miles of sand dunes in Brevard County is many years away, and the constant condition of dune erosion seems unending. To restore a natural beach ecosystem that man has selfishly abused, is a goal that Brevard County needs to reach if they are to preserve its most valued natural resource for future generations.

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PESTIFEROUS SPREAD OF MANY ORNAMENTAL AND FRUIT SPECIES IN SOUTH FLORIDA

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Abstract. **The massive invasion of large tracts of South Florida by** Melaleuca quinquenervia **and** Casuarina equisetifolia **from Australia and** Schinus terebinthifolius **from Brazil is an environmental problem now receiving serious attention. There are dozens of other introduced ornamental plants and fruit trees which have been multiplying spontaneously in our area for many years or have recently become conspicuous as weeds on private and public properties—some because of seed distribution by exotic birds new to our fauna. Outstanding examples are** Cestrum diurnum, Bischofia javanica, Washingtonia robusta, Ptychosperma elegans, Murraya paniculata, Eriobotrya japonica, Pouteria campechiana **and** Pithecellobium dulce. **We should try to discourage the planting of some undesirable species and warn of the need to control the spread of others, in order to reduce the maintenance load of cultivated grounds and the threat to undeveloped areas which are being overrun by vigorous alien vegetation.**

Charles Torrey Simpson, commenting on "Weeds and Plant Tramps" in Chapter VIII of his book on *Florida Wild Life* published in 1932, wrote: "We have two classes of weeds in Florida: those which are indigenous and have become weeds since the white man arrived, and the regular globe trotters, plants which make themselves a nuisance wherever they go. In all it is probable that we have over a hundred species of plants that may justly be classed as weeds." (9). He was embracing, along with woody plants, the great diversity of herbaceous weeds unintentionally dispersed in the geographical movement of man, animals and materials. Many new "weeds" have appeared since his day, especially in South Florida which, from the late 19th century, has been a focal point for tropical plant introduction.

The great increase in our naturalized flora is attributable mainly to the escaping from cultivation of trees, shrubs, vines and other plants deliberately imported as ornamentals or as sources of food, timber, fiber or forage. Some of these importations, multiplying and spreading without control, are now dominating our natural areas, crowding out our native vegetation, with resultant detrimental impact on our wildlife and even on the health of humans and livestock.

The exotic plant invasion of South Florida has reached such proportions that it can no longer be ignored. Of prime public concern today are the aggressive cajeput or punk tree, *Melaleuca quinquenervia* S. T. Blake, the Australian pine, *Casuarina equisetifolia* L. var. *incana* Benth., and Brazilian pepper, *Schinus terebinthifolius* Raddi, all proudly introduced by early plantsmen as fine contributions to our horticulture. Of growing concern to those who are aware of its spread is the day-blooming jessamine, *Cestrum diurnum* L., not only because of its "population explosion" but because its fruits have caused grave poisoning in children and its foliage has been linked to swift and fatal calcification in horses and cattle (5).

Other exotic poisonous plants such as the castor bean, *Ricinus communis* L., and the rosary pea, *Abrus precatorius* L., despite their wide recognition as health hazards, have been allowed to spread vigorously. We are in great need of an awakening to the preciousness of our urban and rural outdoor areas and active interest in the creation of noxious plant control regulations. We must begin to roll back the exotic plant invasion, strive to restore wherever possible the purity of our native flora, and be alert to the potential of introduced species not presently of major concern but which have the ability to multiply and disperse themselves with the aid of birds, wind or other agencies. Some large-fruited or large-seeded species, formerly remaining within bounds, are doubtless being distributed by exotic birds—parrots, parakeets and others—which are now flying free and breeding locally.

The following list includes somewhat over 200 species with "weed tendencies", *excluding* numerous herbaceous weeds of accidental introduction, lawn grasses, and vegetables such as the tomato, okra and celery which occasionally volunteer. The species are roughly grouped according to plant type. Comments on each are brief because of space limitation. Most of the species I have personally observed as escapes. Some have been confirmed and a number added by Mr. Curtis Dowling, Florida Bureau of Plant Industry, and others who have had ample reason to be conscious of and/or vexed by excessive plant proliferation. Reference numbers show those which are such long-standing introductions as to appear in Small's *Manual of Southeastern Flora* and Baker's *Florida Wild Flowers.* I have omitted about two dozen which appear in the more recent Long and Lakela *A Flora of Tropical Florida* despite the authors' notations that they either were not found at all, or were found and noted as "possibly" or "doubtfully" naturalized, or found only on abandoned home sites.

By way of grading this alien vegetation, I have marked the most *serious threats* with 3 asterisks; others which are lesser *public nuisances,* with 2 asterisks; those which are important *private nuisances* with 1 asterisk. The rest are spreaders which should be recognized and possibly avoided in order to minimize the labor of maintenance of public and private properties and upgrade the quality of South Florida landscaping which is generally untidy, to say the very least. For one thing, there is widespread, deplorable neglect of foundation shrubbery and hedges which are prime breeding grounds for invasive trees often not extracted when very young and tolerated until and after they become too large for easy removal.

Trees

** *Acacia auriculaeformis* A. Cunn. EARLEAF ACACIA. Australia. Locally spontaneous from seed.

* *Adenanthera pavonina* L. RED SANDALWOOD; CIRCASSIAN BEAN. India; southeast Asia. Escaped (6). ". . . the birds eat and plant the bright seeds . . . it is coming up almost everywhere near where the tree is grown." (9).

*** *Albizia lebbeck* Benth. WOMAN'S TONGUE. Tropical Asia; northern Australia. Spontaneous from seeds in cultivated grounds, hedges, neglected lots and hammocks. (2, 3, 10).

* *Alstonia scholaris* R. Br. DEVIL'S TREE. India. Proliferating from seed at USDA Subtropical Horticulture Research Unit, Miami.

Annona montana Macfad. MOUNTAIN SOURSOP. Tropical America; West Indies. Occasionally escapes locally.

* *Annona squamosa* L. SUGAR APPLE. Tropical America. Locally spontaneous from seed in South Florida and Florida Keys (6, 10).

* *Bauhinia purpurea* L. ORCHID TREE (fall-blooming). Tropical Asia. Occasionally spontaneous from seed.

