Proc. Fla. State Hort. Soc. 90:104-107. 1977.

TREES AND SHRUBS FOR ENVIRONMENTAL EDUCATION

ROBERT M. CRAIG
REBA M. STONE
U. S. Department of Agriculture,
Soil Conservation Service,
Gainesville, FL 32602

Additional index words. conservation.

Abstract. **In our urban environment there are few opportunities to become aware of natural things and their past, present, and future importance to people. Environmental education is one method of presenting teaching experiences to students. This can occur in formal classrooms, but it is especially effective in the outdoors. Plants can provide numerous opportunities to increase our awareness of the environmental and related ecological considerations. The U. S. Department of Agriculture, Soil Conservation Service, recently determined plants that could be used for this purpose. Numerous plants were identified. Nineteen trees and shrubs were identified as having special values in environmental education. These plants also have values for beautification and landscaping. Information is given on the name, growth form, climatic adaptation, methods of propagation, ornamental value, and specific use in environmental education.**

There is a growing revival of interest in the natural resources Mother Nature has given us. Remedies, often scorned as old wives' cures, are being reexamined by modern medicine men. Health food enthusiasts are promoting the use of natural foods as alternatives to processed foods. Environmental issues involving energy conservation, air pollution, water quality, noise pollution, and other problems have become national concerns. Memberships of environmentally-related organizations have increased significantly. Due to this concern, environmental education has become increasingly important. Actions by the Florida Legislature have placed emphasis on the development of an effective environmental education program for schools in Florida.

In 1970, the Florida Legislature passed the first of a series of legislative acts which established the Florida Environmental Education Program. The Environmental Education Act of 1970 mandated that the Department of Education develop a state program in environmental education. In response to this act, the Florida Master Plan and Action Guide for Environmental Education was developed. The Environmental Education Act of 1973 provided the essential staff and structure to begin serious state assistance towards implementing the Florida Master Plan.

Environmental education serves to arouse children's interest in their environment and to develop an appreciation for the natural world in which they live. The outdoors can be used as an educational laboratory to provide a learning climate for relating students to the environment on an individual basis. This method will lead these students to become concerned with the preservation and improvement of their environment.

One basic approach in environmental education is to study plant resources and their usefulness. Trees and shrubs provide many uses such as sources for natural foods, dyes, and medicines; they are used extensively in landscaping. Various edible plants can be utilized as exciting foods which are as economical as they are nutritious. Natural-dyed yarns produce beautifully distinctive colors unavailable commercially. A large number of prescription drugs and home remedies are derived from plants. Trees and shrubs are used as landscape plants to provide beautification for homes, schools, and other buildings. They are also useful as buffers, screens, and ground covers for solving urban problems such as noise pollution, unsightly views, and erosion. They also provide valuable food sources for urban wildlife. Environmental education generates an awareness of the importance of these plant resources to the total environment.

The U. S. Department of Agriculture, Soil Conservation Service (SCS), determined several plants which are useful in environmental education (16). This determination was accomplished by an extensive review of appropriate literature and experience in working with environmental educators throughout Florida during the past ten years.

Materials and Methods

The SCS first became substantially involved in environmental education work at the Resource-Use Outdoor Education Center at Perry, Florida in 1968. The Center was one of the first in Florida to serve a multi-county area. SCS's involvement expanded in scope during the late 1960's and early 1970's to include technical assistance to outdoor educational centers for Alachua, Bay, DeSoto, Duval, Hernando, Hillsborough, Leon, Martin, and Seminole Counties. Currently, the involvement is primarily with public school systems throughout the state.

The authors documented their experiences with the evaluation of plants in environmental education. Every known publication on the subject was studied and appropriate information on Florida's native plants was tabulated. Approximately 50 publications were involved in this work. The more important publications are used as references in this paper.

Teachers, conservationists, senior citizens, farmers, and other informed citizens were also interviewed concerning uses of plants for environmental education. In 1970, information from the authors' experiences in environmental education, interviews, and the literature review was made available to SCS personnel in the form of an in-service technical publication. This material was reviewed to determine the most useful trees and shrubs in relation to environmental education and landscape values.

