20 Ethnobotany of Florida's Weedy Vines

Daniel F. Austin
Department of Biological Sciences, Florida Atlantic University, Boca Raton, Florida 33431; daustin@fau.edu

Abstract

The beneficial uses of exotic plants are often obscured by their potential, as exotics, to displace native plants communities. Within Florida, 29 previously cultivated exotics are listed amongst the 125 exotics found in the Florida Exotic Pest Plant Council's (FLEPPC) "1997 List of Florida's Most Invasive Species." These displaced cultivars offer us insight into how these exotics functioned as natives in the communities from which they came.

Introduction

The Florida Exotic Pest Plant Council's (FLEPPC) "1997 List of Florida's Most Invasive Species" (Florida Exotic Pest Plant Council 1997) includes 29 species of climbers (also called vines, twiners, creepers, lianas, and other names; see Austin 1994). Humans have introduced into Florida dozens of species with this life-strategy. Many species have escaped cultivation (see Austin 1998a) and these 29 are considered the worst offenders.

Gordon and Thomas (1997) and Austin (1998a) listed some of the reasons that exotic species may have been introduced into the United States. Both papers indicate that about 72% of the climbers were brought here as ornamentals. There are, however, numerous other reasons for having these plants nearby. Those reasons are known to people in their homelands and usually are not imported with them. Indeed, 28 of these climbers have medicinal uses in their respective homelands, and all have bioactive chemicals.

We usually examine only the recent causes plants are found near people, for ornament or foods. However, the following species illustrate the history of how hu-

mans came to cultivate plants near their homes. First they are used as foods or medicines and become ornamental only after these other important aspects of their roles as camp-followers.

Florida's Weedy Vines

No attempt has been made to include exhaustive lists of names, uses, or chemistry. Instead, names are mostly confined to examples from the region of nativity, while uses span the range of the species. Chemicals are confined to compounds linked with uses.

Rosary pea (*Abrus precatorius* L.; Fabaceae). Native from Africa to Japan, these vines occur nearly throughout the peninsula (Wunderlin 1982; Wunderlin et al. 1996). This vine was first offered for sale by Royal Palm Nurseries in 1887-1888 (R. Pemberton, pers. comm., 1997). Simpson (1916) commented that, "when once established on a place, it spreads rapidly by means of its seeds." Birds spread the red and black seeds.

Common Names. India: *gaungchi, rati;* Africa: *mongaluchi;* Japan: *tô-azuki, adahan.*

Uses. Leaves and roots as sweetener, masticatory, and remedy for hoarseness, coughs, colds, diarrhea; seeds medicinal; necklaces, rosaries, and rattles; aphrodisiac (Burkill 1966; Cribb and Cribb 1981; Morton 1981; Lampe and McCann 1985).

Chemicals. Abrin (a toxalbumin), abric acid (a glycoside), abrine, abralin (Perkins and Payne 1978; Lampe and McCann 1985); 0.005 g seed lethal to humans. Glycyrrhizin, the active principle of liquorice also present (Cribb and Cribb 1981).

Coral vine (*Antigonon leptopus* Hook. & Arn.; Polygonaceae). Native to tropical America, this herbaceous twiner has been in Florida since before 1916 (Simpson 1916) and according to Gordon and Thomas (1997), before 1924.

Common names. Americas: *amor enredado, coralillo rosado, cuamecate;* Japan: *nitobe-kazura.*

Uses. Tubers and flowers cooked and eaten; nectar source of honey. Tubers used against diarrhea (Burkill 1966; Morton 1981).

Chemicals. Starches, sugars (Morton 1981).

Calico flower (*Aristolochia littoralis* Parodi; Aristolochiaceae). This South American species, formally called *A. elegans* Mast., is found in several central Florida counties, from Alachua to Highlands (Wunderlin et al. 1996). *Aristolochia* was offered for sale by Royal Palm Nurseries in 1893-1894 (R. Pemberton, pers. comm., 1997).

Common names. Americas: birthwort, snakeroot.

Uses. Roots as snakebite and scorpion sting remedy; leaves and roots are tonic, antiseptic, abortifacient, antidiarrheal, and antirheumatic (Burkill 1966; Cribb and Cribb 1981; Morton 1981; Lampe and McCann 1985).

Chemicals. Alkaloid aristolochine in roots and seeds (Perkins and Payne 1978).