** *Bauhinia variegata* L. ORCHID TREE (spring-blooming). India. Common as an escape, abundantly invading neglected lots, hedges. Runs wild also in Puerto Rico.

** *Bischofia javanica* Blume. BISHOPWOOD. Tropical Asia, Java and Pacific islands. Introduced by Reasoner. Birds feed on copious fruits and plant seeds in cultivated grounds, hammocks.

* *Brosimum alicastrum* Sw. BREADNUT. Central and South America; West Indies. Locally spontaneous from seeds.

*** *Casuarina equisetifolia* L. var. *incana* Benth. AUSTRALIAN PINE. Southern Asia to Australia. Seeds carried by wind and water. Has formed dense stands on sandbars, sandy and rocky shores; in hammocks, pinelands and Everglades. (3, 6, 10).

** *Casuarina glauca* Sieb. BRAZILIAN OAK; SWAMP OAK. Queensland, Australia. Spreads by suckers from roots, forms dense stands. (6).

*** *Cestrum diurnum* L. DAY-BLOOMING JESSAMINE; DAY JESSAMINE. West Indies. Bird-planted seedlings abundant in hammocks, waste places, along roadsides, fences, and in pastures. Continuous fruiting maximizes potential for widespread proliferation. (6, 10).

Citrus aurantifolia Sw. LIME. Southern Asia. Seedlings found in thickets and hammocks, peninsular Florida and the Keys. (6, 10).

Citrus aurantium L. SOUR ORANGE. Southern Asia. Seedlings found in woods and hammocks, southern Florida and Keys. (3, 6, 10). Introduced by Spaniards. ". . . has been so long naturalized that it is called also 'wild orange' " (3).

Citrus limon Burm. f. LEMON. Southern Asia. Occurs in woods and hammocks, peninsular Florida and Keys. (6, 10).

Citrus medica L. CITRON. Asia. Found in pinelands and hammocks, peninsular Florida and the Keys. (6, 10).

Citrus sinensis Osbeck. SWEET ORANGE. China. Seedlings occur in woods and hammocks, peninsular Florida and Keys. (6, 10).

* *Cocculus laurifolius* DC. LAUREL-LEAVED SNAILSEED. Southern Asia. Does not fruit in South Florida. Suckers spring from roots around tree and along hedges of this species.

Crescentia cujete L. CALABASH TREE. West Indies; tropical America. Seedlings found in coastal hammocks and on the Florida Keys. (6, 10).

** *Dalbergia sissoo* Roxb. SISSOO. India. Naturalized in South Florida (3, 6). Being increasingly used in commercial landscaping.

Delonix regia Raf. ROYAL POINCIANA. Madagascar. Seedlings found in hammocks and pinelands. (6, 10).

* *Diospyros digyna* Jacq. BLACK SAPOTE. Mexico; Central America. Locally spontaneous from seed.

* *Eriobotrya japonica* Lindl. LOQUAT. China; Japan. Locally spontaneous from seed.

* *Eugenia uniflora* L. SURINAM CHERRY. Brazil. Locally spontaneous from seed.

Ficus elastica Roxb. INDIA RUBBER TREE. Tropical Asia. Small reported in pinelands and on roadsides, southern peninsular Florida. Long and Lakela say "doubtfully naturalized". Possibly from discarded trimmings?

** *Flacourtia indica* Merr. (*F. ramontchi* L'Her.) GOVERNOR'S PLUM. Seedlings found in hammocks and disturbed sites on Key Biscayne and elsewhere in South Florida. (6).

* *Hura crepitans* L. SANDBOX TREE. Tropical America. Locally spontaneous from seed. Proliferates excessively at USDA Subtropical Horticulture Research Unit, Miami. (6).

* *Jacaranda mimosaefolia* D. Don (*J. acutifolia* H. & B.) JACARANDA. Brazil. Locally spontaneous from seed. (6).

* *Jatropha curcas* L. PHYSIC NUT. West Indies, tropical America; Old World tropics. Seeds germinate beneath and around tree; also found in nearby disturbed sites. (6).

** *Leucaena leucocephala* De Wit. (*L. glauca* Benth.) LEAD TREE. West Indies; tropical America. Small and Long and Lakela do not indicate that this is an exotic species. Dr. David Fairchild wrote that he introduced seed from Reunion in 1898. Eighteen years later the plant had become a weed along roadsides and in people's yards; spreading fast. (4).

** *Lonchocarpus violaceus* Kunth. (*L. punctatus* HBK). VIOLET LANCEPOD. West Indies. Naturalized on Florida Keys (6). [Recently a dog was violently poisoned by eating seeds of *L. sericeus* HBK.]

* *Malpighia punicifolia* L. BARBADOS CHERRY. Southwestern U. S. to northern South America; West Indies. Seedlings come up beneath tree and far away where seeds are dropped by birds.

* *Mangifera indica* L. MANGO. Southern Asia. Naturalized in hammocks, South Florida and Keys (6). Arises in hedges in cultivated grounds; probably from discarded fruits or seeds.

Manilkara zapota Royen (*Achras zapota* L.). SAPODILLA. Central America; Mexico. Seedlings found in hammocks, old fields, cultivated grounds, Everglade Keys and Florida Keys (3, 6, 10).

*** *Melaleuca quinquenervia* S. T. Blake. CAJEPUT; PUNK TREE. Australia. Extensively naturalized, forming solid stands in Everglades; invading large tracts of low ground along highways. Amazingly, Barrett wrote in 1956: "Naturalized on Big Torch Key and occasionally elsewhere." (3).

** *Melia azedarach* L. CHINABERRY. Asia. Seedlings occur in fields, along fences and roadsides. (6, 10).

Melicoccus bijugatus Jacq. SPANISH LIME; MAMONCILLO. Tropical America. Naturalized on shell mounds and Indian middens in Florida Keys. (3, 6).

Morinda citrifolia L. INDIAN MULBERRY. Southern Asia, East Indies, Australia. Naturalized on Lignum Vitae Key (6).

Moringa oleifera Millsp. HORSERADISH TREE. Southeast Asia. Seedlings found in pinelands, hammocks, fields and on roadsides. (3, 10).

Muntingia calabura L. PANAMA BERRY; CAPULIN. Tropical America. Naturalized in hammocks and pinelands. (6).