Results and Discussion

Almost 100 native or naturalized woody plant species were identified as having value for use in environmental education. This paper considers only the 43 plant species that are also recommended for landscaping (1). Nineteen of the plants have special significance when considering their preservation or establishment in areas used for environmental education. This is because of plant characteristics that afford teacher-student experiences and landscape values. These plants are also easily established and maintained.

Table 1 summarizes information on the plant description, climatic adaptation, environmental education uses as edible, medicinal, dye or household, and methods of propagation. Although plants have been utilized in medicines for millenia, many are poisonous in whole or in part. This is also true for some edible plants. Often only experienced persons can tell the difference between potentially useful and harmful substances. Extreme caution

Table 1. Characteristics of useful woody plants for environmental education.

Scientific Name	Growth Form[z]	Climatic Adaptation[y]	Env. Educ. Use[x]	Method of Propagation[w]
Acer rubrum	1	N,C,S	D,E,W	S,T,N
Carya spp.	1	N,C,S	D,E,O,W	S,T
Chionanthus virginicus	3	N,C	M,W	C,S,L
Coccoloba uvifera	3	S	E,O	C,S,L,N
Cornus florida	3	N,C	D,E,O,M,W	S,T,N
Ilex vomitoria	4	N,C	M,O,W	C,T,N
Liquidambar styraciflua	1	N,C	E,M	S,T
Morus rubra	3	N,C,S	E,M,O,W	S,T
Myrica cerifera	4	N,C,S	D,E,M,O,W	C,S,T,N
Pinus	1	N,C,S	D,E,M,W	S,T,N
Prunus serotina	1	N,C	D,E,M,W	S,T
Prunus angustifolia	3	N,C	E,M	S,T
Quercus spp.	1	N,C,S	D,E,O,W	S,T,N
Rhizophora mangle	3	C,S	D,E,O,W	S,T
Rhus glabra	4	N,C,S	D,E,M	S,T
Sabal palmetto	1	N,C,S	E,O	S,T,N
Salix spp.	3	N,C,S	M,O	C,S
Sambucus simpsonii	4	N,C,S	D,E,M,O,W	C,S
Zanthoxylum clava-herculis	3	C,S	M,W	C,S

[z]Growth form: 1=Large tree; 2=Medium-sized tree; 3=Small tree; 4=Large shrub.

[y]Climatic adaptation: N=All of North Florida south to Zone C; C=St. Augustine and Tarpon Springs south to Zone S; S=Vero Beach and Ft. Myers south.

[x]Environmental Education Use: D=Dye; E=Edible; M=Medicinal; O=Other; W=Wildlife.

[w]Method of Propagation: C=Cuttings; L=Layering; N=Available commercially; S=Seed; T=Transplant.

should be used before any plants or plant substances are taken internally.

Six of the featured plants are currently under investigation by SCS through its plant materials program in Florida. These plants are: *Chionanthus virginicus* L., fringetree; *Myrica cerifera* L., southern wax-myrtle; *Prunus angustifolia* Marsh., chickasaw plum; *Quercus michauxii* Nutt., swamp chestnut oak; *Rhizophora mangle* L., red mangrove; and *Salix spp.* L., willow.

Acer rubrum L., red maple—This hardy, fast-growing tree occurs throughout Florida in woodlands on wet soils. The leaves vary in size and shape, with three to five lobes. Clusters of small, bright red flowers and prominent winged fruit appear in early spring before the leaves develop. The leaves turn to red and yellow in the fall before dropping off.

Indians used the maple sap as a fresh drink, fermented into an intoxicating beverage, and to make sugar. The sugar was mixed with pulverized corn and used as a highly nutritious food on long journeys. Coon (3) gives several ways to use fresh maple sugar in cooking. The dried inner bark was pounded to remove rough fibers and then baked as bread. Brown shades of dye can also be obtained from the bark. The buds are an important food source for squirrels and deer.

