

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. anthropophagum* 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

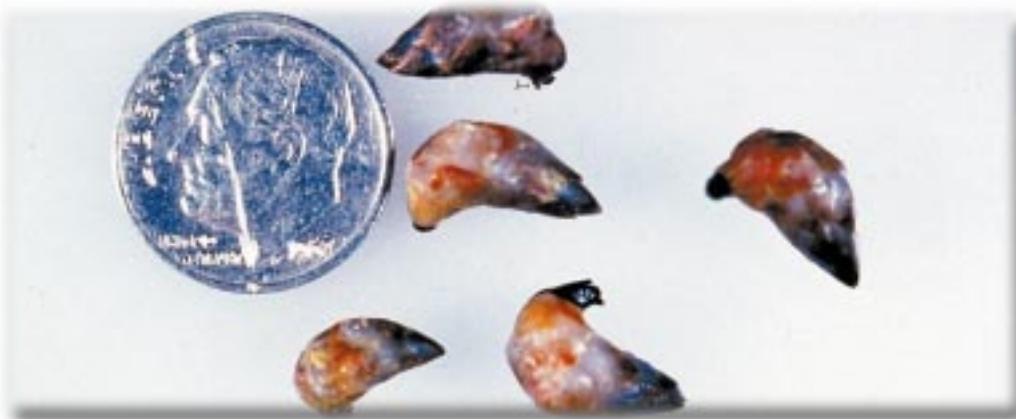
Origin: Warmer regions of Old World

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 par 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 par 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 elliottii* 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