* *Murraya koenigii* Spreng. CURRY-LEAF TREE. India, Southeast Asia, Java. Suckers excessively from roots.

Noronhia emarginata Stadtm. MADAGASCAR OLIVE. Madagascar. Locally spontaneous from seed.

Parkinsonia aculeata L. JERUSALEM THORN. Tropical America. Seedlings found in hammocks, on roadsides and stream banks. (3, 6 "possibly", 10).

* *Persea americana* Mill. AVOCADO. Tropical America. Spontaneous beneath and around tree. Seedlings found in hammocks and pinelands, southern peninsular Florida and Keys (6, 10).

Phyllanthus acidus Skeels (*Cicca disticha* L.). OTAHEITE GOOSEBERRY. Tropical Asia and Madagascar. Seedlings found in pinelands and waste places, Everglade Keys and Florida Keys. (3, 6, 10).

** *Pithecellobium dulce* Benth. MANILA TAMARIND; GUAMUCHIL. Mexico, Tropical America. Thorny seedlings spring up freely in vacant lots and in hedges. (6).

* *Pongamia pinnata* Merr. PONGAM. Tropical Asia, Africa, Australia, Polynesia. Locally spontaneous from seed, despite Long and Lakela's "doubtfully".

* *Pouteria campechiana* Baehni. CANISTEL; EGG-FRUIT. Tropical America. Spontaneous from seed in dooryards. Seedlings found in hammocks, southern Florida and the Keys (3, 6, 10).

** *Psidium guajava* Raddi. GUAVA. Tropical America. Spontaneous in dooryards, hammocks and pinelands. Forms thickets in old fields and along roadsides. (3, 6, 10).

Psidium littorale Raddi. CATTLEY GUAVA; STRAWBERRY GUAVA. Brazil. "Often growing wild" (3).

Punica granatum L. POMEGRANATE. Southern Asia. "Old fields, woods and waste grounds" (10). "Sometimes becoming naturalized. Found on Big Pine Key" (3). "Doubtful" (6).

Schefflera actinophylla Harms (*Brassaia actinophylla* Endl.) QUEENSLAND UMBRELLA TREE. Australia. Introduced in 1927 (3). Seeds dropped by birds germinate at base of other trees, sometimes on trunks of palmetto where the tree may grow in the same manner as a strangler fig.

*** *Schinus terebinthifolius* Raddi. BRAZILIAN PEPPER TREE; erroneously called "Florida holly". Brazil. ". . . widely established and spreading in most soil types of peninsular Florida (6)". This tree is a steadily advancing menace in the Keys as well as on the mainland, seedlings springing up in dooryards and hedges, forming jungles along roadsides, in pastures, woods, along canals and fences.

Spondias purpurea L. PURPLE MOMBIN. Tropical America. Naturalized in disturbed sites, on shell mounds (6).

Syzygium jambos Alston. ROSE APPLE. East Indies. Locally spontaneous from seeds. (6, "possibly").

** *Tabebuia pentaphylla* Hemsl. PINK TRUMPET TREE. Tropical America and West Indies. Stray seedlings becoming common as the tree is increasingly planted along streets and in parkways. (6, "may not be well established").

Tamarindus indica L. TAMARIND. East Indies. Seedlings found in hammocks and cultivated grounds, Everglade Keys and Florida Keys (3, 6, 10).

Tecoma stans HBK. (*Stenolobium stans* Seem.) YELLOW ELDER. West Indies; northern South America. I am reluctant to classify this thrilling fall bloomer as a "nuisance". Henry Nehrling was enthusiastic even though, as he said, hundreds of seedlings spring up around the parent plant (7). It forms thickets on neglected land. Small and Long

and Lakela were content to treat it as a native.

Terminalia catappa L. TROPICAL ALMOND. East Indies, Malaya, Madagascar. Seedlings found in pinelands and old fields, southern Florida and the Keys (3, 6, 10).

** *Thevetia peruviana* Schum. LUCKY NUT; YELLOW OLEANDER. Tropical America. Seedlings found in cultivated grounds, waste places, pinelands of southern peninsular Florida and Keys (6, 10). Seeds so toxic should not be allowed to spread.

Vitex agnus-castus L. CHASTE TREE. Southern Europe. Naturalized on roadsides, in hammocks and waste places (6, 10).

Vitex trifolia L. and var. *variegata* Moldenke. INDIAN PRIVET; INDIAN WILD PEPPER. Asia; East Indies; Australia. Naturalized in disturbed sites in South Florida; "especially near coast" (6).

Palms

Cocos nucifera L. COCONUT. Probably native to islands of Indian Ocean. Naturalized in southern Florida and the Keys (6, 10). Not likely distributed by birds (!) as twice suggested by Robert Lewis Taylor in his historical novel, *A Journey to Matecumbe* (McGraw-Hill Book Co., N. Y., 1961). Coconuts sprout readily in fallen fronds and other trash beneath the palms on Key Biscayne and wherever there are similar conditions.

** *Ptychosperma elegans* Blume. SOLITAIRE PALM. Australia. Seedlings are springing up in abundance in hedges and shady dooryards.

** *Washingtonia robusta* H. Wendl. MEXICAN WASHINGTON PALM. Northern Mexico, including Lower California. Seedlings spring up in agricultural fields, vacant lots and in cultivated ground, often close to masonry.

Shrubs

* *Ardisia humilis* Vahl (*A. solanacea* Roxb.). SHOEBUTTON ARDISIA. East Indies. Regenerates vigorously from seed, forming colonies in cultivated ground and in hammocks, especially around sites of old nurseries. (6, 10).

* *Barleria cristata* L. PHILIPPINE VIOLET. India and East Indies. Widely naturalized in southern Florida, often abundant on disturbed sites; especially the white-flowered, sometimes the purple. (6).

Breynia nivosa Small. SNOWBUSH, and var. *roseo-picta,* ROSE SNOWBUSH. South Pacific. Self-multiplying by suckers from creeping rootstocks; will exceed its bounds in cultivated ground. Found by Small in pinelands and waste places (10).

Buddleja lindleyana Fort. (*Adenoplea lindleyana* Small). China. Found in pinelands, cultivated and disturbed sites (6). Coastal plain, Florida to Texas and Georgia (10).

* *Caesalpinia pulcherrima* Swartz (*Poinciana pulcherrima* L.). DWARF POINCIANA. Tropics of Old and New World. Locally spontaneous from seed. (6, 10).