Lather leaf (*Colubrina asiatica* (L.) Brongn.; Rhamnaceae). Native to southeastern Asia, this scrambling shrub was first reported by Small (1933) as occurring in southern Florida and the Keys. The species later started becoming a pest in Miami-Dade and Monroe counties (Long and Lakela 1971) and spread north to Martin County (Austin 1978).

Common names. Japan: *yaeyama-hama-hatsu-me;* Philippines: *kabatiti.*

Uses. Tonic, febrifuge, root decoction diuretic; medicinal baths; bark as soap (Burkill 1966; Morton 1981).

Chemicals. Saponins, tannin, colubrinin (Morton 1981).

Madagascar rubber vine (*Cryptostegia madagascariensis* Decne.; Asclepiadaceae). This native of Madagascar was introduced some time before 1933 (Gordon and Thomas 1997). This is perhaps what Simpson (1916) and (Fairchild 1947) mentioned.

Common names. *Caoutchouc.*

Uses. Weak leaf decoction for stomachache; latex removes calluses, used against eczema and athlete's foot (Burkill 1966; Morton 1981).

Chemicals. Cardiac glycosides, carcinostatic steroids (Perkins and Payne 1978).

Air potato, winged yam (*Dioscorea bulbifera* L., *D. alata* L.; Dioscoreaceae). These vines are native in southeastern Asia and Africa. *Dioscorea bulbifera* was sent by the U.S. Department of Agriculture (USDA) to Florida horticulturist Henry Nehrling in 1905 (Morton 1976). *Dioscorea alata* was offered for sale by Royal Palm Nurseries in 1897 (R. Pemberton, pers. comm., 1997).

Common names. Japan: *diajo, kayamu, kashû-imo, niga-kashû;* Africa: *ndiga, idiya;* Papua New Guinea: *hiav hetar, mahaniv;* Philippines: *ubi-ubihan.*

Uses. Tubers edible; leaves as poultice on pimples and tumors; in baths for skin irritations and stings; sudorific, febrifuge and digestive; considered contraceptive in Australia (Burkill 1966; Cribb and Cribb 1981; Morton 1981; Petir et al. 1997).

Chemicals. Starch, sterols, glycosides (Perkins and Payne 1978).

Pothos (*Epipremnum pinnatum* (L.) Engl.; Araceae). A native of the Solomon Islands, this plant was already in cultivation by the 1940s (Bailey 1949), although the USDA listed it as introduced in the 1970s (Gordon and Thomas 1997).

Common names. Japan: *habu-kazura, pabu-kattza;* Papua New Guinea: *uriv apeparuk kokarev.*

Uses. People and cattle eat young leaves, vermifuge in horses; roots with betel and lime to prevent caries; heated sap from stem used to treat sores and cuts; roots in basketry (Burkill 1966; Morton 1981; Lampe and McCann 1985; Petir et al. 1997).

Chemicals. Oxalic acid crystals (Lampe and McCann 1985).

Hiptage (*Hiptage benghalensis* (L.) Kurz; Malpighiaceae). This native of India was first reported in the wild by Roger Hammer and John Popenoe in 1990 in Secret Woods Nature Center, Ft. Lauderdale. It was later found escaping at Fairchild Tropical Garden, Miami (T. Hendrickson, pers. comm., 1992).

Common names. India: *madmalti, kampti, madhavi, ati muktamu;* Japan: *usuba-saru-no-o.*

Uses. Leaves insecticidal; used against cutaneous diseases, rheumatism, and asthma (Burkill 1966).

Chemicals. Glycoside hiptagin, yields HCN (Burkill 1966).

Water spinach (*Ipomoea aquatica* Forssk.; Convolvulaceae). The species has a long history in Asia, beginning with the Chin Dynasty (290-307 A.D.) in China (Burkill 1966). *Ipomoea* was proposed long ago as a commercial food crop in Florida (Ochse 1951; Ng 1954; Edie and Ho 1969). This commonly eaten food plant from Asia was introduced into Florida before the 1950s (Gordon and Thomas 1997).

Common names. China: *ong-tsai, kang kung;* Japan: *yo-sai, un-sai;* India: *kalmi-sag, kalambi*, *water convolvulus;* Malaysis: *kangkong.*

Uses. Leaves eaten as potherb; tonic, somewhat laxative (Roi 1955; Burkill 1966; Morton 1981).

