

PROPAGATION OF TWO THREATENED COASTAL DUNE PLANTS HAVING BEAUTIFICATION AND EROSION CONTROL FEATURES

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species in imminent danger of extinction or extirpation and whose survival is unlikely if the causal factors presently at work continue operating. Threatened plants are believed likely to move into the endangered category in the near future if the causal factors now at work continue operating.

Additional index words. *Ernodea littoralis* SW, *Mallotonia gnaphalodes* (L.) Britt.

Materials and Methods

Every reasonably accessible coastal dune location in Florida was visited. One hundred fifty-five representative sites were selected for a detailed study. It was felt that these adequately represented the type and extent of coastal dunes 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 average high tide inland to the scrub-zone. Unknown plants were identified by University of Florida Herbarium personnel.

It was decided that a general survey of a wide magnitude would yield more applicable information than a smaller number of more detailed studies. The results are discussed in detail by Craig (3, 4, 5, 6).

The individual studies were reviewed to determine the endangered and threatened plant species in relation to their climatic adaptation, beautification features, and occurrence on specific dune types. Two of the plants had specific features that make them valuable for landscaping and erosion control. Detailed propagation techniques were determined for these plants by studies at the U.S.D.A.'s Soil Conservation Service Plant Materials Center near Brooksville, Florida.

Results and Discussion

Table 1 contains information on the status, plant type, location on dune, range and occurrence of the eleven rare and endangered plant species. Three different types of growth form were evident and are the basis for the following plant groups: woody plants, grasses, and herbaceous plants. Additional information is contained in Ward's (11) publication on rare and endangered plants in Florida.

The Atlantic Ocean and Gulf of Mexico shoreline in Florida is 1,266 miles long. Coastal beaches and dunes occur along 780 miles of this shoreline and are prime areas for recreation and development. The U.S. Army Corps of Engineers (9) reports that 210 miles of this beach and dune area have serious erosion problems. Erosion problems are a result of natural forces, construction activities, structures that have altered offshore currents, and inadequate vegetative cover on the dunes.

The problem on 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). Initial efforts to solve this coastal dune erosion problem involved field studies of vegetation on selected coastal dune sites in Florida.

The results indicate that eleven endangered and threatened plant species occur on Florida's coastal dunes. Endangered plants have been defined by Ward (11) as

Table 1. Status, plant type, location on dune and occurrence of endangered and threatened plants that occur on Florida coastal dunes.

Scientific name	Common name	Status ^z	Plant type ^y	Location on dune ^x	Range ^w	% Occ. ^v
<i>Catesbaea parviflora</i> SW	Small-flowered lily thorn	E	S	B	K	<1
<i>Chrysopsis cruiseana</i> Dress	Cruise's golden-aster	T	H	F	NW	1
<i>Coccothrinax argentata</i> (Jacq.) Bailey	Silver palm	T	Tr	B	SE	<1
<i>Eragrostis tracyi</i> Hitchc.	Sanibel lovegrass	T	G	B	SW	<1
<i>Ernodea littoralis</i> SW	Beach creeper	T	S	F	SW, SE	1
<i>Jacquemontia reclinata</i> House	Beach jacquemontia	E	V	F	SE	<1
<i>Liatis provincialis</i> Godfrey	Godfrey's blazing-star	T	H	F	NW	<1
<i>Lupinus westianus</i> Small	Gulfcoast lupine	T	H	F	NW	1
<i>Mallotonia gnaphalodes</i> (L.) Britt	Sea lavender	T	S	F	SE	3
<i>Okenia hypogaea</i> Schlecht. & Cham.	Burrowing four-o'clock	E	H	F	SE	3
<i>Remirea maritima</i> Aubl.	Beach-star	E	H	F	SE	1

^zE—endangered, T—threatened.

^yTr—Tree, S—Shrub, V—Vine, G—Grass, H—Herb.

^xF—Frontal and back dunes, B—back dune only.