Red maple can be used to provide shade and beauty for streets, homes, schools, and parks. Propagation is by seed or transplanting. The seed require no pregermination treatment and should be planted in late spring soon after collection. Plants may also be purchased from commercial nurseries. (7, 9, 14)

Carya spp. Nutt., hickory—This is a large, deciduous tree with smooth, compound leaves and strong, hard wood. It occurs primarily in upland hardwood hammocks and bottom hardwood areas. Both staminate and pistillate flowers appear on each tree in the spring. The pear-shaped fruit is an edible nut.

Hickory nuts are edible raw or as substitutes for other nuts in cooking. The husks may be removed by hand, trampling, or running them through a corn sheller. The Indians used the oil from the nuts in paints and as a cure for sunburn.

Hickory was the main fuel for early settlers. They also made their fences from this strong wood. The green hickory was used for smoking meat. The bark yields a distinctive shade of yellow for dyeing.

Several species of hickory occur throughout Florida. Propagation is by sowing untreated seed in the fall, followed by mulching, or sowing of stratified seed in the spring. (3, 6, 9, 14)

Chionanthus virginicus L., fringetree—This slow-growing tree also occurs as a shrub. It is most abundant in the understory of pine hardwood forests. Attractive, greenish-white flowers appear in the spring. In the fall, clusters of purple fruit ripen and the leaves turn yellow. The foliage, twigs, and fruit are eaten by wildlife.

The bark is used as a tonic, diuretic, astringent, and to reduce fever. Early pioneers prepared a liquid of boiled root bark as a treatment for skin irritations.

The fringetree is planted as an ornamental. It is only moderately-resistant to browsing and may die if more than one-third of the annual growth is removed. Propagation is from seed, cuttings, layering, grafting, or budding onto ash seedlings. Seed should be planted in the fall after cleaning, or in the spring after stratification. (14)

Coccoloba uvifera (L.) L., seagrape—This shrub or small tree may reach a height of 25 feet. It is salt tolerant and occurs along beaches from Brevard and Manatee Counties southward. The thick, bluish-green leaves are round and leathery. It has small, yellowish flowers and grape-like fruit which ripens in the fall.

The fruit are edible raw and can also be used for making juice, jelly, syrup, and wine. Early Spaniards used the dried leaves to convey written messages.

The seagrape is useful in home landscaping and for roadsides. Propagation is from seed, cuttings, or air-layering. Florida law prohibits the removal or digging up of seagrapes. Plants of all sizes are readily available from commercial nurseries. (1, 11)

Cornus florida L., flowering dogwood—This is a small, deciduous tree found in mesic hammocks and open pine woods in northern Florida. It is an attractive tree in spring with yellowish flowers and showy-white bracts. The foliage and fruit turn bright red in the fall.

The Indians used the fruit for food. The inner bark was boiled to treat diarrhea and reduce fevers. The wood was used to make bows, baskets, and cooking racks. Early settlers prepared the dry bark to use in the place of quinine. They also used the peeled bark for toothbrushes because they thought the chemical content would whiten the teeth. The bark yields a red coloring for dye.

The dogwood is used as an ornamental and for wildlife plantings. Propagation is from seed, transplanting in the winter, or cuttings under mist. The best results for seeding are to plant freshly collected and cleaned fruit in the fall. Plants are available commercially. (3, 9, 12, 16)

Ilex vomitoria Ait., yaupon holly—This deciduous shrub or tree occurs in coastal dune areas, open woods, and moist hammocks in northern Florida. It has small, dark-green leaves and bright red berries which ripen in the winter. The berries contain ilicin which can be toxic to children when taken internally.

The leaves contain caffeine. They were used extensively

by Indians to make a ceremonial drink to purge the body before religious events. The wood is used in cabinetry and for construction of novelties.

The berries are choice food for birds. The holly is used for specimen plantings and hedges. Propagation is by transplanting seedlings or from cuttings. Complete germination of seed will not occur until 1 to 2 years. Several varieties are available commercially. (1, 5)

Liquidambar styraciflua L., sweet gum—This large, deciduous tree occurs as far south as Cocoa and Tampa in hammocks, swamps, and wooded areas. It has star-shaped leaves which turn red and yellow in the fall. The fruit is a spiny globe which drops off in the fall.

Indians treated wounds with the water used to boil the leaves. Early settlers used the sap for chewing gum. The seeds are eaten by many species of birds.

