

HERBACEOUS PLANTS FOR COASTAL DUNE AREAS

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Abstract. A study of 152 coastal dune sites throughout Florida identified 175 plant species. Slightly over half of these were herbaceous plants. Some of these plants have features that make them useful for vegetating coastal dunes, beautification and landscaping. The most important of these plants are: baybean (*Canavalia maritima* (Aubl.) Thou.), beach morning-glory (*Ipomoea pes-caprae* (L.) Sweet), blanket flower (*Gaillardia pulchella* Foug.), burrowing four o'clock (*Okenia hypogaea* (Schlecht and Sham.)), cucumberleaf sunflower (*Helianthus debilis* Nutt.), largeleaf pennywort (*Hydrocotyle bonariensis* Lam.), fiddle-leaf morning-glory (*Ipomoea stolonifera* (Cyr.) GME), partridge pea (*Chamaecrista* spp. L.), and sea purslane (*Sesuvium portulacastrum* L.). Information is given on these plants, such as common and scientific name, growth form, climatic adaptation, methods of propagation, ornamental value and other pertinent facts.

The outer shorelines, along both the Atlantic Ocean and the Gulf of Mexico coasts are 1,266 miles long. Coastal dunes and beaches occur along 780 miles of these shorelines. The dunes and beaches are some of Florida's most valuable assets and are prime areas for recreation and development.

It has been reported (9) that 210 miles of this beach and dune area have serious erosion problems. These erosion problems are caused by construction activities, structures that have altered the offshore currents, and inadequate vegetative cover on the dunes.

The problem of inadequate vegetative cover on the coastal dunes is recognized in the U. S. Department of Agriculture, Soil Conservation Service's Long Range Plant Materials Program for Florida (1). The initial effort has been to make a field study that included the kind and extent of native and naturalized plants that occur on coastal dunes.

The results indicate that several plants have a high potential for use in dune stabilization work. These plants are discussed in detail by Craig (4, 5, 6 and 7). Some of the herbaceous plants have growth habits and ability to adapt to coastal dune conditions. This makes them especially valuable in preventing erosion and for landscaping.

Materials and Methods

The determination of sites to be studied was made by visiting every reasonably accessible coastal dune location in Florida. One hundred fifty-two sites were selected for a detailed study. It was felt that these adequately represented the type and extent of coastal dune vegetation in the state.

Information was obtained at each site on soil conditions, type and size of dune area, extent of use by people, dominant and minor vegetation and other pertinent information. The area studied was from the first vegetation above the water inland to the permanent shrub zone.

All observations and determinations were made visually and were estimated. It was thought that a general survey of a wide magnitude would yield more applicable information than a smaller number of more detailed studies. The indi-

vidual studies were then reviewed to determine the useful herbaceous plant species.

Results and Discussion

Ninety-one herbaceous plant species were identified. Tables 1, 2, 3 and 4 contain information on the occurrence and dominance of these plants. This paper considers in detail only the 9 herbaceous plants that have value for preventing erosion and for landscaping.

Four different types of growth forms were evident and are the basis for the following plant groups: vines and vine-like; creeping, decumbent or prostrate; large upright and small upright.

Vine or vine-like

This group includes the herbaceous plants whose stems require support and which climb by tendrils or twining or creep along the ground. Nineteen plant species with this growth habit occurred on coastal dunes. Table 1 contains information on the occurrence and dominance of these plants. Three of these have special significance when considering their use in beautification and revegetating coastal dunes.

Table 1. Percentage and occurrence of native and naturalized vines and vine like plants on coastal dunes.

Scientific Name	% of sites Occ* Dom [†]	NE FL	SE FL	W FL	SW* FL
<i>Ampelopsis arborea</i> (L.) Koehne	1 —	3	3	—	—
<i>Canavalia maritima</i> (Aubl.) Thou.	24 7	48	37	2	14
<i>Centrosema virginianum</i> (L.) Benth.	1 —	—	—	2	—
<i>Cuscuta</i> spp. L.	5 —	3	6	8	2
<i>Echites unbellata</i> Jacq.	4 —	2	12	—	3
<i>Galactia regularis</i> (L.) B.S.P.	5 1	—	—	20	—
<i>Ipomoea pes-caprae</i> (Michx.)	42 14	46	69	32	24
<i>Ipomoea stolonifera</i> (Cyrill.) Poir.	11 4	40	3	—	2
<i>Ipomoea triloba</i> L.	1 —	3	—	—	—
<i>Lonicera japonica</i> Thunb.	1 —	—	—	1	—
<i>Parthenocissus quinquefolia</i> (L.) Planch.	4 —	3	9	—	5
<i>Senecio confusus</i> Britt.	1 —	—	1	—	—
<i>Smilax</i> spp. L.	14 2	12	6	20	12
<i>Strophostyles helvola</i> (L.) Ell.	7 —	9	3	15	—
<i>Tecomaria capensis</i> Spach.	1 —	—	—	—	1
<i>Tribulus cistoides</i> L.	6 —	—	26	—	2
<i>Vigna marina</i> (Berm.) Merrill	1 —	—	6	—	—
<i>Vitis</i> spp. L.	4 —	3	6	2	5
<i>Wisteria frutescens</i> (L.) Poir.	1 —	—	—	1	—

*Occ = occurred.