Chemicals. Protein (Snyder et al. 1981), minerals, vitamins B and C (Roi 1955), and salts, e.g., iron.

Gold Coast jasmine, jasmine (*Jasminum dichotomum* Vahl, *J. fluminense* Vell., *J. sambac* (L.) Aiton; Oleaceae). These three jasmines are native to tropical Africa and Asia. *Jasminum sambac* was offered for sale by Royal Palm Nurseries in 1887-1888 (R. Pemberton, pers. comm., 1997). David Fairchild and J. M. Dalziel introduced *J. dichotomum* about 1906 (P. I. 73067) from the African Gold Coast (now Ghana). Fairchild and P. H. Dorsett later introduced *J. fluminense* in 1916; it was introduced again in 1931 and 1932 from different sources.

Common names. Africa (S. Leone): *yeloma-kongoleng ma-kutt-a-kutt;* China: *mo li;* Japan: *matsuri-ka;* Malaysia: *melati, melor;* India: *malliika.*

Uses. Flowers give aroma to tea, perfumes; medicinal against headache, eye lotions; leaves for fevers; roots for venereal diseases, fevers, and galactafuge (Burkill 1966).

Chemicals. Volatile oils (Burkill 1966).

Honeysuckle (*Lonicera japonica* Thunb.; Caprifoliaceae). Perhaps the most loved and hated vine in North America, these plants were introduced as ornamentals in 1875. They escaped shortly after introduction and have overrun many plant communities. Honeysuckle is established throughout the Florida Panhandle and south to the Tampa region. Birds spread the fruits.

Common names. Japan: *sui-kazura, nindô;* China: *jin yin hua.*

Uses. Leaves for tea in Africa (Perkins and Payne 1978); vegetative parts for stomach trouble and diarrhea; flowers antifebrile, corrective, and astringent; bark as fiber; used in basketry by the Cherokee (Burkill 1966; Morton 1981).

Chemicals. Saponins, tannins, luteolin, and i-inositol (Morton 1976).

Old World climbing fern (*Lygodium microphyllum* (Cav.) R. Br.; Schizaeaceae). This fern was introduced and sold commercially by Reasoner's Nursery in the late 1800s (R. Pemberton, pers. comm., 1997). Native to Africa, Asia, and Australia (Brock 1988), the climber was first found in the wild near the Palm Beach and Martin County line in Florida in the late 1960s. The expanded range was discussed by Nauman and Austin (1978), and more recently by Stocker et al. (1997).

Common names. Japan: *iriomote-samisen-tsuru, sitiskattza.*

Uses. Astringent, lotions, poultices, skin diseases, measles, and swellings; leaves in mixture against smallpox; sacred ceremonies; contraceptive; spores used against urinary problems; baskets, construction, and attaching spear tips (Burkill 1966; Cribb and Cribb 1981; Morton 1981; Petir et al. 1997).

Chemicals. Flavonoids and triterpene hydrocarbons (Cribb and Cribb 1981).

Cat's claw (*Macfadyena unguis-cati* (L.) A. Gentry; Bignoniaceae). Fairchild (1947) and Morton (1976) recorded that this climber was introduced before 1947. Fairchild was using it as an ornamental and loved its golden flowers. The species is native from the Caribbean to Argentina, where it grows in forests.

Common names. Americas: golden shower, *uña de gato.*

Uses. Fiber (Burkill 1966; Morton 1981).

Chemicals: Quinones, pseudoindicans, and flavonoids (Morton 1981).

Wood rose (*Merremia tuberosa* (L.) Rendle; Convolvulaceae). This tropical American native came under scrutiny after Hurricane Andrew (1992). No one records when it was introduced. Neither Gray (1886) nor Chapman (1897) recorded the species here, but Small (1913) and Simpson (1916) found it a few years later.

Common names. Americas: *aguinaldo rosado, batatilla ventruda xixicamatic, ehtiil San Diego wits, man ch'aah, quiebra cajete,* seven fingers.

Uses. Laxative.

Chemicals. Resins, hygrine alkaloids, calystegines, coumarins umbelliferon, and scopoletin (Austin 1998b).

Sewer vine, skunk vine (*Paederia crudassiana* Prain, *P. foetida* L.; Rubiaceae). These climbers are native in the Indian Himalayas, China, the Philippines, and the Malay Peninsula (Puff 1991). The species was introduced as a fiber crop and used as an ornamental (Pankowski 1992; Hall 1993), but was surely a curiosity also. The binomial for skunk vine refers to the bad smell and is the least vulgar of the names used for the plant.