^wNE—Atlantic Coast north of Indian River County; SE—Atlantic Coast south of Brevard County; SW—Gulf of Mexico, Pinellas County and southward; NW—West of Franklin County; K—Florida Keys only.

^vOcc=Percentage of sites plant occurred on in sites studied within known range (Column 6).

Woody Plants

This group includes one tree and three shrubs. A prostrate shrub called beach-creeper, *Ernodea littoralis* SW and a large shrub called sea-lavender, *Mallotonia gnaphalodes* (L.) Britt, have special value for beautification and erosion control. Detailed propagation techniques are given in the individual plant writeup.

Silver Palm (*Coccothrinax argentata* (Jacq. Bailey). The Silver palm is a small, upright tree. Leaf bases are overlapping and fibrous. This gives the impression that the trunk is closely wrapped with a coarsely woven fabric. The trunk is unbranched and terminates in a graceful crown of leaves. The lower leaf surface is covered with fine oppressed hairs which give a bright silvery color.

According to Little (8) these trees occur naturally from Palm Beach County south through the Florida Keys. In this particular study it was found only on back dunes in the Florida Keys.

Bush and Norton (2) recommended propagation by seed which germinate in about six weeks. It can also be bought at some nurseries.

Beach-creeper (*Ernodea littoralis* SW). The Beach-creeper is a vine like shrub with prostrate stems and branches. The leaves are leathery, narrow and about 1 inch long often clustered. The numerous white to light pink flowers and numerous yellow berries are especially attractive in the summer.

These vine-like shrubs occur along the coasts of South Florida from Pinellas County on the west to southern Brevard County on the east.

This species forms low, dense colonies on coastal dunes. The growth type, small leaves and golden-yellow berries make it an attractive plant, potentially useful for erosion control on coastal dunes.

A successful method of propagation was developed. Four to five inch cuttings were treated with a rooting compound of auxin B on 3/4 - 1 inch of the basal stem and planted to a depth of 3 - 4 inches in well leached sand. Cuttings were placed in 65 to 70 percent shade and watered daily for 3 weeks and every other day thereafter. Shading was decreased by 15-20 percent each 5 - 6 weeks and at 15 - 17 weeks they were moved into full sun and watered every third day. Five to seven months are required for cuttings to become satisfactorily rooted. It will also propagate naturally by permitting plant runners to grow across pots and develop new plants at the nodes.

Beach-creeper can also be started from seed. Remove the pulp and place the seed on a well leached sand and cover with 1/4 inch of sandy soil. Water as needed and fertilize lightly each 2 weeks following germination for optimum growth.

After transplanting to a permanent site, the plants should be watered twice weekly until well established. Also fertilize with 6-6-6 or 8-8-8 at the rate of 1/2 to 1 pound per 1000 square feet twice during the growing season to develop and maintain growth.

Sea-Lavender (*Mallotonia gnaphalodes* (L.) Britt). The sea-lavender is a shrub up to 6 feet high. The entire plant may form smoothly rounded clumps up to 23 feet wide. The leaves are slender, densely covered with light gray pubescence and closely spaced toward the tips of twigs. The flowers are small, white, and bell-shaped.

Sea-lavender is one of the most conspicuous and attractive coastal shrubs. They occur naturally on coastal dunes in Martin County and southward through the Florida Keys. The attractive leaves and growth type make it an attractive plant with potential for erosion control on coastal

dune areas. It is recommended for landscaping by Bush and Morton (2).

This plant was successfully propagated using five to seven inch cuttings basally dipped into a rooting compound of auxin B and carefully planted into potting soil. With 1/2 to 1 inch of exposed leaves and leaf bud extended above the soil line. The planted cuttings were placed in 65-70 percent shade and watered daily for 3 weeks. Shade and watering were gradually reduced until at 12 weeks the cuttings were in 25-30 percent shade and watered each second day. Cuttings were then moved into full sunlight and watered each third day until they reached a height of 14 to 16 inches.

