examine many of the planet's rarest life forms first-hand. Although this will be a national collection, the holdings themselves will not be centralized. The collections will be maintained in the participating institutions around the country in climates similar to those they encounter in the wild. Because it will be coordinated by the Center, information sharing and decision making is expected to be organized consistently and efficiently while the actual cultivation of the plants will take place at the most appropriate sites around the nation. The participating institutions and any additional institutions affiliated with them will focus on regionally viable species. This focus will result in 1) greatly reduced costs for maintenance; 2) reduced vulnerability to support service interruptions, power failures, and water shortages; 3) maintenance of hardy genotypes, exposed to a climate in which the natural populations live; and 4) educational value in enhancing an understanding of the regional flora.

Bok Tower Gardens and Fairchild Tropical Gardens are participating institutions. They will be maintaining living regional collections on a permanent basis. Their collections will serve as a major resource for public education, garden ornamentals and as a potential gene pool for medicine and food.

As required by the Center, the Board of Directors of each of these nonprofit institutions approved in May, 1985, their institutional participation in the Center for Plant Conservation.

Bok Tower Gardens has been concerned with the conservation of Florida fauna and flora since its founding in 1929. Currently, Bok Tower Gardens has 11 species under cultivation that are on the Center for Plant Conservation's list of rare and endangered Florida plant species. These include: *Calamintha ashei, Chionanthus pygmaeus, Dicerandra cornutissima, Dicerandra frutescens, Dicerandra immaculata, Illicium parviflorum, Magnolia ashei, Prunus geniculata, Rhododendron austrinum, Taxus floridana,* and *Torreya taxifolia.*

Since Bok Tower Gardens has only recently begun a formal program to conserve endangered plants, most of the specimens of these species are immature or not well established. It should be noted that Bok Tower Gardens is not a research institution, but has as part of its mission the conservation of Florida's endangered flora, both *ex situ* and *in situ,* and is currently managing the 4,000-acre Tiger Creek Nature Preserve in Polk County on behalf of The Nature Conservancy.

Fairchild Tropical Gardens has 25 species currently under cultivation that are on The Center for Plant Conservation's list of rare and endangered species for its biogeographic area. Thirteen of these are Florida natives and include: *Amorpha crenulata, Cereus eriphorus* var. *fragrans, Cereus robinii, Coccothrinax argentata, Comelina gigas, Forestiera segregata* var. *pinetorum, Hypelate trifoliata, Opuntia triacantha, Peperomia floridana, Pseudophoenix sargentii, Roystonea elata, Torreya taxifolia,* and *Tripsacum floridanum.* The other species are from Puerto Rico and the Virgin Islands.

The living collections of endangered species of Bok Tower Gardens and Fairchild Tropical Gardens will be increasing in the future and will serve not only as a resource for public education and as a potential gene pool, but will also become a source for garden ornamentals.

Such endangered Florida species as *Chionanthus pygmaeus,* the Pygmy Fringe Tree, may well become common in cultivation. Not only are the flowers of this particular species highly ornamental, but the species is well adapted to the excessively drained, sandy soils of much of Florida. As Florida's population increases and water crises become more frequent, this and other species of water-conserving plants may well come into prominence as ornamentals and become the first proof, although in all likelihood not the last, of the direct societal benefit of the conservation of Florida's endangered plants.

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Proc. Fla. State Hort. Soc. 98:316-320. 1985.

INTRODUCING NATIVE FLORIDA SHRUBS FOR LANDSCAPING

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Abstract. **Though many Florida native trees have long been familiar to us, only a few of Florida's native shrubs have been commercially grown and regularly used for landscaping until the last few years. A new environmental awareness has encouraged growers to take a second look at the wide variety of native shrubs that could be cultivated. This synopsis reviews the basic characteristics of the shrubs such as family relationships, size and form, color, ecosystem membership, growth, range, cultural notes, and successful propagation techniques. The list was compiled with a geographical emphasis for central Florida though the range of most of these shrubs is much greater.**

Florida's early horticulturists were intrigued by our native vegetation and put much effort into bringing it into cultivation. Dr. Henry Nehrling grew and described a large number of native plants including *Zamia pumila,* L., coontie, and *Befaria racemosa,* Vent., tarflower. Frederick Law Omsted, Jr. designated up to half of the plantings at Bok Tower Gardens and Pineland (the nearby home) for native

Table 1. Central Florida Native Shrubs.

