GUIDELINES
Avicennia germinans (L.) L. - Black Mangrove

(Figures 6, 9; Plate II)

PLANT CHARACTERISTICS

Ecological Function/User Applications - shoreline protection and sediment stabilization; nursery habitat for birds and marine life; contribution to detrital-based food web; aesthetics; water-quality maintenance.

Natural Geographic Distribution/Cold Hardiness - low-energy, coastal wetlands; throughout southern Florida and American tropics, north on the Atlantic coast to Matanzas Inlet vicinity and on the Gulf coast to Cedar Key; least cold-sensitive of the three mangrove species; freezes only in coldest winters in northern parts of its range; zones 3-7.

Optimum Soil Type - saturated organic soils with periodic tidal inundation.

Resistance to Erosion - good in older plants; rapid sediment buildup may eventually kill larger plants; protect young plants from wave action; initial use of smooth cordgrass to stabilize shorelines may encourage establishment of naturally colonized and broadcast propagules.

Potential Growth Rate - In early years, two to two and one-half feet or more per year in nutrient-rich, protected areas.

PLANT AVAILABILITY

Nursery Sources - liner size up to one-gallon pots; limited availability of larger plants.

Natural Sources - transplants rare due to governmental regulations regarding natural populations; propagules available in early fall (floating or removed from trees). Cannot be propagated by cuttings or air-layering.

PLANTING GUIDELINES

Elevation - small plants and propagules at approximate MHW (except during highest spring tides); larger plants may tolerate elevations lower than MHW, but specific site characteristics will modify survival.

Ground Slope - up to 30° (1 to 2) for larger plants, but less than 10° (1 to 5) is preferable; protected, wet ground with no slope for propagules.
Avicennia germinans (continued)

Depth - top of root-ball even with soil surface.

Planting Window - in the spring, after danger of frost has passed, through November; planting in the northernmost part of its range is not recommended (zones 3-4); rainy periods better if plants have been grown in fresh water.

Density - historically, three feet on center (O.C.) or less for one-gallon plants (legal requirements will dictate maximum distances); denser plantings emulate natural recruitment and should improve overall quality of planting.

MAINTENANCE GUIDELINES

Watering - not required.

Fertilization - for small plants, a teaspoon of time-release, nitrogenous fertilizer incorporated when planted; responds well to higher nutrients in culture.

Weeding - control flotsam and jetsam until plants are fully established; some sea-grass wrack desirable.

Pruning - may tolerate various pruning techniques if done properly; see state and local restrictions in Guideline Category Descriptions (pp. 15-16).

[Relevant Literature - 10, 11, 13-15, 21, 27, 39, 42, 47, 48-54, 57, 62, 65, 66, 74, 77, 78, 80, 85-91, 96]
*Borrichia frutescens* (L.) DC.- Sea Ox-eye Daisy

(Figures 15, 16; Plate V)

**PLANT CHARACTERISTICS**

Ecological Function/User Applications - sediment stabilization; seed source for birds and small mammals; aesthetics.

Natural Geographic Distribution/Cold Hardiness - coastal high marshes and dunes; Virginia to Florida and Gulf states; tolerates lowest temperatures throughout Florida; zones 2-7.

Optimum Soil Type - saturated, silty sands.

Resistance to Erosion - good; tolerates sediment buildup.

Potential Growth Rate - rapid spread through rhizomes.

**PLANT AVAILABILITY**

Nursery Sources - liners, four-inch pots, occasionally one-gallon pots.

Natural Sources - seeds prolifically; does not transplant well.

**PLANTING GUIDELINES**

Elevation - high-marsh areas above mean high water.

Ground Slope - up to 45° (1 to 1), but less than 10° (1 to 5) is preferable.

Depth - top of root-ball slightly below soil surface.

Planting Window - March through November south of Tampa Bay/Cape Canaveral and April through October northward.

Density - as desired to fill in between principal planted species (e.g., sea-oats or marsh-hay).
Borrichia frutescens (continued)

MAINTENANCE GUIDELINES

Watering - when planted, and periodically for first few weeks if rain or tidal inundation is lacking.

Fertilization - light fertilization may be helpful in high pH soils/dredge spoil.

Weeding - remove and control exotics.

Pruning - tolerates limited top cutting.

[Relevant Literature - 11, 26, 27, 45, 67, 68]
Distichlis spicata (L.) Greene - Saltgrass

(Figures 21, 22, 30, 33; Plate VII)

PLANT CHARACTERISTICS

Ecological Function/User Applications - sediment stabilization; food source for birds and small mammals; habitat.

Natural Geographic Distribution/Cold Hardiness - coastal high marsh and inland saline wetlands; Canada to Florida and Gulf states; tolerates lowest temperatures throughout Florida; zones 2-7.

Optimum Soil Type - wet to saturated silty sands.

Resistance to Erosion - fair; tolerates slow sedimentation.

Potential Growth Rate - rapid; dense cover in second year in some sites.

