

LANDSCAPING FOR OPEN SUNNY SITES IN MIAMI-DADE: USING PINE ROCKLAND UNDERSTORY AND GROUND COVER PLANTS

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Introduction

The purpose of this publication is to review shrubs and groundcovers native to Miami-Dade that are suited to open sunny sites. Ideal for this purpose are those associated with pine rockland which, apart from thriving in full sun, are also adapted to both nutritionally poor soil and drought. In addition to their use in either pine rockland restoration or creating harmonious ‘natural’ landscapes, some of the plants reviewed are also appropriate choices for low maintenance Miami-Dade landscapes in general.

As part of an effort to reduce rising residential demands on available water resources, serious consideration should be given to replacing at least some of the turf grass found in local landscapes with alternative groundcovers. In addition 50% of the plants used for new landscapes in Miami-Dade must be those regarded as ‘low maintenance’. The groundcovers and understory palms and shrubs described below are suitable choices in either of these instances, and should be considered if undertaking a partial renovation to a more [Florida Friendly Landscape](#).

[A previous publication on groundcovers](#) for open sunny sites in Miami-Dade described mainly exotic species, including several exhibiting good tolerance of



Bourreria succulenta Bahama strongback (see Table 1)

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calcareous soils and drought. However some exotic groundcovers pose a potential threat to existing natural plant communities; when landscaping in the vicinity of such areas the use of appropriate native groundcovers is strongly recommended.

Overview of pine rockland in Miami-Dade

Prior to European settlement pine rockland was associated with an area of elevated oolitic limestone (maximum elevation 20'), known as the Miami Rock Ridge, stretching roughly from Big Pine Key (now within Everglades National Park) north and east to present day North Miami Beach. Areas of pine rockland are also found in the lower Florida Keys.

The Miami Rock Ridge is characterized by a highly uneven surface due to the presence of solution holes² and shallower depressions. In its northern extension, these depressions are sand filled. Further south there are more extensive areas of bare limestone; any soil present is a thin covering of mostly dry plant litter and rubble. In some sections principally to the north and west of Homestead are small patches of reddish, sandy to clay/loam based soils (Redlands). In the ridges lower sections bordering wetlands to the south is a covering of highly alkaline marl based soil. To the north of this, thin fingers of slow draining marl dissect the ridge.

As a result of agricultural use, sections of gravelly loam soil are found where the limestone has been rock ploughed, particularly in the area known as the Redland. Further east and north, where extensive urban development has occurred, construction fill/topsoil is found. These differences in soil are reflected in localized variations in the associated flora.



Callicarpa americana beautyberry (See Table 1)

Factors influencing pine rockland vegetation

In contrast to the more nutrient rich, slightly acidic organic soils of hardwood hammocks, pine rockland soils are nutrient poor and slightly to highly alkaline (pH 7.4 – 8.6). Drainage is rapid with very limited moisture

² Solution holes form as acid produced during decomposition of plant matter slowly erodes underlying limestone.

retention. The open tree canopy that characterizes pine rockland is supplied by a single species, the Dade County slash pine (*Pinus elliotii* var. *densa*) which, unlike the species type, is adapted to the nutritionally poor Miami limestone substrate. With only 15 – 25% canopy closure, there is sufficient light for the development of a diverse plant understory. This includes several species of palms, numerous shrubs (see Table 1 for brief selection), as well as grasses, ferns, and low growing perennials/ wildflowers (see Table 2). The make-up of this understory can vary depending on local ‘soil’ conditions as described above: e.g., sandy compared to exposed limestone, or moister more organic soils bordering solution holes or depressions.

More varied and larger species of hardwood trees are more likely at the edge of pine rockland if there is a nearby hardwood hammock. Competing hardwood trees are suppressed in nature by regular fires (historically one every four years) which burn off the understory including sapling hardwoods. The thick bark of South Florida slash pine renders it resistant to fire, except in rare instances where there is sufficient fuel (brush) to allow flames to reach the tree canopy. In addition the early seedling stage of south Florida slash pine is able to re-sprout from the root collar after fire damage.