W-West of Franklin County.

*NE FL-Atlantic Coast north of Indian River; SE FL-Atlantic Coast south of Indian River; SW-Gulf of Mexico south of Pasco County;

[†]Dom = dominant.

Baybean (*Canavalia maritima* (Aubl.) Thou.). This herbaceous vine occurs on coastal dune sites south of St. Johns County along the Atlantic Ocean and south of Pasco County along the Gulf of Mexico. It occurred on 24% and was dominant on 7% of the sites studied.

It is a creeping plant with thick, fleshy stems that extend outward for several feet. The flowers are pinkish purple and nearly one inch long in stout, long-stalked racemes. Seed-pods are thick and average 6 inches long.

Propagation is by vegetative methods or seed. Seed soaked in warm water for several hours germinate readily.

Studies by Barr (2) in Australia indicate that baybean is a good plant for coastal sand dune reclamation.

Beach morning-glory (*Ipomoea pes-caprae* (L.) Sweet). This herbaceous, perennial vine occurs on coastal dune sites throughout Florida, but it is not a dominant plant on dunes along the Gulf of Mexico in west Florida. It occurred on 42% and was dominant on 14% of the sites studied.

It is a prostrate, spreading perennial vine with thick, fleshy, flexible stems that may extend 75 feet. The shape of the leaf blade resembles the footprint of a goat. The pink-purple flowers are bell-shaped, up to 3 inches wide and are borne on long stalks. Blooming extends throughout the year in south Florida, but is limited to late summer and fall in north Florida.

Bush and Morton (3) recommend propagation by seed, but vegetative methods are also possible. Seed soaked in warm water for several hours germinate readily.

Fiddle-leaf morning-glory (*Ipomoea stolonifera* (Cyr.) GME). This small, herbaceous vine occurs on coastal dune sites along the Atlantic Ocean and south of Pasco County along the Gulf of Mexico. It occurred on 11% and was dominant on 4% of the sites studied.

This morning-glory is much smaller than the beach morning-glory. The leaves are long-stalked, and the blades are either unlobed and oblong or broad and lobed into three or five round-ended lobes. The flowers are white.

Exact propagation methods are undetermined at this time, but vegetative material can be used.

Creeping, Decumbent or Prostrate

This group includes the herbaceous plants which have a prostrate, reclining or trailing growth habit, but are not vine-like in appearance.

Twenty-nine plant species with this growth habit occurred on coastal dunes and five of these can be considered for use in beautification and for revegetating coastal dunes. Table 2 contains information on the occurrence and dominance of these plants.

Burrowing four o'clock (*Okenia hypogaea* (Schlecht and Cham.)). This small, prostrate plant is found only in south Florida on coastal dunes and appears on the Florida list of endangered plant species. It occurred on 9% of the sites studied along the southeast coast and 2% of the sites studied along the southwest coast. It is much admired in the wild state because of its small attractive flowers.

The sticky, downy stem is yellow or pink in color and creeps horizontally along the ground. Flowers are solitary, five-pointed, about one inch wide and bright rose-purple in color.

Bush and Morton (3) recommend its use for landscaping, but exact propagation methods are not known. According to Dr. Daniel B. Ward of the Department of Botany, University of Florida, "The subterranean fruit enables the burrowing four o'clock to ensure that its seed are well placed in a suitable habitat for germination and growth, but at the same time inhibits the ease with which this plant is distributed."

Blanket flower (*Gaillardia pulchella* Foug.). This attractive flowering plant is found throughout Florida, but is most common along the northeast coast. It occurred on 11% and was dominant on 3% of the sites studied.

Leaves are borne singly, and are narrow, frequently sharply-toothed, and about three inches long. The plants are generally about two feet tall. The conspicuous flowers are commonly crimson or purplish and the rays often have yellow tips.

Exact propagation methods are undetermined at this time. It appears that seed or vegetative material can be used.

Table 2. Percentage of occurrence and dominance of native and naturalized herbaceous plants on coastal dunes with creeping, decumbent or prostrate growth habits.