Scientific Name Common Family	Height (ft)	Spread (ft)	Form	Leaf characteristics	Flower and fruit	Foliage[z]	Ecosystem	Range	Propagation	Cultural Notes and remarks
Asimina obovata (Willd.) Nash Paw Paw Annonaceae	6	3	upright with few branches	4 inches, oval	4 inches, creamy	D	scrub and sand hill	South FL to North GA	seed in fall	Full sun, sandy soil. Little fertilizer. Deep tap root.
Agarista populifolia (Lam.) Judd Fetterbush Ericaceae	10	10	arching branches, dense	2 inches, when young are rusty red turning bright green then dark glossy green	White bell-shaped clusters	E	swamp and wet woods	NE FL to SE SC	seed or cutting	full sun to shade (wet acid soil)
Baccharis halimfolia L. Groundsel Tree Asteraceae	10	8	upright and spreading	2 inches coarsely toothed bluish	female billows with fluffy white seed pappus	E	hammocks, marshes and beaches	FL to TX MS, AR	Seed in fall	Full sun to partial shade. Responds to water and fertilizer
Befaria racemosa Vent. Tarflower Ericaceae	7	4	upright	1 inch, bluish	2 inches, white and pink, clustered at tips	E	Flatwoods to sand scrub	FL thru SE GA	Seed, cuttings are difficult	Full sun to partial shade, average soil, little fertilizer
Bumelia tenax (L.) Willd. Silver Buckthorn Sapotaceae	10	10	spreading, contorted branches	copper backed leaves and twigs		E	Scrub, sandhill and coastal dunes	Central FL to SC	Seed or cutting	Sun to partial shade, sandy soil, requires little fertilizer
Callicarpa americana L. Beauty Berry Verbenaceae	6	6	spreading with arching branches	4 inches, opposite	reddish-grape berries in dense clusters on stems	D	Pinelands	FL to Mexico, MD	Seed or cutting	Partial shade, average soil and fertilizer
Cephalanthus occidentalis L. Buttonbush Rubiaceae	8	5	oval, open	opposite, 4 inches	white balls of flowers	D	Swamp and wet ground	FL to TX, MN, ME	Cuttings	Full sun to partial shade. Avg Fertilizer
Ceratiola ericoides Michx. Rosemary Empetraceae	6	6	round	needle like on short, upright stems, dark green	tiny yellow seed Dec-Mar	E	Sandscrub	Southeast U. S. coastal Plains	Cuttings in June, difficult seed slow	Full sun, little fertilizer sandy soil
Erythrina herbacea L. Coral bean Fabaceae	6	3	upright or arching, few long branches	arrow-head 2-inch leaflets	brilliant red in long racemes	D	hammocks, Pinelands	FL to TX, NC	Nicked seed tuber.	Shade to Sun, avg. fertilizer and water. Long tuber
Euonymus americana L. Hearts-a-bustin Celastraceae	6	3	slender, upright	glossy dark green 1-4 inches	red, warty fruit with red arils	E	Woods	FL to TX, NY	cuttings, seed	Shade to partial shade, peaty soil, avg fertilizer
Garberia heterophylla (Bart.) Merr. & Harp. Garberia Asteraceae	3	3	round, dense	rounded, grayish 1 inch	Lavender heads, terminal clusters	E	Scrub and sandhill	N and C FL	Seed	Full sun to partial shade, sandy soil, little fertilizer
Hibiscus coccineus Walt. Red Star Hibiscus Malvaceae	6	2	upright	5 inches, palmate, toothed	crimson 6-8 inch blooms	D	Marshes and swamps	C FL to SE GA to S AL	Seed	Full sun to partial shade, wet soil, avg. fertilizer.
Hypericum fasciculatum Lam. St. John's Wort Hypericaceae	4	3	erect, much branched above	needlelike	yellow, ½-inch blooms	E	Shores of ponds and lakes, wet depressions	FL to NC, MS	Cuttings	Full sun, medium wet soil, avg fertilizer
Hypericum hypericoides (L.) Crantz. St. Andrew's Cross Hypericaceae	3	3	erect, very much branched above	bright green, ¾ inch	yellow ¾-inch blooms	E	Variety from wet to dry	FL to VA, MO, Mex and the islands	Seed	Full sun to shade, avg soil, avg. fertilizer.
Hypericum reductum P. Adams St. John's Wort. Hypericaceae	1½	3	mounding	needlelike	yellow ½-inch blooms in mass	E	Scrub and sandhills	C FL to NC,AL	Cutting and seed	Full sun, sandy soil, little fertilizer
Ilex ambigua (Michx.) Torr. Sand Holly Aquifoliaceae	15	8	loosely pyramidal	glossy, leathery 2 inches, reduced in full sun	abundant red berries	D	Scrub, hammocks and upland woods	FL to TX, AR, NC	Cuttings	Full sun to partial shade, sandy soil, little fertilizer

Table 1. Continued.