Hamelia patens firebush (See Table 1)

Rapid control of pine rockland fires permits a more diverse range of hardwood trees to become established. Without regular fires pine rockland is eventually overtaken by hardwood species leading to the development of hardwood rockland hammocks. Compared to pine rockland these form a much more closed canopy creating increased shade, narrower temperature fluctuations, and greater humidity. The heavier leaf litter produces a thin surface layer of soil with a higher content of organic matter. Such conditions are in contrast to those found in neighboring pine rockland, and are reflected in the range

of understory plant species. Fire is obviously not an option for controlling undergrowth in a residential setting, so in maintaining a pine rockland volunteer species of hardwood trees (e.g., mahogany, live oak and gumbo limbo) should be removed as they appear. Shrubby hardwood species are found scattered in pine rockland (e.g., dwarf live oak), and a few of these (see above) can be considered when selecting understory plants.

For further, more detailed information on pine rockland flora and fauna, especially for restoration projects, consult the references at the end of this publication.

Installation and Care: Understory Palms and Shrubs

Before installing shrubs and [palms](#) it is important to realize that irrespective of whether they are native or exotic, all plants require care during installation and diligent attention to after care (see text box on 'Establishment' below right). Even though a plant may be regarded as 'low maintenance' there is still a period during which it needs to be watered on a regular basis to ensure it develops a strong root system.

Installation – A 3 gallon container shrub will become established more rapidly and is easier to install than one of larger size. Planting in late spring as rainy season commences can reduce the need for supplemental water and provide sufficient time to establish before the cooler and drier winter weather. For shrubs/trees that prefer soil with some organic content, incorporate compost (do not exceed 10 – 15%) in the area where the shrub(s) is to be planted. For shrubs adapted to rocky or very sandy soils heavy soils will require amending with *coarse sand/grit*. The planting hole should be at least 3x the width, but no deeper than the rootball, and have sloping sides. Do not cover the top of the rootball with soil. Thinly shave the sides of the rootball (e.g., with a sharp spade) and loosen roots to facilitate growth into the surrounding soil.

Root disturbance of existing Dade County pines should be kept to a minimum by installing small size plants (1g or smaller). In addition do not enrich the soil or apply fertilizer. ***If there are no pine trees*** proceed as shown in the text box. In either instance water in plants until established, providing frequent light applications for the first week then less frequent but deeper for the following 6 months. Late spring at the start of rainy season is the ideal time to install plants. Pine straw makes the most natural mulch, but is of limited availability locally. In

addition it settles more rapidly than other materials (becomes less effective in suppressing weeds) and [has been found to present a much greater fire risk than other commonly used mulches.](#)

Although Florida slash pine is the essence of pine rockland, it is possible to simulate such a plant community in the absence of pine trees using appropriate understory palms and shrubs (see Table 1) plus the groundcovers described below (Table II). This is a preferable option if space is limited; successfully establishing and maintaining a stand of Dade county pine trees in a ¼ acre residential lot is not easy. Use the groundcover plants described below with a few widely spaced under-story shrubs from those listed in Table 1. You could also opt to include two or three of the listed small hardwood trees to provide added vertical interest, or even a larger tree that produces negligible shade (such as wild tamarind).

Establishment – For a 3 gallon shrub, *in the absence of measurable rainfall*, provide 1-2 gallons of water every other day for the first 6 months after installation. Apply water to the top of the rootball either by hand (a watering can or hose with a wand type nozzle) or irrigation system (use drippers or bubblers, avoid lawn sprinklers which waste water). For the first 4-5 weeks it is important to direct water to the top of the rootball rather than the surrounding soil.



