike, or scalelike.

Stolon. Prostrate stem growing at the surface of the ground, often giving rise to new growth. (Adjective: stoloniferous—having stolons.)

Style. The part of the pistil connecting the ovary and the stigma.

Subglobose. Nearly spherical in shape.

Tendril. Thread or cordlike process that clasps or twines around other objects; may represent a modified (specialized) branch, leaf, leaflet, stipule, or petiole.

Tomentose. Covered densely with soft, matted, woolly hairs.

Trichome. Any hairlike outgrowth of the epidermis.

Trifoliolate. Said of a compound leaf having 3 leaflets.

Truncate. Appearing cut off; a squarish end or base of a leaf or other structure.

Tuber. A swollen, starch-storing portion of an underground stem, as in the potato, or less often of an aerial stem, as in the air potato.

Turion. An enlarged, short lateral bud, a "winter bud" able to break off from the parent plant and elongate into a new plant, as in hydrilla.

Unarmed. Having no thorns, spines, or prickles.

Unifoliolate. Said of a compound leaf reduced to a single leaflet, appearing simple.

Unisexual. Said of a flower having only male or only female parts, not both.

Viscid. Sticky.

Whorl. With 3 or more leaves (or other parts) at a node.

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