The sweet gum is used in landscaping for homes, schools and commercial sites. Propagation is by transplanting or planting stratified seed in the spring. Some seed will not germinate readily and may not come up until the second year. (15, 16)

Morus rubra L., red mulberry—This small tree occurs in hammocks and floodplain woods. It has sharp-pointed leaves and the fruit is dark red and similar to a blackberry.

The fruit may be eaten raw or used in pies and jelly. Dried mulberries can be used in the place of raisins. Squirrels, birds, and turkeys also eat the berries. Indians used the sap from the leaves to treat ringworms. The root-bark was boiled to make a drink to treat tapeworms. The wood is used for fence posts.

Propagation is by seed or transplanting. Seed must be pretreated before planting. This involves cold-water soaking for 100 hours or stratification in moist sand at low temperatures for 30 to 90 days. (6, 14, 16)

Myrica cerifera L., southern waxmyrtle—This is an evergreen shrub or small tree. The leaves are yellowish-green and aromatic when crushed. The fruit is round, coated with a bluish-white wax, and ripens in the fall. It occurs throughout Florida in coastal areas, swamps, hammocks, and flatwoods. The fruit is a source for food for many birds. The dense branches provide nesting sites and wildlife cover.

The bayberries were used for making scented candles, soap and lubricants. The leaves were used for tea, and as a flavoring in cooking. The roots were used in treating dysentery, sores, ulcers, and skin diseases. The leaves, twigs, and berries produce a blue color for dyeing.

The waxmyrtle is used in landscaping for homes. Propagation is from seed, cuttings, or transplanting. Seed germination is increased by stratification at low temperatures. It is also available commercially. (3, 6, 9, 14)

Pinus spp. L., pine—This is a family of evergreen trees which grows to 100 feet in height and has needle-like clusters of two to five leaves. The cones are variously-shaped, but are usually long and tapering to a point, with woody scales and spiny tips. Several species of pine occur throughout Florida. They are a food source for wildlife.

Turpentine, pine oil, and pine tar are obtained from old pine stumps by extraction or distillation. The pine oil is used as an antiseptic and deodorant in household cleaning. Pine tar is used as an antiseptic for skin disorders and in cough syrups. Indians drank the liquid left after boiling the inner bark as a treatment for venereal diseases. The seeds are edible. The inner bark was used as an emergency food, raw or cooked. The wood is used in building materials, furniture, and poles.

Propagation is by seed or transplanting. The most common practice for seed is to plant nondormant seed in the spring. Plants are also available from commercial nurseries. (8, 14, 16)

Prunus serotina Ehrh., wild cherry—This large, aromatic tree has small, white flowers and dark red cherries. It grows as far south as Lake County in hammocks and along fence rows; it thrives on sandy soils.

The bark was used extensively in home remedies for coughs and colds, diarrhea, and as a sedative to the respiratory nerves. A red dye can be obtained from the bark and a gray or green from the leaves. The fruit is used in making jelly, wine, and pies. Except for the fruit, all other plant parts contain toxic substances when used in excess. It is an important food source for several species of birds. The foliage is poisonous to cattle, especially when wilted. Propagation is by seed or transplanting. Seed should be stratified in cold temperatures for 120 days and planted in early spring. (5, 6, 14, 16, 17)

Prunus angustifolia Marsh., chickasaw plum—This is a small, deciduous tree which occurs in woodlands in north Florida. Fragrant, white flowers with bright red centers appear in spring. Orange-colored fruit ripen in late summer. It is used as an ornamental because of its beauty.

Indians used bark tea to rid themselves of worms; they boiled the inner bark to cure mouth sores. The fruit is used to make jelly and preserves. All other plant parts contain toxic substances when used in excess. Propagation is by seed or transplanting. Seed should be stratified in cold for 90-150 days and planted in early spring. (5, 14, 15)

Quercus L., oak—This is a family of large trees which occurs throughout Florida. They are divided into two groups: the white oaks which have leaves with rounded lobes; and the red oaks whose leaves have pointed lobes. The fruit is the acorn, which is an important food to wildlife.