Scientific Name	% of sites Occ ^a	Dom	NE FL	SE FL	W FL	SW FL
<i>Achyranthes maritima</i> (Mart.) Standley	3	—	—	14	—	—
<i>Alternanthera ramosissima</i> (Mart.) Standley	3	—	—	12	—	—
<i>Ambrosia hispida</i> Pursh.	1	—	—	—	—	6
<i>Cakile edentula</i> (Bigel.) Hook.	1	1	1	—	1	—
<i>Cakile fusiformis</i> Greene	1	1	—	1	—	1
<i>Cakile lanceolata</i> (Willd.) O. E. Schulz	1	—	—	1	—	—
<i>Chamaesyce ammannioides</i> (H.B.K.) Small	1	—	—	1	1	—
<i>Chamaesyce buxifolia</i> (Lam.) Small	1	—	—	—	—	1
<i>Chamaesyce ingallsii</i> Small	1	1	1	1	—	—
<i>Crotalaria pumila</i> Ortega	7	—	—	23	—	5
<i>Gaillardia pulchella</i> Foug.	11	3	26	6	5	7
<i>Glottiphyllum depressum</i> N. E. Br.	1	—	—	3	2	—
<i>Helianthemum arenicola</i> Chapm.	1	—	—	—	1	—
<i>Helianthemum corymbosum</i> Michx.	1	—	—	—	1	—
<i>Helianthus debilis</i> Nutt.	32	10	40	80	—	7
<i>Hydrocotyle bonariensis</i> Lam.	29	2	37	—	68	2
<i>Lippia nodiflora</i> Michx.	6	2	—	11	2	10
<i>Mentzelia floridana</i> Nutt.	4	—	6	14	—	—
<i>Okenia hypogaea</i> Schlecht. & Cham.	3	—	—	9	—	2
<i>Philoxerus vermicularis</i> (L.) R. Br.	1	—	—	6	—	—
<i>Physalis angustifolia</i> Nutt.	1	—	1	1	—	1
<i>Physalis viscosa</i> var. <i>elliotti</i> waterfall (Kunze)	8	—	3	11	8	10
<i>Portulaca phaeosperma</i> Urban	1	—	1	1	—	1
<i>Portulaca pilosa</i> L.	2	—	14	1	—	1
<i>Salsola kali</i> L.	1	—	6	—	—	—
<i>Sesuvium portulacastrum</i> L.	20	1	3	17	40	10
<i>Tribulus cistoides</i> L.	6	—	—	26	—	2
<i>Verbena maritima</i> Small	3	—	6	9	—	—
<i>Wedelia trilobata</i> (L.) A. Hitch.	3	—	—	9	—	5

^aSee Table 1.

Cucumberleaf sunflower (*Helianthus debilis* Nutt.). This sunflower occurs often south of Duval County along the Atlantic Ocean and occasionally south of Pasco County along the Gulf of Mexico. It occurred on 32% and was dominant on 10% of the sites studied.

It spreads rapidly by underground runners to form low, dense mats. The flower heads are about two inches across with yellow rays and a purplish-brown disk. It blooms profusely throughout the summer and is one of the most beautiful coastal plants.

Propagation is by seed or use of vegetative material such as underground runners.

Largeleaf pennywort (*Hydrocotyle bonariensis* Lam.). This creeping, herbaceous plant occurs throughout most of Florida on coastal dunes. It occurred on 29% and was dominant on 2% of the sites studied.

It spreads by means of far-reaching underground stems. The height of the growth is about six inches. Leaves are bright, shiny green and slightly scalloped along the edge. Underground stems are white. The flowers are small, pale white-green on a single stem from the soil surface and branch near the top.

Graetz (8) recommends propagation by digging and transplanting the rhizomes.

Sea purslane (*Sesuvium portulacastrum* L.). This creeping, herbaceous plant is found throughout Florida on coastal dunes. It occurred on 20% and was dominant on 1% of the sites studied.

The plant sprawls on the ground, forming mats. The succulent leaves are broadest between the middle and the tip. The flowers have five sepals colored like petals. The sepals are green on the outside and pink inside.

Exact propagation methods are undetermined at this time, but vegetative material roots easily.

Upright

This group includes the herbaceous plants that grow upright from an erect stem or stems.

Forty-three plant species with this growth habit occurred on coastal dunes. Table 3 contains information on the occurrence and dominance of the larger plants. This group attains a height of 2 feet or more at maturity. Table 4 contains information on the occurrence and dominance of the smaller plants. This group attains a height of less than two feet at maturity.

Only one of these plants has special significance when considering use in beautification and revegetation of coastal dunes.

Table 3. Percentage and occurrence of large native and naturalized plants on coastal dunes with upright growth habits.