Cajanus cajan Millsp. PIGEON PEA. Old World tropics. Naturalized in pinelands, hammocks, cultivated grounds; southern peninsular Florida and Keys (6, 10).

* *Calliandra haematocephala* Hassk. RED POWERPUFF. Tropical America. Locally spontaneous from seed.

* *Calliandra surinamensis* Benth. PINK POWDERPUFF. Northeastern South America. Locally spontaneous from seed; more prolific than the red powderpuff.

Cassia bicapsularis L. CANDELILLO. Bahamas; West Indies; tropical America; Mexico. Widely naturalized in low ground; an attractive "weed". Long and Lakela treat as native.

*** *Cassia occidentalis* L. COFFEE SENNA. Tropics of Old and New World. Naturalized in pineland, pastures, waste places, cultivated grounds. Toxic to cattle, causing many losses from central Florida to Georgia. Classed as a major pest in Hawaii. (3, 6 "possibly", 10).

Cassia tora Britt. & Rose. SICKLEPOD. Tropical America. Occurs as an escape in pinelands, fields, pastures, waste grounds, and along roadsides. Seeds formerly used as a mordant in dyeing with indigo; might have been introduced with *Indigofera.* (3, 10).

** *Clerodendrum indicum* Kuntze (*C. siphonanthus* R. Br.). TUBEFLOWER. East Indies. Suckers excessively from roots, forms spreading clumps in cultivated grounds, along roadsides, in waste places. (6, 10).

** *Clerodendrum philippinum* Schauer (*C. fragrans* var. *pleniflorum* Schauer). China and Japan. A vigorous spreader, abounding in vacant lots, along roadsides, waste places, in southern Florida and on the Keys. (6, 10).

** *Clerodendrum speciosissimum* Van Geert (*C. fallax* Lindl.) JAVA GLORYBOWER. Indonesia. Spreads extensively by root suckers in cultivated ground; invades disturbed and neglected areas; southern Florida and the Keys. (6).

Codiaeum variegatum var. *pictum* Muell. Arg. "CROTON"; LEAF-CROTON. Malaya. Seedlings spring up abundantly in shady grounds adjacent to parent plants. Long and Lakela doubted that this plant had become naturalized.

Cryptostegia madagascariensis Bojer. MADAGASCAR RUBBER VINE. Africa. Probably this aggressively climbing shrub which Small and Long and Lakela reported as naturalized in hammocks and on shell mounds and along roadsides under the name of *C. grandiflora* R. Br. The latter is rare in Florida but has overrun many of the dry islands of the West Indies.

Hibiscus eetveldeanus Wildem. & Th. Dur. (*H. acetosella* Welw. ex Hieron). REDLEAF HIBISCUS. South Africa. Naturalized in neglected land and along roadsides in southern Florida and on the Keys (6).

Hibiscus rosa-sinensis L. CHINESE HIBISCUS. Asia. Naturalized in fields, waste places and on roadsides of peninsular Florida (6, 10).

Hibiscus sabdariffa L. ROSELLE. Old World tropics. Formerly much planted in Florida. Reseeded itself and sometimes spread excessively. Small found it in pinelands, hammocks and waste places in Everglade Keys and on the Florida Keys.

Indigofera endecaphylla Jacq. CREEPING INDIGO; TRAILING INDIGO. Africa. Introduced as a forage; has run wild in hammocks and along trails (6).

Indigofera hirsuta Harv. HAIRY INDIGO. Africa. Introduced as a cover crop. Has escaped into pastures and wasteland and along roadsides (6).

Indigofera suffruticosa Mill. (*I. anil* L.). WILD INDIGO; AÑIL. Tropical America. Introduced as a dye plant. Naturalized in pinelands, hammocks, cultivated grounds. (3, 6, 10).

Indigofera tinctoria L. INDIGO. Southern Asia. Introduced as a dye plant. Occurs as an escape in pinelands and among scrub oaks (3, 6).

** *Jatropha gossypifolia* L. BELLYACHE BUSH. Tropical America. Seeds toxic. Spontaneous in cultivated ground, along roadsides and other disturbed sites, especially on the Keys. (6, 10).

** *Jatropha multifida* L. CORAL PLANT. Southwestern U. S. to northern South America. Locally spontaneous from seed. Seedlings found in pinelands and Everglade Keys (6, 10). A hazard because of toxic seeds.

* *Malpighia coccigera* L. SINGAPORE HOLLY. West Indies. Locally spontaneous from seed.

Manihot esculenta Crantz. CASSAVA. Brazil. Found as an escape in cultivated grounds, pinelands, Everglade Keys and Florida Keys (6, 10).

* *Murraya paniculata* Jackson. ORANGE JESSAMINE. Southeast Asia, Australia and Pacific islands. Seedlings spring up in abundance throughout dooryards where parent plants are allowed to fruit. Long and Lakela: "doubtfully naturalized".

Pluchea odorata Cass. SHRUBBY FLEABANE. Tropical America. Naturalized in hammocks and waste grounds, southern peninsular Florida and Keys (6, 10).

Plumbago capensis Thunb. PLUMBAGO. Southern Africa. Naturalized in dry soil, in waste places and on roadsides (6, 10).

Rhodomyrtus tomentosa Hassk. DOWNY MYRTLE. Eastern Asia and Australia. An early escape from cultivation, forming extensive thickets near Orlando, Bradenton, Oneco, Bonita Springs, Naples and Estero. (6).

Sesbania grandiflora Pers. SESBAN. East Indies. Seedlings found in hammocks and cultivated grounds, Lower Keys and Key West (6, 10).

Solanum torvum Sw. TURKEY BERRY; PRICKLY SOLANUM. West Indies. Seedlings formerly encountered along roadsides, waste places, swamps (10).

* *Tetrapanax papyriferum* Koch. RICEPAPER PLANT. Formosa and South China. Suckers freely; spreads out of bounds.

Tithonia diversifolia Gray. MEXICAN SUNFLOWER. Mexico. Naturalized in pinelands, along roadsides, cultivated grounds. (6, 10).

* *Triphasia trifolia* P. Wils. LIMEBERRY. Probably southern Asia and East Indies. Spontaneous from seed in cultivated grounds, hammocks and fields (10). Not limited to Key West and Lower Keys as in Long and Lakela.