Scientific Name Common Name Family	Height (ft.)	Spread (ft.)	Form	Leaf characteristics	Flower and fruit	Foliage[z]	Ecosystem	Range	Propagation	Cultural Notes and remarks
Ilex glabra (L.) A. Gray Gallberry Aquifoliaceae	6	4	oval	1 inch, shiny bright green leaves	black fruit	E	Sandy soil, lowground, flatwoods and acid prairies	FL to Nova Scotia, LA	Cuttings	Full sun to partial shade, colonial from subterranean runners
Ilex opaca var. arenicola (Ashe) Ashe Scrub Holly Aquifoliaceae	15	8	pyramidal and dense	light, green shiny spine-toothed	red berries	E	Sand scrub	Highland County to North C. FL	Cuttings	Full sun, sandy soil, little fertilizer
Illicium parviflorum Michx. ex Vent. Florida Anise Illicaceae	8	8	round or oval	dark green, glossy 4 inches	creamy yellow, ½ inch flowers and crown shaped fruit	E	low woods and swamps	Central FL to GA	Cuttings	Partial shade, wet peaty soil, fragrance similar to oriental anise.
Itea virginica L. Virginia Willow Saxifragaceae	6	5	spreading, arching branches	3-inch leaves, red and yellow in winter	drooping cylindrical racemes of creamy flowers in spring	D to SEV	Swamps, stream margins, wet woodlands	FL to NJ Ill., Tx	Cuttings, seed	Partial shade, (Ful sun to shade) wet peaty soil
Lyonia ferruginia (Walt.) Nutt. Rusty Lyonia Ericaceae	10	10	round, older specimens developing crooked trunks	2-inch olive green leaves covered with rusty hairs, newgrowth rust-colored	white bell-shaped flowers in clusters	E	Sand scrubs to flatwoods, acid soil	FL to SC W. Indies & Mex	Seed	Full sun to partial shade, acid soil, little fertilizer
Lyonia lucida (Lam.) D. Don. Shiny Lyonia Ericaceae	6	6	round, gentle arching branches	glossy green 2-inch leaves dark in shade, new growth rusty red color then bright green	rose to white bell-shaped flower in clusters	E	Sandscrubs to flatwoods, bogs cypress ponds		Seed and cuttings	Full sun to shade, acid soil, little fertilizer
Myrica cerifera L. Wax Myrtle Myricaceae	20	15	round, full to the ground	dark olive green 2-inch glossy leaves	grayish waxy fruit	E	Hammocks, wet sandy soil, swamps	FL to TX ARK, NJ W. Indies	Seed	Full sun to partial shade, med. wet soil, avg. fertilizer
Osmanthus megacarpa Small. Scrub Wild Olive Oleaceae	15	10	oval, open appearance	5-inch, light green, opposite leaves	white flowers in panicles, 1-inch glubose fruit	E	Sand scrub	Central FL	Seed and cuttings, difficult	Full sun to partial shade, sandy soil, little fertilizer, sweet odor
Persea humilis Nash. Silk bay Lauraceae	15	10	pyramidal, dense	1-inch, olive green leaves with copper undersides		E	Sand scrub	Central FL	Seed	Full sun to partial shade, sandy soil, little fertilizer, bay odor
Quercus chapmanii Sarg. Chapman Oak Fagaceae	20	15	shrubby tree, oval	2-4 inches obscurely lobed leaves		SEV	Scrub and sandhill	FL to SC	Seed in fall	Full sun to partial shade, sandy soil, little fertilzier
Quercus inopina Ashe. Inopina Oak Fagaceae	8	6	oval, open	2-4 inch revolute leaves		E	Sand scrub	Central FL	Seed in fall	Full sun, sandy soil, little fertilizer
Quercus myrtifolia Willd. Myrtle Oak Fagaceae	15	12	round, dense	2-inch, dark green, shiny leaves		E	Sand scrubs, sandhills and coastal dunes	FL to MS, SC	Seed in fall	Full sun to partial shade, sandy soil, little fertilzier
Rhaphidophyllum hystrix (Pursh) Wendl. & Drude. Needle Palm Arecaceae	8	8	mounding, short trunk with spines	palmate leaves, bluish cast			Wet to mesic woods	Central FL to GA, AL	Seed	Shade to partial shade, medium wet peaty soil, avg. fertilizer
Rhodoendron viscosum var. serrulatum (Small) Ahles. Swamp Honeysuckle Ericaceae	12	9	oval, open branching, dense in full sun	2-inch, hairy leaves	white honey-suckle shaped azalea blooms in summer	D to SEV	Wet woods and swamps	Central FL to VA, MS	Seed, cuttings in spring	Partial shade, medium wet peaty acid soil, little fertilizer, flowers very fragrant in summer
Rhus copallina L. Shining Sumac Anacardiaceae	15	8	upright, little branching	2-ft pinnate leaves	dark red seed clusters and bright	D	dry hills and pinelands	FL to TX, MN, ME	scarified seeds	Sun to shade, avg. soil and avg. fertilizer

Table 1. Continued.