Scientific Name	% of sites		NE FL	SE FL	W FL	SW FL
	Occ ^a	Dom				
Ambrosia artemisiifolia L.	1	—	3	—	—	—
Atriplex pentandra (Jacq.) Standley	3	1	9	9	—	—
Balduina uniflora Nutt.	2	—	—	8	—	—
Bidens pilosa L.	9	1	6	12	1	14
Chamaecrista fasciculata (Michx.) Greene	15	4	30	12	6	10
Chamaecrista littoralis Pollard	1	—	1	—	—	—
Chrysopsis cruiseana Dress	1	—	—	—	1	—
Cordyline guineensis (L.) Britt.	4	—	—	14	—	7
Crotalaria purshii DC.	1	—	—	—	1	—
Eupatorium spp. L.	1	—	—	—	—	1
Euphorbia heterophylla L.	7	—	—	17	—	10
Flaveria latifolia (J. R. Johnston) Rydb.	3	—	—	6	—	5
Gilia rubra (L.) Heller	2	—	1	—	2	5
Heterotheca subaxillaris (Lam.) Britt. & Rusby	20	—	26	11	40	10
Lupinus westianus Small	1	—	—	—	1	—
Monarda punctata L.	3	—	—	6	—	5
Pancreatium narcissiflorum Jacq.	3	—	—	6	—	2
Phytolacca americana L.	2	—	—	6	—	2
Polygonella polygama (Vent.) A. Gray	1	—	—	6	—	—
Ricinus communis L.	1	—	1	—	—	—
Verbesina virginica L.	1	—	—	1	—	—

^aSee Table 1.

Partridge pea (*Chamaecrista* spp. L.). These upright plants occur throughout Florida. The most common species is *Chamaecrista fasciculata* Michaux. It occurred on 15% and was dominant on 4% of the sites studied.

It stands up to 3 feet tall, but is usually shorter. The leaves are pinnately divided into almost elliptic segments. The small flowers are yellow-colored with 5 petals.

Propagation is by seed which can be purchased commercially.

Other plants

The following native or naturalized plants are also important in the coastal dune ecosystem. They can also be considered for use in vegetating coastal dunes and for

Table 4. Percentage and occurrence of small native and naturalized plants on coastal dunes with upright growth habits.

Scientific Name	% of sites		NE FL	SE FL	W FL	SW FL
	Occ ^a	Dom				
Aster racemosus Ell.	1	1	6	—	—	—
Atriplex arenaria Nutt.	3	1	9	9	—	—
Catharanthus roseus G. Don	6	—	6	11	—	7
Chamaecrista aspera (Muhl.) Greene	1	—	—	—	—	1
Cnidocolus stimulosus (Michx.) Engelm S. Gray	15	1	7	32	17	1
Commelina angustifolia Michx.	6	1	6	8	3	10
Coreopsis leavenworthii T. & G.	1	—	—	—	—	1
Crotonopsis linearis Michx.	2	—	9	—	—	—
Cyperus brunneus Sw.	3	—	3	3	2	2
Cyperus rotundus L.	3	—	3	3	—	5
Heliotropium angiospermum Murr.	1	—	—	1	—	—
Lachnanthes caroliniana (Lam.) Dandy.	1	—	—	—	1	—
Limonium carolinianum (Walt.) Britt.	1	—	1	—	—	—
Melanthera aspera (Jacq.) Small	4	—	3	9	—	5
Melanthera deltoidea Michx.	1	—	—	1	—	—
Melanthera parvifolia Small	1	—	—	1	—	—
Oenothera humifusa Nutt.	21	1	14	20	25	19
Paronychia erecta (Chapm.) Schinners	3	—	—	—	12	—
Pteridium aquilinum (L.) Kuhn	1	—	1	—	—	—
Remirea maritima Aubl.	1	—	—	6	—	—
Syngonanthus flavidulus (Michx.) Ruhl.	1	—	—	—	2	—
Utricularia cornuta Michx.	1	—	—	—	2	—

^aSee Table 1.

beautification and landscaping. The vines are: Virginia creeper (*Parthenocissus quinquefolia* (L.) Planch), wild-bean (*Strophostyles helveola* (L.) Ell.), and wild grape (*Vitis* spp. L.). The creeping, decumbent or prostrate plants are: crotalaria (*Crotalaria pumila* Ortega), and lippia (*Lippia nodiflora* Michaux.). The upright plants are: basket-flower (*Pancreatium narcissiflorum* Jacq.), lupine (*Lupinus westianus* Small), bee balm (*Monarda punctata* L.) seaside evening primrose (*Oenothera humifusa* Nutt.), verbena (*Verbena maritima* Small), and Madagascar periwinkle (*Catharanthus roseus* G. Don).

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