** *Triumfetta semitriloba* Jacq. BURWEED. South America. Naturalized in cultivated grounds, pinelands, hammocks; peninsular Florida and Keys (2, 6, 10).

*** *Urena lobata* L. CAESAR BUR. East Indies and southern Asia. Naturalized in hammocks, waste places and on roadsides. ". . . of our vilest weeds . . . one of the worst is *Urena lobata,* a mean bur-bearing plant . . . I have seen west of Lake Okeechobee the tails of cattle so covered with these burs that each would fill a bushel basket . . ." (9).

Vines

*** *Abrus precatorius* L. ROSARY PEA; JEQUIRITY BEAN. India. Abundantly naturalized in cultivated and wild areas at least as far north as Stuart. Simpson wrote in 1932: "I was at considerable trouble to get this established in my place as I brought its seeds from Honduras . . . but when they really got ready they went! . . . they have taken full possession of a half acre of young forest and after years of fighting I am compelled to own that they have beaten me." He should have enlisted help for the fatally toxic seeds are an ever-present menace and temptation to young and old. (2, 6 10).

Allamanda cathartica L. YELLOW ALLAMANDA. Brazil. Naturalized in hammocks and on roadsides. (6, 10).

Antigonon leptopus Hook. & Arn. CORAL VINE. Mexico. Widely distributed as an escape, draping neglected lots and climbing trees, growing from seeds and tubers. (6).

Argyreia nervosa Bojer (*A. speciosa* Sweet). WOOLLY MORNING-GLORY. Tropical Asia. Seedlings found in hammocks, Everglades (6, 10).

Asystasia gangetica T. Anders. GANGES PRIMROSE. Southwestern Asia and Africa. Naturalized in cultivated grounds and neglected areas (6).

Boussingaultia leptostachys Moq. (*Anredera leptostachys* Steenis). MADEIRA VINE. Mexico; tropical America. Escaped from cultivation; especially in waste places in Key West (6).

Canavalia gladiata DC. HORSE BEAN. East Indies. Found in waste places and cultivated grounds. (6, 10).

Cardiospermum halicacabum L. BALLOON VINE. Old World tropics. Escaped in waste places and cultivated grounds (2, 6, 10).

Clitoria ternatea L. BUTTERFLY PEA. Moluccas. Occurs as an escape in pinelands and hammocks, Everglade Keys and Florida Keys (2, 6).

** *Colubrina asiatica* Brongn. HOOP WITHE. Coasts of Old World tropics. Aggressive, occupying large areas in and around coastal hammocks, Elliott's Key, Key Biscayne and elsewhere in the Keys and southern Florida (6, 10).

*** *Dioscorea bulbifera* L. AIR POTATO. Old World tropics. Sent by USDA to Henry Nehrling in 1905. After finding that the aerial tubers dropped "and soon formed impenetrable masses", he wrote: "With the exception of the Kudzu Vine I have never seen a more aggressive and dangerous weed in Florida." At one time, his sons collected 8,000 of the aerial tubers which he sold to a New York nurseryman for one cent apiece. (6).

Dolichos lablab L. (*Lablab purpureus* Sweet). HYACINTH BEAN. East Indies. Naturalized in pinelands, hammocks, waste places, southern Florida and Keys. (6, 9, 10).

* *Doxantha unguis-cati* Rehd. CAT'S CLAW. West Indies to Argentina. Dr. David Fairchild found it aggressive at his home, the Kampong, in Coconut Grove (4). It has been a great nuisance at the USDA Subtropical Horticulture Research Unit for many years. (6).

** *Ipomoea tuberosa* L. WOOD ROSE. Tropics of both hemispheres. Spontaneous from seed; quickly covers large areas in fields, on fences, shrouding bushes and trees.

Jasminum dichotomum Vahl. GOLD COAST JASMINE. Gold Coast and Ghana. Springs up from bird-distributed seeds in hammocks, neglected lots and on roadsides (6).

*** *Jasminum fluminense* Vellozo (erroneously *J. azoricum*). BRAZILIAN JASMINE. Brazil. Bird-planted seedlings abound on fences, power poles, invading hedges and various disturbed sites. Has become a major pest. (6).

Jasminum officinale var. *grandiflorum* Bailey (*J. grandiflorum* L.). CATALONIAN JASMINE. Southern Asia. Found as an escape in pinelands, thickets, waste places (10).

Jasminum nitidum Skan. PINWHEEL JASMINE. Admiralty Islands. Found naturalized in hammocks, disturbed sites, southern Florida (6).

Jasminum sambac Ait. ARABIAN JASMINE. India. Spreads by underground stems; invades hammocks and woods. (6, 10).

Luffa cylindrica Roem. SPONGE GOURD. Old World tropics. Naturalized in thickets, waste places, along roadsides; uncommon (6, 10).

*** *Momordica charantia* var. *abbreviata* Ser. BALSAM PEAR. Tropical Asia. "Introduced into Brazil with the slave trade and from there spread rapidly to Middle America" (1). A major pest in *Citrus* groves; grows rampantly throughout all cultivated and neglected areas. Fruit toxic to dogs and children. (3, 6, 10).

Monstera deliciosa Liebm. CERIMAN. Guatemala and Mexico. Climbs and creeps out of bounds; "sometimes running for hundreds of feet". Aerial roots descend to the ground, may be 40 ft. long (9).

*** *Mucuna deeringiana* Merrill. VELVET BEAN. Asia. Rampant in *Citrus* groves; pinelands, hammocks, old fields, shrouding shrubbery and tall trees. (6, 10).

*** *Paederia foetida* L. CHINESE FEVER VINE. Japan and China to Malaysia. Introduced by USDA as a potential fiber plant before 1897. When introduced again in 1916 it was recorded as having already "become a troublesome weed among the bamboos at the Brooksville, Fla., Field Station". Was introduced again from India in 1932 despite the knowledge that "The leaves or any part of the plant when bruised emit a most offensive odor." Does not flower or produce seed here but stems take root and vine shrouds immense areas. Aggressiveness and foul odor have been causes of bitter complaints from residents of a section of Coral Gables near Red Road and North Kendall Drive. (10).

Phaseolus lathyroides L. WILD PEA-BEAN. Tropical America; Old World tropics. Has escaped locally (6). Is a common weed in Hawaii.