PLANT AVAILABILITY

Nursery Sources - liners, two- and four-inch pots.

Natural Sources - bare-root, plugs, seeds; vegetative state easily confused with some growth forms of Sporobolus virginicus and Paspalum vaginatum.

PLANTING GUIDELINES

Elevation - from just below MHW to highest spring-tide levels; best with infrequent inundation but withstands frequent inundation.

Ground Slope - up to 30° (1 to 2), but less than 10° (1 to 5) is preferable.

Depth - top of root-ball approximately two inches below soil surface at higher elevations.

Planting Window - March through November south of Tampa Bay/Cape Canaveral and April through October northward.

Density - bare-root one foot O.C., two-inch plugs two feet O.C., four- and six-inch plugs three feet O.C.
*Distichlis spicata* (continued)

**MAINTENANCE GUIDELINES**

**Watering** - not required in moist soils subject to inundation.

**Fertilization** - responds well to one teaspoon per plant of a time-release, nitrogenous fertilizer when planted.

**Weeding** - remove and control exotics.

**Pruning** - mowing can stimulate vegetative growth.

[Relevant Literature - 8, 9, 11, 18, 26, 27, 30, 36, 44, 45, 73, 96]
*Helianthus debilis* Nutt. - Dune Sunflower; Beach Sunflower

(Figures 13, 14; Plate V)

Note: Two subspecies of interest to planters occur in Florida: *Helianthus debilis* subspecies *debilis* occurs along the Atlantic coast, and *Helianthus debilis* subspecies *vestitus* (E.E. Wats) Heiser occurs only along the central peninsular Gulf coast. These subspecies differ somewhat in stem color, hairiness, leaf margins, and flower size. Because of this differentiation, care should be taken not to transport the subspecies between coasts. Preservation of these subspecies should be of concern to growers because introduction of plants of the Atlantic coast subspecies could dilute the genetic composition of the threatened Gulf coast subspecies.

**PLANT CHARACTERISTICS**

**Ecological Function/User Applications** - food source for birds, small mammals, and insects; minor role in dune stabilization; aesthetics.

**Natural Geographic Distribution/Cold Hardiness** - see note above; throughout peninsular Florida dunes; subject to cold damage in northern parts of its range in colder winters; zones 4-7.

**Optimum Soil Type** - well-drained sandy and calcareous dune soils.

**Resistance to Erosion** - fair; usually found in sheltered, stable dunes.

**Potential Growth Rate** - rapid with moderate water but slow in less stabilized, drier sands.

**PLANT AVAILABILITY**

**Nursery Sources** - liners, two- and four-inch pots.

**Natural Sources** - cuttings, seeds.

**PLANTING GUIDELINES**

**Elevation** - behind fore dune or on stabilized slopes above erosional forces.

**Ground Slope** - up to 30° (1 to 2), but less than 10° (1 to 5) in unstable sands.

**Depth** - top of root-ball approximately two inches below soil surface.
Helianthus debilis (continued)

Planting Window - March through November south of Tampa Bay/Cape Canaveral.

Density - as desired to fill in between principal planted species (e.g., sea-oats).

MAINTENANCE GUIDELINES

Watering - when planted and every five days for one month if heavy rainfall does not occur.

Fertilization - approximately one teaspoon per plant of balanced, time-release fertilizer (14-14-14), incorporated when planted, aids root establishment; too much fertilizer may inhibit root growth.

Weeding - remove and control exotics.

Pruning - withstands heavy clipping once established.

[Relevant Literature - 2, 18, 22, 46, 64, 84]
Ipomoea imperati (Vahl) Griseb. - Beach Morning-glory

(Figures 11, 12; Plate IV)

Note: Recent taxonomic revision has placed Ipomoea stolonifera (Cyrillo) J.F. Gmel. in synonymy with Ipomoea imperati.

PLANT CHARACTERISTICS

Ecological Function/User Applications - soil stabilization; aesthetics.

Natural Geographic Distribution/Cold Hardiness - coastal dunes and sandy shores; Florida and Gulf states north to South Carolina; tolerates lowest temperatures throughout Florida; zones 2-7.

Optimum Soil Type - well-drained sandy soils.

Resistance to Erosion - fair, once established.

Potential Growth Rate - rapid but uneven; dense cover possible in two to three growing seasons.

PLANT AVAILABILITY

Nursery Sources - liners, two- and four-inch pots, one-gallon pots.

Natural Sources - cuttings, seeds.

PLANTING GUIDELINES

Elevation - upper high marsh and dune areas; withstands infrequent inundation.

Ground Slope - up to 20° (1 to 3); grows on steeper slopes if stable.

Depth - top of root-ball slightly below soil surface.

Planting Window - March through November south of Tampa Bay/Cape Canaveral and April through October northward.

Density - small plants one and one-half feet O.C., large plants three feet O.C., or intermittent among principal dune species (e.g., sea-oats).
Ipomoea imperati (continued)

MAINTENANCE GUIDELINES

Watering - when planted and periodically during the first few weeks if heavy rainfall does not occur.