Alvaradoa amorphoides flowering ♀

Table 1. Understory small trees³, shrubs/palms associated with pine rocklands; *items listed are those most likely to be available from commercial nurseries⁴ – it may be necessary to go out of area to find a particular plant. Do not remove plants from the wild as many are rare and legally protected.*

<i>SPECIES</i>	<i>SOIL CONDITIONS</i>	<i>FORM</i>
<u>Palms</u>		
<i>Coccothrinax argentata</i> Silver Palm	Full sun; nutrient poor, sandy to rocky, calcareous soils. Drought tolerant	Slow growing fan palm to 15'; undersides of leaflets are silvery – more frequent in Florida Keys.
<i>Thrinax morrisii</i> Key Thatch Palm	Full sun; sandy/rocky calcareous soils, with some organic matter; water in extreme drought	Slow growing fan palm to 15'. Restricted to pine rockland of Fl. Keys.
<i>Thrinax radiata</i> Florida Thatch Palm	Full sun - as for <i>T. morrisii</i> but prefers somewhat moister soils.	Similar to <i>T. morrisii</i> but also found in Dade pine rocklands Fronds lack silvery underside.

³ Range of small trees more varied where pine rockland is in close proximity to hardwood hammock (see text)

⁴ As well as native plant nurseries, visit local native plant society meetings/shows, fares and rambles.

<i>Sabal spp.</i> Dwarf palmetto ⁵	Full sun; nutrient poor sandy soil; drought tolerant.	Virtually trunkless to small palms depending on species.
<i>Serranoa repens</i> Saw Palmetto ^a	Full sun/light shade; sandy to calcareous soils; drought tolerant.	Low growing fan palms that form extensive clumps.
<u>Shrubs and small trees</u>		
<i>Alvaradoa amorphoides</i> Alvaradoa ⁶	Full sun/light shade; sandy or calcareous soils, drought tolerant.	Shrub/ slender, small tree to 25'; leaves imparipinnate ⁷ with small, thin, rounded leaflets; dioecious; flowers ⁸ pale yellow in 4-6" pendent spikes (winter); winged, red-flushed, fruits (samara) each with a single seed.
<i>Annona glabra</i> Pond apple	For permanently wet organic soils only (associated with solution holes).	Low branching small tree to 20' with broad open canopy; inedible fruit.
<i>Ardisia escallonioides</i> Marlberry	Sandy to calcareous soils with some organic content. Limited drought tolerance	Upright shrub to 12' with fragrant flowers. Provide light to moderate shade.
<i>Bourreria cassinifolia</i> Pineland Strongback	Calcareous to sandy soil with some organic content. Drought tolerant	Medium shrub to 8' with fragrant white flowers and orange drupes.
<i>Byrsonima lucida</i> Locustberry	Full sun; calcareous soil preferably with some organic content (must be free draining); drought tolerant	Shrub to 10' with attractive flowers of variable color, white/pink/yellow.

⁵ *Sabal miamiensis* was recorded as being indigenous to Miami-Dade (early 20th Ct.) but has been largely extirpated (almost certainly extinct). Possibly a cross of *Sabal etonia*, found in sand pine scrub of central Florida, and *Sabal minor*, native to peninsular Florida north of Lake Okeechobee and the panhandle. *Sabal palmetto* (cabbage palm) is a much larger palm (>20') found throughout Florida; where it occurs in pine rocklands it is usually dwarfed (<10').

⁶ Endangered, found only in Miami-Dade and restricted to border between pine rockland and rockland hammock. Common in dry limestone forests of southern Mexico/ C. America.

⁷ Pinnate leaf with a single terminal leaflet

⁸ Female flowers lack petals – the ovary, which is borne on a stalk-like receptacle (gynophore), is clearly visible (greenish yellow), more so as it develops into a red tinged fruit (samara). The male inflorescence is thinner, more snake-like; individual flowers have filamentous petals.