Phaseolus vulgaris L. KIDNEY BEAN. Probably South America. Small found as an escape in pinelands and hammocks.

** *Porana paniculata* Roxb. CHRISTMAS VINE. India. Naturalized in South Florida, in disturbed sites (6). Stems root at joints; vine shrouds trees (7).

*** *Pueraria thunbergiana* Benth. KUDZU. Eastern Asia. Has been an abundant and pestiferous weed on fences, roadsides and in woods (10). Much has been eliminated but it still exists, though strangely missed by Long and Lakela.

Pyrostegia ignea Presl. FLAME VINE. Brazil. Naturalized along some roadsides and in hammocks in South Florida (6).

Rhaphidophora aurea Birdsey. HUNTER'S ROBE. Solomon Islands. Creeps and climbs out of bounds.

Senecio confusus Britt. MEXICAN FLAME VINE. Mexico. Naturalized at some sites on the mainland and in the Keys (6).

Solanum seaforthianum Andr. BRAZILIAN NIGHTSHADE. Brazil. Found in hammocks and disturbed sites (6). Seeds distributed by mockingbirds and thrushes (7). ". . . red berries . . . much relished by mocking birds and which sometimes intoxicate them." (8).

Syngonium podophyllum Schott. SYNGONIUM. Southern Mexico to Panama. Has escaped from cultivation in South Florida (6).

Tecomaria capensis Spach. CAPE HONEYSUCKLE. Southern Africa. Vigorous stems climb high and also trail on ground where they take root and spread; plant may soon cover a vacant lot.

Thunbergia alata Bojer. BLACK-EYED CLOCKVINE. Eastern and southern Africa. "These plants seed themselves here." (8). Found as an escape in prairies, on roadsides and waste places (6, 10).

Thunbergia fragrans Roxb. SWEET CLOCKVINE. India. Naturalized in hammocks, waste places, on fences and along roadsides (6, 10).

Cacti and Succulents

** *Agave sisalana* Perrine. SISAL AGAVE. Introduced by Dr. Henry Perrine from Yucatan in 1836. Multiplies by bulbils and colonizes hammocks, pinelands and cultivated grounds (6, 10).

Euphorbia lactea Haw. CANDELABRA CACTUS. East Indies. Found as an escape in hammocks and waste places on the Florida Keys (6, 10). From discarded cuttings?

Hylocereus undatus Britt. & Rose. NIGHT-BLOOMING CEREUS; STRAWBERRY PEAR. Crawls and climbs by aerial roots. Found as an escape in hammocks in southern Florida and the Keys (2, 6, 10).

Kalanchoe crenata Haw. SCALLOPED KALANCHOE. Africa. An escape in hammocks, waste places, on roadsides (10); "not seen recently" (6).

* *Kalanchoe pinnata* Pers. (*Bryophyllum pinnatum* Kurz) LIFE PLANT. Tropics of Old and New World. Spreads profusely in cultivated grounds, waste places, hammocks (6, 10). "Wherever a leaf of this plant is dropped there is sure to spring up a little garden of it, for the succulent foliage sprouts at every crenation. . ." (8).

Opuntia ficus-indica Mill. INDIAN FIG. Origin unknown, widely grown in tropics and subtropics. Found on roadsides, in old fields and waste places (2, 10).

Pedilanthus tithymaloides Poit. SLIPPERFLOWER. Tropical America and West Indies. Found as an escape in hammocks and pinelands; Everglade Keys and Florida Keys (6, 10).

Pereskia aculeata Mill. LEMON VINE. Tropical America. Small reported as an escape in hammocks and thickets in southern Florida. It was still encountered in the Redlands 30 years ago but was not seen by Long and Lakela. May have disappeared.

Sanseverinia thyrsiflora Thunb. BOWSTRING HEMP. South Africa. Naturalized (6). ". . . vigorously growing rootstocks establish this plant around gardens. However, it is frequently met with in localities remote from gardens" (10).

** *Sanseverinia trifasciata* Prain. SNAKEPLANT. Africa and Asia. Has vigorous creeping rootstocks, has run wild in many locations in South Florida. ". . . if turned loose in the open they take possession unless they are grubbed back." (8).

Selenicereus coniflorus Britt. & Rose. CONEFLOWER SNAKE CACTUS. Mexico. Naturalized inland in pinewoods . . . "near the Everglades, west of Halendale, and fence-rows in peninsular Florida." (10).

Selenicereus pteranthus Britt. & Rose. SNAKE CACTUS. Mexico. Naturalized on hammocks or high sand dunes, below Ft. Pierce (2, 10).

Herbaceous Plants

Alpinia speciosa K. Schum. SHELL FLOWER. Eastern Asia. Forms spreading clumps. Aggressive when established (10).

Asparagus officinalis L. ASPARAGUS. Europe. "The occurrence of this esculent outside of vegetable gardens is due mostly to the agency of birds which are fond of eating the fruits" (10). (6).

Asparagus plumosus Baker. ASPARAGUS FERN. South Africa. Naturalized in South Florida, in cultivated grounds and neglected areas (6).

* *Asparagus sprengeri* Regel. SPRENGER ASPARAGUS. South Africa. Fruits are abundant and conspicuous; often found as an escape. (6). A pest in some areas.

Begonia semperflorens Link & Otto. EVERFLOWERING BEGONIA. South America. Naturalized in low ground, South Florida (6).

Belamcanda chinensis DC. BLACKBERRY LILY. China. An early escape from gardens (10).

Callisia fragrans Woods (*Spironema fragrans* Lindl.). BASKET PLANT. Has escaped to hammocks in South Florida (6).

Canna indica L. INDIAN SHOT. Native to tropical America; not

"India, Africa" (6). Has escaped into low grounds from Florida to Texas (10).

** *Carica papaya* L. PAPAYA. Tropical America. Naturalized before 1778 (2). Small-fruited wild papayas abundant in hammocks, pinelands, waste places, South Florida and Keys (2, 3, 6, 10).

Catharanthus roseus G. Don. MADAGASCAR PERIWINKLE. Probably native to tropical America. ". . . has run rampant in gardens and sandy waste places throughout. . ." (8). "This showy plant has taken possession of acres of scrub land in southern peninsular Florida" (10). Common also on Keys (6).