Fertilization - responds well to light application of a time-release fertilizer (14-14-14).

Weeding - remove and control exotics; shaded out by dense grasses.

Pruning - tolerates clipping for landscape purposes.

[Relevant Literature - 2, 18, 22, 46, 96]
Ipomoea pes-caprae (L.) R. Br. - Railroad-vine

(Figures 10, 12; Plate IV)

PLANT CHARACTERISTICS

Ecological Function/User Applications - soil stabilization; aesthetics.

Natural Geographic Distribution/Cold Hardiness - dune swales, high beaches, and coastal wetlands margins; central and south Florida, further north on the Atlantic coast; sensitive to freezing temperatures; zones 5-7.

Optimum Soil Type - moist sandy or calcareous soils.

Resistance to Erosion - fair, once established.

Potential Growth Rate - rapid but uneven; dense cover possible in two to three growing seasons (more rapid in moister soils).

PLANT AVAILABILITY

Nursery Sources - liners, two- and four-inch pots, one-gallon pots.

Natural Sources - cuttings, seeds.

PLANTING GUIDELINES

Elevation - above MHW to limits of high marsh and in low dune areas; withstands infrequent inundation.

Ground Slope - up to 20' (1 to 3); grows on steeper slopes if stable.

Depth - top of root-ball slightly below soil surface.

Planting Window - April through October south of Tampa Bay/Cape Canaveral; planting in the northernmost part of its range is not recommended.

Density - smaller units one and one-half feet O.C., larger units three feet O.C.
*Ipomoea pes-caprae* (continued)

**MAINTENANCE GUIDELINES**

**Watering** - when planted and periodically during the first few weeks if heavy rainfall does not occur.

**Fertilization** - responds to a light application of balanced, time-release fertilizer (14-14-14).

**Weeding** - remove and control exotics.

**Pruning** - tolerates clipping for landscape purposes.

[Relevant Literature - 2, 18, 22, 46, 62, 79, 94, 96]
*Iva frutescens* L. - Marsh-elder

(Figures 17, 19; Plate VI)

**PLANT CHARACTERISTICS**

*Ecological Function/User Applications* - seed source for birds and small mammals; planted to retard exotic plant invasion.

*Natural Geographic Distribution/Cold Hardiness* - coastal high-marsh margins; Canada to Florida and Gulf states; tolerates lowest temperatures throughout Florida; zones 2-7.

*Optimum Soil Type* - moist, low-salinity soils; tolerant of high-pH soils.

*Resistance to Erosion* - moderate; offers protection against rainfall-induced erosion.

*Potential Growth Rate* - rapid in better soils.

**PLANT AVAILABILITY**

*Nursery Sources* - four-inch pots, one-gallon pots.

*Natural Sources* - cuttings, seeds.

**PLANTING GUIDELINES**

*Elevation* - above MHHW.

*Ground Slope* - up to 20° (1 to 3).

*Depth* - top of root-ball even with soil surface.

*Planting Window* - March through November south of Tampa Bay/Cape Canaveral and April through October northward.

*Density* - intermittently with other plants.
*Iva frutescens* (continued)

**MAINTENANCE GUIDELINES**

**Watering** - when planted, unless heavy rainfall occurs.

**Fertilization** - responds well to balanced fertilizers (e.g., 14-14-14).

**Weeding** - remove and control exotics.

**Pruning** - response not documented, but probably survives.

[Relevant Literature - 11, 26, 96]
Iva imbricata Walt. - Beach-elder, Dune-elder

(Figures 18, 19; Plate VI)

PLANT CHARACTERISTICS

Ecological Function/User Applications - food source for birds and small mammals; secondary component of dunes and high marsh; traps sand.

Natural Geographic Distribution/Cold Hardiness - coastal dunes and high-marsh margins; Virginia to Florida and Gulf states; tolerates lowest temperatures throughout Florida; zones 2-7.

Optimum Soil Type - sandy soils.

Resistance to Erosion - poor to fair; tolerates sand accretion.

Potential Growth Rate - moderate; shrubby habit.

PLANT AVAILABILITY

Nursery Sources - four-inch pots, one-gallon pots.

Natural Sources - cuttings, seeds.

PLANTING GUIDELINES

Elevation - above MHHW.

Ground Slope - up to 30° (1 to 2).

Depth - top of root-ball four inches below soil surface in dunes; in heavier soils, root-ball even with soil surface.

Planting Window - March through November south of Tampa Bay/Cape Canaveral and April through October northward.

Density - intermittently with other plants (e.g., sea-oats).
Iva imbricata (continued)

MAINTENANCE GUIDELINES

Watering - when planted (especially in dunes) unless heavy rainfall occurs.

Fertilization - responds to balanced, time-release fertilizer (14-14-14) incorporated when planted.

Weeding - remove and control exotics.

Pruning - does not tolerate severe clipping.

[Relevant Literature - 2, 6, 11, 15, 16, 18, 22, 46, 64, 96]