Common names. China: *ke che teng,* another name means "chicken excrement plant;" Japan: *hekuso-kazura* (flatulent vine); Malay Peninsula: *akar sekentuk* (refers to its fecal smell); India: *so maráji, gandali, hiran-vel, prasárani.*

Uses. Against intestinal problems, flatulence, rheumatism, emetic, poultice, and fibers (Burkill 1966).

Chemicals. Volatile oils, indol, and alkaloids (Burkill 1966).

Stinking passion-flower (*Passiflora foetida* L.; Passifloraceae). Austin (1976) and Morton (1976) independently reported the species in the wild from Palm Beach and Miami-Dade counties. These foci probably resulted from separate introductions.

Common names. Americas: *marigouya, parcha de culebra, marie gouja*, love in a mist; Japan: *kusa-tokei-sô.*

Uses. Tea for sore throats, kidney trouble, asthma, biliousness, and emmenagogue; leaves for dressing of wounds and against itching (Burkill 1966; Cribb and Cribb 1981; Morton 1981).

Chemicals. Alkaloids, phenols, tannins, and cyanogenic compounds (Morton 1981).

Kudzu (*Pueraria montana* (Lour.) Merr.; Fabaceae). Officially, these vines were introduced in 1899 from China and Japan where they are native. Fairchild (1947) brought them into Miami-Dade County in the early 1900s.

Common names. China: *ge gen;* Japan: *kuzu;* India: *birali kund, patal kohnda, dari.*

Uses. Roots edible; used against ulcers and boils; buds sudorific febrifuge and diaphoretic; fibers (Burkill 1966; Morton 1981).

Chemicals. Starch, butyric acid, glutamine, adenine, and asparagine. An isoflavonoid (daidzin) was recently found that decreases alcohol addiction (Keung et al. 1996). (For more information and uses, see the web sites http://www.siu.edu/~ebl/ and http://www.sa.ua.edu/brent/kudzu.htm).

Climbing cassia (*Senna pendula* var. *glabrata* (Vogel) Irwin & Barneby [= *Cassia bicapsularis* misapplied = *C. surattensis* misapplied = *C. coluteoides*]; Fabaceae). We do not know when it was first introduced from tropical America; it was not listed by Chapman (1897) or Small (1913), but was included as *C. bicapsularis* by Small (1953) and Bailey (1949).

Common names. Americas: *hierba hedionda, mezquitillo, pisabed, casse fetide, cafe negro,* black raisin; Japan: *moku-senna.*

Uses. Leaves treat hemorrhoids, and ringworm and other skin diseases (Burkill 1966; Cribb and Cribb 1981; Morton 1981).

Chemicals. Anthraquinones (Perkins and Payne 1978; Lampe and McCann 1985).

Aquatic soda apple (*Solanum tampicense* Dunal; Solanaceae). This species was not listed by the FLEPPC Committee on Invasive Species in 1993 (Gorgon and Thomas 1997), being first included in 1997 (Florida Exotic Pest Plant Council 1997). Fox and Wigginton (1996) recorded the history of invasion of this species, beginning with its first discovery in 1983 at Punta Gorda, Florida. More recently, Fox and Bryson (1998) have provided more details on its impact on Florida wetlands.

Common names. United States: wetland nightshade, aquatic soda apple; Cuba: *ajicón*; Belize: *sosumbra;* El Salvador: *huistomate, huevo de gato.*

Uses. None found, but genus widely used.

Chemicals. Genus noted for solanine-type glycoalkaloids (Perkins and Payne

1978; Morton 1981).

Nephthytis (*Syngonium podophyllum* Schott; Araceae). It is unfortunate that the horticultural trade has taken up the name "nephthytis" and "African evergreen" for this tropical America plant. *Nephthytis* is a distinct African genus. These plants are also called "arrowhead vine." The species is native from Mexico to Panama, and is said to have been introduced in 1979 (Gordon and Thomas 1997).

Common names. Americas: African evergreen, arrowhead vine; Cuba: *malanga trepadora;* Columbia: *airo-kaho* (forest itch); *sunkinia, sunkip* (Peru).