Scientific Name Common Name Family	Height (ft.)	Spread (ft.)	Form	Leaf characteristics	Flower and fruit	Foliage[z]	Ecosystem	Range	Propagation	Cultural Notes and remarks
					red fall leaves					
Sabal etonia Swingle ex Nash. Scrub Palmetto Arecaceae	4	4	mounding, underground trunk and bud	palmate, bright green, filiferous blades	black round fruit		Sand scrub	Central and South FL	seed	Full sun, sandy soil, little fertilizer
Sabal minor (Jacq.) Pers. Bluestem Arecaceae	6	6	mounding, little above ground trunk	palmate, bluish blades, not filiferous	bright orange flowers		Hammocks, flatwoods, swamps	FL to NC, AR, TX	Seed	Partial shade, medium wet soil, avg. fertilizer
Serenoa repens (Bartr.) Small Saw Palmetto Arecaceae	12	12	mounding, branching sometimes arborescent	palmate, bright green leaves, bluish on east coast	fruit orange before turning black		Scrub, sandhills, flatwoods, coastal dunes	FL to SC, LA	Seed or trunk cutting	Sun to partial shade, avg. soil, avg. fertilizer
Vaccineum corymbosum L. Highbush Blueberry Ericaceae	12	8	broad, bushy, branching crown	1-inch, bright green leaves	white to pinkish bell shaped flowers, blue-black fruit	D	upland woods to swamps	Central FL to ME, MN, LA	cuttings	Partial shade, acid peaty soil, avg. fertilizer
Vaccineum darrowi Camp. Little Blueberry Ericaceae	2	2	round, colonial	⅜-inch leaves, new with bluish cast and red edges	white to pink bloom and blue-black fruit	E	pine flatwoods, sandhills, scrub	South Cen. FL to GA, TX	cuttings	Full sun to partial shade, acid soil, little fertilizer
Vaccineum myrsinites Lam. Shiny Blueberry Ericaceae	2	2	round, colonial	⅜-inch leaves, new shiny bright green	white to pink blooms and black fruit	E	pine flatwoods, sandhills, sand scrub	S. FL to SC, AL	cuttings	Full sun to semi-shade, acid soil, little fertilizer
Viburnum obovatum Walt. Blackhaw Caprifoliaceae	12	8	stiffly branched, open form	1-inch, glossy, dark green leaves	white flower clusters profuse in spring	E	hammocks, thickets, and swamps pinelands	S. FL to SC, AL	cuttings	Partial shade, avg. soil, avg. fertilizer
Zamia pumila L. Coontie Cycadaccae	3	4	round	stiff, prinnate, 2-ft leaves	orange seed in cones	E	hammocks, pinelands	FL, Keys and West Indies	seed, division	Partial shade to full sun, avg. soil, avg. fertilizer, cooked roots used by Florida Indians.

[z]Foliage: E = evergreen, SEV = semievergreen, and D = deciduous.

plants including *Baccharis halimifolia,* L., groundsel tree, *Vaccineum darrowi,* Camp., little blueberry, *Psychotria nervosa,* Swartz, wild coffee, and *Callicarpa americana,* L., beauty berry. Charles Simson from south Florida in his 1911 *Ornamental Gardening in Florida* book devotes the first descriptive section to native plants. He decries the loss of hammock, "The greedy landowner seizes his ax and grub hoe and with the aid of fire he wipes out of existence this lovely vegetation which it has taken nature centuries to develop, . . . that he may show his skill in ornamental planting, putting out rows of palms alternated with Chinese hibiscus (8)." Native thinking was present then.

This was also the age of great plant exploration, particularly of South America and by such Floridians as David Fairchild who brought back large numbers of intriguing plants from tropical and subtropical regions that people were eager to see if they could be grown in Florida (3). Through time what has become planted has been determined by what was popular and available. Like the exotics, such plants as the *Myrica cerifera,* L., wax myrtle, have gone in and out of popularity. It is now in.