Cleome spinosa Jacq. SPIDERFLOWER. Tropical America; West Indies. Naturalized in disturbed sites, roadsides, hammocks, southern Florida and the Keys (6).

Commelina communis L. DAYFLOWER. Eastern Asia. Naturalized about gardens, on moist banks and in waste grounds (10).

Coriandrum sativum L. CORIANDER. Eurasia. Culinary herb cultivated in South Florida, especially by Chinese gardeners. May be found near fields as an escape. Is naturalized nearly throughout the U.S. (10); not just "Key West" (6).

Cosmos caudatus HBK. WILD COSMOS. Tropical America. Naturalized in cultivated grounds and waste places (10).

*** *Crotalaria incana* L., WOOLLY RATTLEPOD; *C. mucronata* Desv. (*C. striata* DC.), STREAKED RATTLEPOD; *C. retusa* L., LARGE YELLOW RATTLEPOD; *C. spectabilis* Roth, SHOWY RATTLEPOD; all possibly from the Old World Tropics; introduced and formerly planted as cover crops; all naturalized in South Florida and the Keys (2, 6, 10). Toxic seeds have caused losses of poultry and livestock.

* *Gloriosa rothschildiana* O'Brien. ROTHSCHILD GLORYLILY. Uganda. Tubers creep underground, extending and multiplying; may infest an acre of lawn.

Gynura aurantiaca DC. VELVET PLANT. East Indies. Naturalized in pinelands, waste places, along roadsides (10).

Hedychium coronarium Koenig. GINGER LILY. India. Naturalized in moist areas; forms extensive clumps.

Heliconia latispatha Benth. FALSE BIRD OF PARADISE. Tropical America. Suckers profusely; tends to exceed bounds.

Heliconia rostrata Ruiz & Pavon. PLATANILLO. Central America to Peru and Brazil. Suckers profusely; forms extensive patches.

Maranta arundinacea L. ARROWROOT. East Indies. Naturalized in hammocks and moist soil, southern peninsular Florida (10).

* *Mirabilis jalapa* L. FOUR O'CLOCK. Tropical America. Occurs as an escape in disturbed land; on roadsides; in gardens and groves. Difficult to eradicate because of large, tuberous roots. (6, 10).

Pachyrrhizus erosus Urban. JICAMA. Probably southern Mexico. Locally naturalized in South Florida (6).

Pilea microphylla Liebm. ARTILLERY PLANT. Mexico, northern South America, West Indies. Naturalized in moist, shady situations; even small fragments quickly take root. (6, 10).

* *Piper auritum* HBK. MAKULAN. Mexico to Colombia. Spreads extensively. A tall, aggressive weed in various locations in South Florida.

Rhoeo spathacea Stearn. OYSTER PLANT. Mexico; Central America; West Indies. Small reported as naturalized in cultivated grounds and pinelands. Long and Lakela wrote: "has not been found persisting without cultivation", yet it spreads irrepressibly; volunteers far from planting site on rock walls and often on roofs of buildings.

*** *Ricinus communis* L. CASTOR BEAN. Probably Africa. Introduced as an oil crop; has run wild extensively, forming solid stands on roadsides; invades pastures. Toxic to humans and livestock.

Russelia equisetiformis Schl. & Cham. FOUNTAIN PLANT. Mexico and Central America. Spreads by means of creeping rootstocks, forms large patches. "Wherever it is planted it takes possession" (8). Has escaped to roadsides and waste places (6, 10).

Setcreasea purpurea Boom. PURPLE QUEEN. Mexico. Introduced about 1953 and widely planted as a ground cover. Spreads locally, creeps and climbs.

Talinum triangulare Willd. TALINUM. West Indies. Small reported it as naturalized in hammocks, pinelands, waste places. Long and Lakela: "uncommon". I have seen it as a weed in an avocado grove.

Trimeza martinicensis Herb. WALKING IRIS. Jamaica, Lesser Antilles, northern South America. New plantlets formed on flower stalk take root when stalk bends over; spreads locally.

Tropaeolum majus L. NASTURTIUM. South America. Self-seeds freely in favorable locations. An escape around gardens and in waste places (6, 10).

Turnera ulmifolia L. YELLOW ALDER. Tropical America, West Indies, Bahamas. Naturalized in coastal Florida and in the Keys (6).

** *Wedelia trilobata* Hitchc. TRAILING WEDELIA. West Indies, Central and northern South America. Naturalized in pinelands and disturbed sites (6, 10). Overruns vacant lots; common on Key Biscayne.

* *Zebrina pendula* Schnizl. WANDERING JEW. Naturalized in hammocks (10). Useful ground cover but exceeds allotted space.

Large Grasses

Arundo donax L. GIANT REED. Warm regions of Old World. Naturalized in South Florida (6).

Cortaderia selloana Aschers. & Graebn. PAMPAS GRASS. South America. Naturalized in South Florida (6).

Neyraudia reynaudiana Keng. SILK REED. An occasional escape in South Florida (6).

Panicum maximum Jacq. GUINEA GRASS. Africa. Abundantly naturalized, especially along roadsides. (6).

Panicum miliaceum L. BROOMCORN MILLET. Old World. Escaped and occurs in disturbed ground (6).

Pennisetum purpureum Schum. NAPIER GRASS. Africa. Common as an escape in southern Florida (6).

** *Rottboellia exaltata* L. (*Manisuris exaltata* Kuntze). ITCH-GRASS. Tropical Asia. Naturalized in Miami area (6). Hairs on sheaths cause skin irritation.

Saccharum officinarum L. SUGARCANE. Probably from the Far East and East Indies. Has escaped to fields and roadsides (6).

Sorghum halepense Pers. JOHNSON GRASS. Africa. Found on roadsides and in waste places as an escape from cultivation (6).

Ferns

Diplazium esculentum Swartz. VEGETABLE FERN. Eastern Asia and Polynesia. Naturalized in moist woods, Dade and DeSoto Counties (11).

Hypolepis repens Presl. FLAKELET FERN. Tropical America. Found in 1895: Monroe Co.; Okeechobee-Clay; Pinellas-Hernando (11). Now in Dade Co. ". . . spreads by rootstocks, far and wide" (11). Long and Lakela treat as native.