<i>Cephalanthus occidentalis</i> Buttonbush	For permanently wet organic soils (found near solution holes). Poor drought tolerance.	Low branching, spreading shrub to 12'; showy white globose flower heads. Semi-deciduous.
<i>Chrysobalanus icaco</i> Cocoplum	Moist sandy/limestone soils with some organic content. Limited drought tolerance.	Spreading shrub to 10-15'; appearance variable ⁹ . Fruit edible.
<i>Citharexylum fruticosum</i> Fiddlewood ¹⁰	Full sun; calcareous or sandy soils, preferably moist.	Small, graceful tree or large shrub; glossy, elliptical leaves and pendent racemes of small, white, fragrant flowers
<i>Conocarpus erectus</i> Buttonwood	Full sun; exposed limestone to sandy soils, but avoid marl.	Usually seen as small, open, low branching tree or shrub.; silver leaf form is not found in pine rockland.
<i>Crossopetalum rhacoma</i> Rhacoma	Wide range of soils including both exposed limestone and sandy soils.	Shrub or small multi-stemmed tree; leathery 1" oval leaves with crenate margins; bright red drupes
<i>Dodonea viscosa</i> Varnish leaf	Prefers sandy soils, but adaptable to any free-draining soil. Highly drought tolerant	Large upright shrub to 12' Leaves appear lacquered; colorful papery seed capsule.
<i>Eugenia axillaris</i> White stopper	Full sun/light shade; sandy or calcareous soils with some organic content; somewhat drought tolerant.	Small tree with pale, whitish bark and aromatic foliage (overpowering to some - plant away from house). Small, white flowers in midsummer are followed by purplish berries.
<i>Exothea paniculata</i> Inkwood	Sandy or calcareous soils with some organic content; somewhat drought tolerant but prefers evenly moist soils.	Evergreen shrub to medium tree; narrow, dense, erect growth habit;. compound leaves - 2-4, shiny, dark green leaflets; small clusters fragrant, white flowers.

⁹ Pineland form has red new leaves and is sold as 'Red Tip'. The cv. 'Horizontal' is a low growing (3-4'), salt tolerant, coastal form more able to withstand drought than 'Red Tip' and better suited to seaside locations.

¹⁰ Leaves very prone to damage from moth larvae

<i>Forestiera segregata</i> Florida swamp privet	Sandy or calcareous soils preferably with some organic content; drought tolerant but more attractive where soil is evenly moist.	Bushy shrub or much-branched tree with multiple trunks; insignificant flowers. Fruit, a black drupe.
<i>Guapira discolor</i> Blolly	Occasionally found in pine rockland; moist calcareous or sandy soils with some organic content; limited drought tolerance.	Small tree or shrub – usually the latter in pine rockland; red drupaceous fruits.
<i>Guettarda scabra</i> Rough velvetseed	Calcareous or sandy soils preferably with organic content, tolerant of all but extended drought.	Small tree/large shrub; leaves scabrous, flowers white jasmine-like, inedible red berries.
<i>Hamelia patens</i> Firebush	A minor component of pine rockland; prefers moist soils with some organic matter.	A potentially large red flowering shrub – growth more compact in full sun; brittle branches; somewhat weedy.
<i>Ilex cassine</i> Dahoon Holly	Sandy, wet to moist, organic soils. Limited drought tolerance	Small tree (≥15'); dioecious, & red berries if pollinated.
<i>Ilex krugiana</i> Krug holly	Calcareous soils preferably with some organic content. Highly tolerant of drought.	Small to medium upright tree with an open canopy; glabrous leaves that rapidly turn black on falling; small, red berries on ♀ trees turning black when fully ripe.
<i>Lantana involucrata</i> White sage	Calcareous or sandy soils preferably with some organic content. Highly drought tolerant.	Erect shrub; leaves scabrous, gray-green, with shallowly toothed margins – sage like smell when bruised. Clusters of fragrant white flowers.
<i>Lyonia fruticosa</i> Coastal plain staggerbush	Sandy soil with some organic matter; avoid bare limestone. Drought tolerant	Small shrub (to 4'); new leaves covered with rusty brown tomentum, restricted to sand filled depressions of northern most extension of limestone ridge.
<i>Mosiera longipes</i> Mangroveberry	Calcareous soils preferably with some organic content; tolerant of all but the most severe drought	Straggly shrub (rarely a small tree); glossy leaves, diminutive white flowers with exserted stamens; fruit a dark purple berry.