The whole native plant movement is popular now, but we hope it goes much farther than that. Concern over Florida's fast-paced development and increasing loss of natural ecosystems have focused attention on restoration. Native plant material is in high demand now by Florida state and local governments, phosphate companies and developers. Government regulations are insisting on it. Landscape architects are eager to specify the material if they can verify availability. A few years ago the debate was" the chicken or the egg," "availability or demand," which comes first. Now growers are rushing to produce before those who are requesting the material give up.

All of the shrubs listed have been produced by growers and are available to some degree. A few shrubs such as *Certiola ericoides* Michx. and *Osmanthus megacarpa* Small are still difficult to propagate. Others such as *Lyonia ferruginea* (Walt.) Nutt. with mycorrhizal innoculation can now become a saleable gallon-sized plant from seed sown within 9 months, or *Rhus copallina* L. with acid scarification within 6 months.

Descriptive Table of Shrubs

The basic characteristics of 38 native shrubs are presented in Table 1. All of the information is given in a

definite sequence to make scanning for specifics easier such as plants suitable to a particular ecosystem.

Family consideration is a help in determining possible propagation techniques or soil type such as acid soils and fibrous roots in the Ericaceae family. Size given is a very general expected optimum size by height and spread. Many scrub species will be dwarfed under harsh growing conditions, just as dense shade will greatly increase the height and density of *Myrica cerifera.* Some shrubs are slow growers or are easily maintained at shorter heights with minimal pruning. Branching pattern and leaf character is also a consideration for texture by landscape designers.

Ecosystem and growth range will give the grower a feeling for the conditions under which the plant may grow. A plant found in the sand scrub and sandhills generally does well on a well-drained soil mix with little fertilizer and less irrigation, especially overhead irrigation. Richer growing conditions can make them more susceptible to disease and insect damage. Wetland plants generally grow easily under average potting soil and fertilizer with regular irrigation. Only those that usually have their roots submersed such as *Pontederia cordata,* L., pickerel weed, seem to require wetter conditions or they will appear stunted. None of the shrubs listed in Table 1 fall into that category.

With a thorough knowledge of Florida's ecosystems, it is possible to determine which plants will do well on a particular site whether there is existing native vegetation or not. Sunshade patterns, soil type in particular, and new drainage patterns caused by construction are considerations. *26 Ecological Communities of Florida* prepared by the U.S. Dept. Agr. Soil Conservation Service is helpful in relating communities, species, and soil types (9). The plants are much more versatile than was expected. Combinations of *Taxodium distichum,* bald cypress, and *Illicium floridanum,* Ellis Florida anise, from swamps and *Garberia heterophylla,* (Bart.) Merr. & Harp. garberia, from sand scrub on the same planting site have been successful after 2 years. However, for long term establishment and little to no maintenance including irrigation after the plants are established (one growing season), native habitat should be considered.

The growth range is also an indication of cold hardiness. Many times the range can be safely extended.

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Proc. Fla. State Hort. Soc. 98:320-322. 1985.

RETAINING AND ENHANCING A NATURAL LANDSCAPE FOR A RESIDENCE

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Abstract. **The process by which a home is built and landscaped on a lot while retaining an existing sandhill ecosystem is discussed. The process was begun by creating a detailed site survey of the existing vegetation. Disturbance of the site during construction was limited to within 5-10 ft of the house, 1 side of the house for access, and the future drive access. The site was cleared of unwanted vegetation using hand tools. Additional plantings of mostly native materials were added to the natural areas, used in a more traditional manner in the disturbed areas around the home, and included in a formal parterre garden. Maintenance included management of weeds and plant suckers, checking irrigation controls, and encouragement of selected species.**

John Kunkel Small observed in the 1920's that the natural Florida landscape was being so desecrated that he could hardly bring himself to return anymore. As landscape architects and contractors we are trying to reverse the trend of the last 60 years by early involvement with a client's site and saving as much of the existing native system as possible.

Reasons for Preserving and Restoring

Cost benefit. Clearing costs are reduced and there is less material to haul away. Erosion costs are reduced. The undisturbed areas reduce erosion and do not require irrigation. There is a lessened cost for heating and cooling buildings. Mature natural landscape can shade south, east and west walls and roof to reduce heat build up and can reduce chill factor by buffering cool winter winds from walls. There is a lessened need for additional landscaping. Preserving landscape can negate need and cost of privacy structures. There are reduced maintenance costs.

Site conditions. Disturbed ground will be quickly covered by primary invasive weed growth not encountered on undisturbed sites. The cheapest way to reclaim disturbed