Acorns were also an important nut food of many Indian tribes. Many acorns in the white oak group are edible raw. The other acorns are bitter because of their tannin content; this can be removed by leaching. The acorns were also used to make flour. Swamp chestnut oak, *Quercus michauxii* Nutt., was used extensively in the production of baskets and for timber. Ink was made from the tannin contained in the gallnuts, or abnormal growths caused by insects. Several different colors of dyes are available from the varied oak species.

The oaks are commonly planted for shade trees because of their pleasing form and size. Propagation is from seed or transplanting. Fall seeding is preferable to spring seeding. Several varieties of oaks are available at commercial nurseries. (4, 6, 14, 16)

Rhizophora mangle L., red mangrove—This shrub or tree occurs from Brevard County southward along coastal shorelines. The yellows flowers and brown, cone-shape fruits mature all year long. Numerous arching roots are produced and spread out from the base to anchor the plant against wave action. The trees serve as nesting sites for wildlife.

The dried leaves may be used in making tea and pipe tobacco. The inner parts of the sprouts can be used for emergency food. A tan dye can be obtained from the bark. Red mangrove can be successfully propagated by planting their seed in filter fiber, Spanish moss, or seagrass. Young seedlings survive transplanting on low salinity sites. (11, 14)

Rhus glabra L., smooth sumac—This deciduous shrub or tree occurs throughout Florida. The leaves turn red in the fall and bright red fruits mature in the summer.

Indians gathered the fruit to make a drink similar to pink lemonade. Mashed fruit and leaves were applied as a wet dressing to treat poison ivy. The roots were chewed for mouth sores. The leaves were used as mordants in dyeing.

Brown and slate colored dyes are obtained from the bark. Propagation is by seeding or transplanting of seedlings. Seed can be sown in the fall or spring after pretreatment with sulfuric acid or hot water to soften the seedcoats. (6, 9, 14, 16)

Sabal palmetto (Walt.) Lodd, cabbage palm—This is Florida's state tree. It occurs throughout the state except in the far western section and some Keys. It grows to 90 feet in height and has fanlike leaves two to seven feet long. The white flowers are small and the fruit is black. Indians used the leaves for roofs of their homes and the trunks for supports. They were also used in religious ceremonies during Easter. The palmetto cores can be cooked and eaten like cabbage.

Propagation is by seed planted soon after collection. The seed should not be permitted to dry before planting. The trees are easily transplanted and generally available commercially. (1, 14, 16)

Salix spp. L., willow--This small, deciduous tree occurs throughout Florida. The leaves are narrow and two to five inches long. Greenish flowers mature in spring. The branches were used to make baskets.

Indians used the roots to treat nosebleeds, headaches, and dysentery. A solution from the leaves and twigs was used to remove dandruff. The wood is used in boxes, crates, furniture, artificial limbs, and fine grades of charcoal. Propagation is by planting finger-sized hardwood cuttings or seed. Seed must be sown immediately after collection. (12, 16)

Sambucus simpsonii Rehder., elderberry—This deciduous shrub occurs throughout Florida on moist, unshaded soil. It has white, fragrant flowers and purple fruit.

The berries were used for making jelly and wine. They are eaten by birds. When dried, they can be substituted for blueberries in cooking. The flowers can be used to make tea, face cream, and as a seasoning in muffins. Early settlers made pickles from the buds. Indians used the flower tea to treat colic and reduce fevers. A hot poultice of leaves was used to reduce swelling of sprains. Cough syrup was made from the berries. The leaves were used to discourage caterpillars from other plants. Shoots, leaves, bark, and roots are poisonous if taken internally. Uncooked berries produce nausea. The bark yields a black color for dyeing, the leaves a green color, and the berries a blue or purple.

Propagation is from cuttings or seed sown in the fall soon after collection or stratified and sown in the spring. In either case, germination often is not complete until the second spring. (5, 6, 12, 14)

Zanthoxylum clava-herculis L., prickly ash—This aromatic shrub or small tree occurs in coastal dune areas, sandy hammocks, and along fence rows throughout Florida. It is deciduous and has thorny bristles.