<i>Myrcianthes fragrans</i> Simpson stopper	Sandy or calcareous soils, preferably with some organic content. Prefers evenly moist soil but can survive limited drought	Erect, small tree/ shrub; smooth, reddish, flaking bark; small aromatic leaves; white, fuzzy flowers ; bright orange berries.
<i>Myrsine cubana</i> Myrsine	Moist limestone preferably with some organic content. Limited drought tolerance	Erect shrub/small tree (≈12') Leaves crowded in whorls at stem tips; terminal clusters of flowers and black fruits.
<i>Psychotria ligustrifolia</i> ¹¹ Bahama Wild Coffee	Moist limestone soils with some organic content. Limited drought tolerance.	Low shrub (3-4') with shiny leaves, flowers insignificant but attractive red berries.
<i>Randia aculeata</i> White Indigoberry	Fast draining limestone, preferably with some organic content. Good drought tolerance	Very slow growing erect shrub to 6-8' with a narrow crown and spiny horizontal branches. Flowers fragrant.
<i>Rhus copallinum</i> Winged sumac	Limestone to sandy soils. Good drought tolerance.	Fast growing, open shrub/ small tree (to 12'); can root sucker profusely to form extensive thickets ¹² .
<i>Sambucus nigra</i> subsp. <i>canadensis</i> ¹³ Elderberry	Full sun/light shade; wet to moist sandy/organic soils. Limited drought tolerance	Large shrub occasionally found in northern most extension of ridge; compound leaves; clusters of white flowers; dark purple berries edible if cooked.
<i>Sideroxylon salicifolium</i> Willow bustic	Calcareous soils with some organic content, preferably moist but can survive all but prolonged drought	Large shrub/medium tree; flaky grey bark; narrow canopy of shiny, medium green leaves; clusters of white fragrant flowers on mostly on leafless stem sections
<i>Tetrazygia bicolor</i> Florida Clover Ash	Free draining limestone rock soils preferably with some organic content, not well adapted to sandy soil; drought tolerant	A large shrub (usually≈12') Leaves prominently veined, shiny; inflorescence (thyrses) of showy white/yellow flowers.

¹¹ The more widely planted shiny leaved wild coffee (*Psychotria nervosa*) is found as an understory component of hardwood hammocks. It is larger, more adapted to shade, and is somewhat less drought tolerant.

¹² Due to propensity to root sucker use in residential yards is not recommended – more suited to large scale restoration projects of natural vegetation.

¹³ Synonyms : *Sambucus canadensis*, *Sambucus simpsonii* and *S. canadensis* var. *lacinata*

<i>Trema micrantha</i> Florida trema	Sandy or calcareous soils having some organic content. Highly drought tolerant	Erect and symmetrical as a medium size tree, more open and untidy as it matures. Leaves opposite, distichous, dull green, upper surface somewhat scabrous.
<i>Vachellia farnesiana</i> var. <i>pinetorum</i> Pineland acacia	Full sun; nutrient poor sandy to calcareous soils; drought tolerant	Low growing (3-8') spiny shrub with small globular, yellow flowers.

Installation and Care: Groundcover

For present purposes, bearing in mind the nature of pine rockland, groundcover includes low growing shrubs as well as grasses, sedges, ferns, wildflowers and some herbaceous perennials. This is because plants that form the herbaceous layer and function as ground cover are limited in pine rockland to areas where there has been more substantial accumulation of soil compared to bare limestone. In addition herbaceous perennials tend to be shaded out where understory shrubs are found growing close together. This should be borne in mind when setting out groundcover especially wildflowers:



Heliotropium polyphyllum

take into account future shade from any understory shrubs present, and if the ground is sandy (as found at the rock ridge's northern extension) or rocky incorporate some organic matter. As will be seen in Table 2 few annuals are found as groundcover, most of the herbaceous plants are perennial with a few biennials.

In preparing the site for planting [follow procedures described in an earlier publication on non-native groundcovers](#), but with the following caveats in mind. When restoring existing pineland, tree litter should be left in place; restrict preparation to the minimal needed for removal of dead and weak plants as well as all exotic species. Use seed (if appropriate) or plants grown in no more than 1 gallon containers.