Plants can then be transplanted to the dune at a depth of 1 to 2 inches deeper than the root and soil line in the pots. Water twice weekly until well established. For best growth, fertilize with 1/2 to 1 pound of 6-6-6 or similar fertilizer per 100 square feet twice yearly.

Small-flowered lily-thorn (*catesbea parviflora* SW). Small-flowered lily-thorn is an irregular, spiny shrub, up to 6 feet tall. The twigs and upper stems are stiff and little branched and are densely clothed with small leaves and sharp spines. The yellow green leaves are glossy and 1/4 to 1 inch long. The small white flowers are borne singly. The fruit is a small, white, few-seeded berry.

These small shrubs occur only on Big Pine Key and Bahia Honda Key. Most often it is found on vegetated dunes facing the open Caribbean.

Grasses

This group includes only one grass.

Sanibel lovegrass (*Eragrostis tracyi* Hitchc.). Sanibel lovegrass is a delicate annual or occasionally perennial bunch grass. It is sometimes 30 inches tall, but is often much smaller. The leaf blades are narrow and up to 8 inches long. The small spikelets are compressed, narrowly oblong, with purplish glumes and lemmas.

This grass is known only from Sanibel Island, southward to Mound Key, Lee County, and northward to Longboat Key, Sarasota County. Its habitat is old fields, disturbed ground and back sides of coastal dunes.

Herbaceous Plants

This group includes one vine, one prostrate plant and four upright plants.

Beach Jacquemontia (*Jacquemontia reclinata* House). This perennial procumbent vine radiates from a woody base and could be mistaken for morning glory, *Ipomoea*. The creeping stem bears elliptic or ovate rather thick leaves. Flowers are white, in clusters from the axils in small bracts; the corolla is cleft into 5 pointed lobes. Many of the leaves and stems have enough pubescence to make them appear whitish.

This species is found only along the southeast coast of Florida. According to D. F. Austin of the Department of Science, Florida Atlantic University, this species now occurs in a few isolated coastal dune areas in Palm Beach County, and perhaps in Broward and Dade Counties.

Burrowing Four-o'clock (*Okenia hypogaea* Schlecht. & Cham.). This small prostrate annual produces stolons that spread out over the soil surface. The stems and leaves are sticky with hairs to which sand often adheres. Leaves are opposite, ovate to cordate-orbicular with crenate margins. The small attractive flowers are solitary, about one inch wide and bright rose-purple in color.

The burrowing four o'clock is known in Florida only from a few locations along the lower east coast of Florida. The habitat is restricted to the ocean side of the coastal dune.

Bush and Morton (2) recommend its use for landscaping but exact propagation methods are not known.

Beach-star (*Remirea maritima* (Aubl.)). The Beach-star is small, six to twelve inches tall, perennial, gregarious, caulescent herb with stems arising at intervals along the elongated rootstock. Leaves are numerous, crowded, and imbricate at the base, with recurved-spreading blades which give the plant a star-like appearance. It is unaffected by salt spray.

Beach-star occurs along the lower eastern coast of South Florida, especially south of Martin County. It once was known as far north as Vero Beach, Indian River County.

Cruise's Golden-aster (*Chrysopsis cruiseana* Dress). This perennial herb produces overwintering rosettes at the lowest nodes of the flowering stems. Prostrate shoots from these rosettes elongate in the summer forming long stems that curve upward. Leaves of the basal rosettes are white-wooly, but leaves of the resulting stems are green and nearly glabrous. The yellow flower heads are produced in late autumn.

This herb is found on coastal dunes from Escambia County east to Walton County on Santa Rosa Island. It is well adapted to the constantly shifting sand of the coastal dunes.

Semple (10) has made extensive studies of the golden-aster genera *Chrysopsis*, *Heterothea*, and *Pityopsis*. He proposes a nomenclatural change to *Chrysopsis gossypina* (Michx.) Ell. spp. *cruiseana* (Dress) Semple.