The decoated roots were used for treatment of venereal diseases, rheumatism, and nausea. The bark was used for healing wounds. The berries were used for respiratory problems. The seeds are eaten by many birds. The tree is also a good honey plant as the fragrant blooms attract many bees in spring. Propagation is through root cuttings, suckers or fall sowing of untreated seed immediately after collection. (8, 12, 14)

Other Useful Plants—The following native or naturalized plants are recommended for landscaping (1) and also have uses in environmental education: *Castanea alnifolia* var. *floridana* Sarg., Florida chinquapin; *Cinnamomum camphora* Nees. & Eberm., camphor; *Conocarpus erectus* L., button mangrove; *Clusia rosea* Jacq., pitchapple; *Diospyros virginiana* L., common persimmon; *Erythrina herbacea* L., eastern coralbean; *Gordonia lasianthus* (L.) Ellis, loblolly bay; *Hamamelis virginniana* L., witchhazel; *Ilex cassine* L., dahoon; *Ilex opaca* Ait., american holly; *Juniperus silicicola* (Small) Bailey, southern red cedar; *Liriodendron tulipifera* L., yellow popular; *Magnolia grandiflora* L., southern magnolia; *Nyssa ogeche* Bartr., ogeechee lime; *Nyssa sylvatica biflora* Sarg., swamp tupelo; *Ptelea trifoliata* L., common hop tree; *Sassafras albidum* Nees., sassa fras; *Ulmus* L., elm; and *Vaccinium arboreum* Marsh., sparkleberry. The shrubs are: *Callicarpa americana* L., American beautyberry; *Chrysobalanus icaco* L., coco-plum; *Eugenia myrtoides* Poir., spanish stopper; *Serenoa repens* Small, saw palmetto; and *Yucca aloifolia L.,* Spanish bayonet.

Literature Cited

1. Bush, Charles S. and Julia F. Morton. Native trees and plants for Florida landscaping. *Dept. of Agr. and Con. Ser., State of Florida Bull.* 193.
2. Conover, C. A. and E. W. McElwee. 1971. Selected trees for Florida homes. *Florida Coop. Ext. Ser. Bull.* 182.
3. Coon, Nelson. 1969. Using Wayside Plants. Hearthside Press, Inc., New York. NY.
4. Craig, R. M. 1974. Swamp chestnut oak, *Quercus michauxii* Nutt. *Proc. Fla. State Hort. Soc.* 87:555-558.
5. Ellis, Michael D. Poisonous Plants Common To Texas and Gulf Coasts. Poison Control Center, Univ. of Texas Medical Branch, Galveston, TX.
6. Gibbons, Euell. 1968. Stalking the Wild Asparagus. David McKay Co., Inc., New York, NY.
7. Graetz, Karl E. 1973. Seaside plants for the Carolinas. *Univ. North Carolina Sea Grant Publication* UNC-SG-73-06.
8. Johnson, Dr. C. H. 1967. Important Medicinal Plants of Florida. *Dept. of Agr. and Cons. Ser., State of Florida.*
9. Kramer, Jack. 1972. Natural Dye Plants and Processes. Charles Scribners' Sons, New York, NY.
10. Kurz, Herman, Robert K. Godfrey, and Kenneth E. Wagner. 1962. Trees of Northern Florida. Univ. of Fla. Press, Gainesville, FL.
11. Morton, Julia F. 1962. Wild Plants for Survival in South Florida. Hurricane House, Miami, FL.
12. Scully, Virginia. 1970. A Treasury of American Indian Herbs. Crown Publishers, Inc., New York, NY.
13. *U. S. Dept. of Agr.* 1953. Check List of Native and Naturalized Trees of the U. S. Handbook No. 41.
14. *U. S. Dept. of Agr., Forest Service.* 1974. Seeds of Woody Plants in the U. S. Handbook No. 450.
15. *U. S. Dept. of Agr., Soil Cons. Ser.* 1975. Environmental Education with Plants. Gainesville, FL.
16. Weiner, Michael A. 1972. Earth Medicines-Earth Foods. Collier-MacMillan Ltd., London.
17. West, Erdman. 1956. The Native Trees of Florida. *Fla. Agr. Exp. Station, Univ. of Florida.* Gainesville, FL.