Lygodium japonicum Sw. JAPANESE CLIMBING FERN. Eastern Asia. Naturalized in hammocks, creek banks, roadside ditches since 1932 (6, 11).

Pteris cretica L. var. *albolineata* Hook. Subtropics of Old World. CRETAN BRAKE: WHITE-STRIPED VARIANT. Rare but naturalized in limestone grottoes (6, 11).

Pteris grandifolia L. LONG BRAKE. Tropical America. Found in Dade Co. in 1950 (11).

Pteris tripartita Presl. GIANT BRAKE. Tropical Africa. Naturalized in swamps; southern Florida, Everglade Keys (6). ". . . flourishes for a time, in a few years dies out." (11).

Pteris vittata L. CHINESE BRAKE. Eastern Asia. Invades masonry, rocky woods, pineland, canal banks, hammocks. (6, 11).

Stenochlaena tenuifolia Moore. GIANT VINE FERN. Old World tropics. Has escaped in hammocks from southern Florida to Hillsborough County (6, 11).

Thelypteris torresiana Alston. MARIANA MAIDEN FERN. Mariana Islands. Naturalized on limestone in hammocks, southern Florida (6). Favors moist woods, disturbed ground; has spread over upper Florida since discovery in 1906 (11).

Trismeria trifoliata Diels. SPLIT-PINNA FERN. Tropical America. Found in Dade Co. in 1953; limited spread in moist woods (11).

Aquatic Plants

*** *Eichhornia crassipes* Solms. WATER HYACINTH. South America. A major weed problem in freshwater throughout Florida. Small and Long and Lakela treat as though native.

*** *Hydrilla verticillata* Royle. DWARF ANACHARIS. Eurasia, Africa, Australia. Naturalized in Florida (6). Since introduction in 1960 has spread throughout the freshwaters of the State; is a troublesome pest.

*** *Myriophyllum brasiliense* Camb. BRAZILIAN WATER FEATHER. South America. Cultivated in aquaria; has escaped and become naturalized (6).

Nelumbo nucifera Gaertn. SACRED LOTUS. Southern Asia to Australia. Locally naturalized as an escape from cultivation (6).

Nymphaea mexicana Zucc. BANANA WATER LILY. Mexico. Naturalized as an escape. (6).

I am certain that other species are germinating spontaneously beneath or near parent plants in various special gardens and collections in South Florida and it is my hope that people who have the opportunity to report on them as additions to this list will do so, so that we may achieve a comprehensive inventory of naturalized exotic plants in South Florida. We will thus have advance warning of those which, if commonly distributed, may offer a serious threat to the environment.

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NOTE: Dr. Fairchild blamed himself for introducing the rampantly spreading vine, *Cissus sicyoides* L. (4), and he probably did bring his high-climbing strain from Java as a fiber source, but, as far as we know, this extremely variable, pantropic species was already growing in Florida as a native.

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GRASSES FOR COASTAL DUNE AREAS

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Abstract. **A detailed study of 152 coastal dune sites throughout Florida indicates that several native or naturalized plants can be used for vegetating coastal dunes. Grasses were found to be the most important plants on the dunes. Their growth habits and adaptability to dune conditions make them especially valuable in preventing erosion and for landscaping. Information is given on these grasses such as common and scientific name, growth form, climatic adaptation, methods of propagation and other pertinent facts.**

Over 30 million tourists and residents utilized Florida beaches during 1975. According to Bruce Johnson, Bureau of Coastal Zone Planning, (9) the pressures of population and tourist growth make it imperative that state and local governments plan for additional public beaches and beach access. Ney Landrum, Director of Department of Natural Resources, Division of Recreation and Parks, (10) reported that the 5 most popular state parks played host to slightly over 5 million visitors during the 1975-76 fiscal year. All of these state parks are along coastal beaches.

This demand on coastal dunes and beaches for recreational purposes has already caused serious erosion problems. In 1973, the Department of Natural Resources determined that at least 200 of the 1200 miles of Florida's coastline have serious erosion problems. This erosion is caused by construction, structures that have altered the offshore currents and inadequate vegetative cover on the dunes. It is obvious that these erosion problems will increase unless preventative or corrective measures are intensified.

The problems of coastal dune erosion and its solution through the use of plant materials is recognized by the U. S. Department of Agriculture, Soil Conservation Service (SCS). The SCS Long Range Plant Materials Program for Florida (1) gives the highest priority to the solution of this problem. A field study was recently completed to determine the plant species that are naturally adapted for use in vegetating 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 (2, 3 and 4). Grasses are generally the most important and noticeable plants of Florida's coastal dunes. Their growth habits and ability to adapt to coastal dune conditions make them especially valuable in preventing erosion and for landscaping.

Materials and Methods

Every reasonably accessible coastal dune location in Florida was visited. One hundred fifty-two sites were selected for 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 scrub-zone. Unknown plants were identified by University of Florida Herbarium personnel.

All observations and determinations were made by visual estimation. 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 individual studies were then reviewed to determine the useful grass species in relation to their climatic adaptation, ability to adequately vegetate coastal dunes, and occurrence on specific soil conditions and dune types.

Results and Discussion

Twenty-five grass species were identified. Table 1 contains information on the occurrence and dominance of these grasses. This paper considers in detail only the 12 grasses that occurred on 5% or more of the sites studied.

Two different types of growth form were evident and are the basis for the following plant groups: decumbent and/or spreading by rhizomes or stolons; and bunch.

Decumbent

This group includes the grasses that curve upward from a horizontal or inclined base. They spread by means of rhizomes and/or stolons. Twelve grasses with this growth habit occur on frontal dunes. Table 1 contains information on the occurrence and dominance of these grasses. Nine of these grasses have special significance when considering their use in revegetating coastal dunes.

Seaoats (*Uniola paniculata* L.). Seaoats is the most important and widespread grass on coastal dunes. It occurred on 85% and was dominant on 81% of the sites studied. It occurs throughout Florida on coastal dune sites. The sites where it did not occur were generally those with excessive foot traffic.

The leaves are narrow, pale green and die back close to the ground each winter in northern locations. The seed heads are compressed spikelets borne at the end of stiff stems 3 or more feet in length and mature in the fall. Individual seeds somewhat resemble the common oats of agronomic use. Rhizomes are relatively few in number and almost as coarse as the above ground stems.