Godfrey's Blazing Star (*Liatris provincialis* Godfrey). Godfrey's blazing star is a perennial herb with a basal corm from which the flower heads are born on elongated spike or raceme. The leaf blades are linear-lanceolate. The flowers are showy with bright lavender purple corollas that stand out at right angles from the stem. Godfrey (7) has described this *Liatris* in detail.

This plant is found only in Gulf, Franklin, and Wakulla Counties, Florida, on or not far from the Gulf Coast. It is found on stabilized coastal dunes and may be locally abundant.

Gulfcoast Lupine (*Lupinus westianus* Small). This lupine is a stout, perennial herb or sub-shrub that grows to a height of 2 to 3 feet and usually has a single upright axis with several somewhat decumbent branches. Leaves are alternate and heavily pubescent. Flowers are purplish-blue, with the standard having a central spot of deep purple. Flowering occurs in April and May.

The Gulfcoast Lupine is found from Destin, Okaloosa County, eastward to St. Vincent Island, Franklin County. It occurs on exposed and actively shifting coastal dunes.

The SCS Plant Materials Center near Brooksville, Florida will continue to work with endangered and threatened plant species that will be useful in solving soil and water conservation problems. As a minimum effort, that facility will continue to determine propagation techniques for rare and endangered plant species. In some instances selection of superior plants will be made in the field. These will then be established at the Center for study. Selections from the best of these plants will be increased, field tested and released for further increased production and utilization on adapted problem sites.

A law, Section 581.185, Florida Statutes, entitled "Preservation of the Native Flora of Florida" enumerates a number of species under collection pressure. The law provides for the issuance of a permit before certain plant species can legally be collected, transplanted, or sold. Commercial collectors should refer to this law before propagating native plant species.

Literature Cited

1. Austin, W. F. 1974. Long Range Plant Materials Program—Florida. U.S.D.A., Soil Conservation Service, Gainesville, Florida. Pg. 27.
2. Bush, C. S. and J. F. Morton. 1969. Native Trees and Plants for Florida Landscaping. Florida Department of Agriculture and Consumer Services. Pg. 12.
3. Craig, R. M. 1974. Natural Vegetation on Florida's Coastal Dunes. Proc. Soil and Crop Sci. Soc. of Florida 34:169-171.
4. ----- . 1975. Woody Vegetation for Coastal Dune Areas. Proc. Florida State Hort. Soc. 88:428-434.
5. ----- . 1976. Grasses for Coastal Dune Areas. Proc. Florida State Hort. Soc. 81:353-355.
6. ----- . 1977. Herbaceous Plants for Coastal Dune Areas. Proc. Florida State Hort. Soc. 90:108-110.
7. Godfrey, R. K. 1961. *Liatris provincialis*, sp. nov., (Compositae), Endemic in Western Florida. The American Midland Naturalist 66, No. 2, pp. 466-470.
8. Little, E. L., Jr. 1978. Atlas of United States Trees, Volume 5. Florida. U.S.D.A. Forest Service, Misc. Publication No. 1361, pg. 12.
9. Regional Inventory Report of the National Shoreline Study, Atlanta, Georgia. U.S. Army Corps of Engineers, South Atlantic Division. 1971. South Atlantic—Gulf Region, Puerto Rico and the Virgin Islands. Pg. 41.
10. Semple, J. C. 1980. Morphological, Anatomical, Habit and Habitat Differences Among the Goldenaster Genera *Chrysopsis*, *Heterothea*, and *Pityopsis*. Canadian Journal of Botany 58, Number 2.
11. Ward, D. B. Rare and Endangered Biota of Florida, Volume 5. Plants. University Presses of Florida, Gainesville, Florida. Pp. 14, 36, 43, 55, 76, 79, 86, 87, 98, 99, 101.