Uses. Latex used to counter bites from the ant *Papaponera* (Schultes and Raffauf 1990). Also used on wounds and to stop bleeding, especially machete cuts, but it causes skin irritation (Vickers and Plowman 1984; Bennett et al. n.d.).

Chemicals. Oxalic acid crystals.

Puncture vine (*Tribulus cistoides* L.; Zygophyllaceae). The story is told that this Old World species was spread around the world during World War II by fruits sticking into airplane tires. Whether or not this is true, the plants were concentrated originally near military bases in southern Florida shortly after the war.

Common names. Africa: *tshehlo, sekanama, matolofiani, isihoho;* Chinese: *ci ji li.*

Uses. Abortive, astringent, used against nose bleed and other blood loss, mouth inflammations, and toothache (Burkill 1966; Cribb and Crib 1981; Morton 1981).

Chemicals. Linolic acid, resins, essential oils, tannin, and glucosides (Roi 1955).

Wedelia (*Wedelia trilobata* (L.) Hitchc.; Asteraceae). This widely used ornamental was introduced some time before 1933 (Gordon and Thomas 1997).

Common names. Americas: *romerillo de playa, herbe soliel, patte à canard, herbe à femme, bouton d'or.*

Uses. Used for abortions; leaves as poultices, tea for coughs and colds; mixed with other herbs to clear placenta after childbirth (Burkill 1966; Morton 1981; Honychurch 1987).

Chemicals. Alkaloids, flavones, wedelo-lactone (Morton 1981).

Chinese wisteria (*Wisteria sinensis* (Sims) Sweet; Fabaceae). Introduced from China, this vine has long been cultivated in the southeastern United States. *Wisteria* was offered for sale by Royal Palm Nurseries in 1887-1888 (R. Pemberton, pers. comm., 1997). Simpson (1916) said that this and other species "do well in the cooler parts of Florida." Before the early 1980s, it was spread through the northern half of the peninsula (Wunderlin 1982).

Common names. Japan: *fuji.*

Uses. Leaves, fruits and seeds poisonous (Burkill 1966; Cribb and Cribb 1981; Morton 1981; Lampe and McCann 1985).

Chemicals. Glycoside wistarin, and a lectin or resin (Perkins and Payne 1978; Lampe and McCann 1985).

Literature Cited

Austin, D. F. 1976. Vegetation of southeastern Florida, I. Pine Jog. *Florida Scientist* 39:230-235.

_____. 1978. Exotic plants and their effects on southeastern Florida. *Environmental Conservation* 5 (1):25-34.

_____. 1994. Creepers, climbers, vines and wines. *The Palmetto* 14(3):6.

_____. 1998a. Invasive exotic climbers in Florida: Biogeography, ecology and problems. *Florida Scientist* 61(2):106-117.

_____. 1998b. Xixicamátic or wood rose (*Merremia tuberosa*, Convolvulaceae): Origins and dispersal. *Economic Botany* 52(4):412-422.

Bailey, L. H. 1949. *Manual of Cultivated Plants.* New York: Macmillan.

Bennett, B.C., M. Baker, and P. Gumez. n.d. Ethnobotany of the Shuar of Amazonian Ecuador. *Advances in Economic Botany.* In press.

Brock, J. 1988. *Top End Native Plants.* Darwin, Australia: [Published by the author].

Burkill, I. H. 1966. *A Dictionary of the Economic Products of the Malay Peninsula.* 2d ed. Kuala Lumpur, Mayaysia: Ministry of Agriculture and Cooperatives.

Chapman, A. W. 1897. *Flora of the Southern United States.* Cambridge, Mass.: Cambridge Botanical Supply.

Cribb, A. B., and J. W. Cribb. 1981. *Wild Medicine in Australia.* Sydney: Collins.

Edie, H. H., and B. W. C. Ho. 1969. *Ipomoea aquatica* as a vegetable crop in Hong Kong. *Economic Botany* 23:32-36.

Fairchild, D. 1947. *The World Grows Round My Door.* New York: Charles Scribner's Sons.

Florida Exotic Pest Plant Council. 1997. Florida Exotic Pest Plant Council's 1997 List of Florida's Most Invasive Species. URL: http://www.fleppc.org/97list.htm.

Fox, A., and A. Wigginton. 1996. Wet and wild aquatic soda apple, the wetland weed from hell. *Florida EPPC Newsletter* 6(4):2-3.

Fox, A., and C. T. Bryson. 1998. Wetland nightshade (*Solanum tampicense*): A threat to wetlands in the United States. *Weed Technology* 12:410-413.

Gordon, D. R., and K. P. Thomas. 1997. Florida's invasion by nonindigenous plants: History, screening, and regulation. In D. Simberloff, D.C. Schmitz, and T.C. Brown (eds.), *Strangers in Paradise.* Wasington, D.C.: Island Press.

Gray, A. 1886. *Synoptic Flora of North America.* New York: Ivison, Blakeman, Taylor & Co.

Hall, D. 1993. *Illustrated Plants of Florida and the Coastal Plain.* Gainesville, Fla.: Maupin House.

Honychurch, P. N. 1987. *Caribbean Wild Plants and their Uses.* London: Macmillan.

Keung, W. M., O. Lazo, L. Kunze, and B. L. Vallee. 1996. Potentiation of the availability of daidzin by an extract of *Radix puerariae. Proceedings of the National Academy of Sciences* 93:4283-4288.

Lampe, K. F., and M. A. McCann. 1985. *AMA Handbook of Poisonous and Injurious Plants.* Chicago: American Medical Association.

Long, R. W., and O. Lakela. 1971. *A Flora of Tropical Florida.* Coral Gables, Fla.: University of Miami Press.

Morton, J. F. 1976. Pestiferous spread of many ornamental and fruit species in South Florida. *Proceedings of the Florida State Horticultural Society* 89:348-353.

_____. 1981. *Atlas of Medicinal Plants of Middle America, Bahamas to Yucatan.* Springfield, Ill.: Charles C. Thomas.

Nauman, C., and D. F. Austin. 1978. Spread of the exotic fern *Lygodium microphyllum* in Florida. *American Fern Journal* 68:65-66.

Ng, C. L. 1954. A proposal to introduce wet-land cultivation of water spinach (in Chinese). T*aiwan Journal of Agricultural Forestry* 8:24-25.

Ochse, J. J. 1951. Two vegetables for south Florida. *Proceedings of the Florida State Horticultural Society* 64:106.

Pankowski, K. 1992. Fast-growing vine at root of park's troubles. *The Orlando Sentinel,* 19 October.

Perkins, K. D., and W. W. Payne. 1978. *Guide to the Poisonous and Irritant Plants of Florida.* Gainesville: Institute of Food and Agricultural Sciences, University of Florida.

Petir, A., D. Materem, P. Yapong, S. Mukarek, M. Okira, and T. Platts-Mills. 1997. *Useful Plants of Salemben Village, Madang Province, Papau New Guinea. Madang, Papua New Guinea.* Publication No. 13. Madang, Papua New Guinea: Christensen Research Institute.

Puff, C., ed. 1991. The genus *Paederia* L. (Rubiaceae–Paederieae): A multidisciplinary study. *Opera Botanica Belgica, Vol.3*.

Roi, J. 1955. *Traité des Plantes Médicinales Chinoises*. Paris.

Schultes, R. E., and R. F. Raffauf. 1990. *The Healing Forest: Medicinal and Toxic Plants of the Northwest Amazonia*. Portland, Ore.: Dioscorides Press.

Simpson, C. T. 1916. *Ornamental Gardening in Florida*. Little River [Miami], Fla.: [Published by the author].

Small, J. K. 1913. *Flora of Miami*. New York: [Published by the author].

_____. 1933. *Manual of the Southeastern Flora*. Chapel Hill: University of North Carolina Press.

Snyder, G. H., J. F. Morton, and W. G. Genung. 1981. Trials of *Ipomoea aquatica*, nutritious vegetable with high protein- and nitrate-extraction potential. *Proceedings of the Florida State Horticultural Society* 94:230-235.

Stocker, R. K., A. Ferriter, D. Thayer, M. Rock, and S. Smith. 1997. Old World climbing fern: Hitting South Florida below the belt. *Wildland Weeds* 1(1):6-10.

Vickers, W.T., and T. Plowman. 1984. Useful plants of the Siona and Secoya Indians of Eastern Ecuador. *Fieldiana Botany* (New Series) 15:1-63.

Wunderlin, R. P. 1982. *Guide to the Vascular Plants of Central Florida*. Tampa: University Presses of Florida.

Wunderlin, R.P., B. F. Hansen, and E. L. Bridges. 1996. *Atlas of Florida Vascular Plants*. CD-ROM.