Crossopetalum ilicifolium

TABLE 2 Ground cover associated with pine rockland. *Items listed include representative grasses, ferns, wildflowers and low-growing perennials including those most likely to be available from commercial nurseries⁵ – additional sources include native plant society meetings, craft fairs and plant rambles. Do not remove plants from the wild many are rare and legally protected.*

Scientific Name (Common Name)	Cultivation	Comments
GRASSES, SEDGES & FERNS		
<i>Andropogon longiberbis</i> Hairy bluestem	Full sun; sandy or free-draining calcareous soil. Drought tolerant.	Clump forming grass to 4-6'; can become weedy – more appropriate for natural area restoration projects.
<i>Aristida beyrichiana</i> Southern wiregrass	Full sun, free draining sandy soils.	A perennial clumping grass with wiry blades; forms seed heads in summer but seed mostly sterile.
<i>Eragrostis elliottii</i> Elliott's love grass	Full sun to light shade; prefers sandy soil with some organic content; drought tolerant, but favors evenly moist soil.	Low / medium clumping grass with bluish blades and above clouds of light, airy, tan colored flower heads; spreads by seed dispersal.
<i>Muhlenbergia capillaris</i> Hairawn muhlygrass	Full sun; sandy or calcareous soils, preferably moist	Small clumps to 3'; highly ornamental when in bloom with airy, pinkish, purple flowers.

<p><i>Pteridium aquilinum</i> <i>var. caudatum</i></p> <p>Lacy bracken fern</p>	<p>Full sun/light shade; sandy or calcareous soils; drought tolerant.</p>	<p>Rhizomatous, tall fern with compound airy leaves; spreads rapidly so be prepared to ensure it remains within bounds.</p>
<p><i>Pteris bahamensis</i></p> <p>Pineland break fern</p>	<p>Full sun/light shade; calcareous soils with little organic matter; highly drought tolerant.</p>	<p>Forms tidy clumps; as old brown leaves accumulate, entire plant can be severely cut back in early spring to stimulate fresh growth.</p>
<p><i>Rhynchospora floridensis</i></p> <p>Florida white top</p>	<p>Full sun; limestone based soils preferably moist, but will survive drought.</p>	<p>Sedge with wiry tufts of linear to thread-like leaves (to 1'); taller scapes bear dense white flower heads - bracts long, linear and spreading with white base.</p>
<p><i>Schizachyrium scoparium</i></p> <p>Little bluestem</p>	<p>Full sun to part shade; fast draining infertile soils, good drought tolerance but will not withstand flooding.</p>	<p>Grass with attractive bluish-green blades, fluffy white seed heads; best use is for restoration projects.</p>
<p><i>Sorghastrum secundum</i></p> <p>Lopsided Indian grass</p>	<p>Full sun; sandy or calcareous soils; highly drought tolerant.</p>	<p>Clump-forming grass; fairly non-descript leaves; late summer or early fall, striking, 4- to 6-foot, one sided tan flower panicles emerge; cut back after flowering.</p>
<p><i>Sporobolus junceus</i></p> <p>Pineland dropseed</p>	<p>Full sun; calcareous or sandy soils; highly drought tolerant.</p>	<p>Attractive ornamental grass, forms large, hemispherical clumps of thin, wiry, blue-green to silvery green leaves; tall spikes bear numerous, tiny, reddish-colored flowers.</p>
<p><i>Tripasum floridanum</i></p> <p>Florida gamma grass</p>	<p>Full sun to light shade; Calcareous or sandy soils; some drought tolerance; requires evenly moist soils to thrive.</p>	<p>Large clumping grass with broad green blades having prominent often whitish midribs. Forms fountain-like clumps. Distinctive flowers rise above leaves on slender stems in midsummer.</p>
<p>HERBACEOUS PERENNIALS & WILDFLOWERS</p>		
<p><i>Angadenia berteroi</i></p> <p>Pineland golden trumpet</p>	<p>Full sun; free-draining calcareous soil; drought tolerant</p>	<p>Low growing shrubby perennial; small leathery leaves with revolute margins; cream to bright yellow bell shaped flowers with over-lapping petals.</p>
<p><i>Asclepias tuberosa</i></p> <p>Butterflyweed</p>	<p>Full sun; free draining calcareous or sandy soils; drought tolerant</p>	<p>Perennial wildflower with orange summertime flowers; occurs in open pineland; attracts humming birds</p>

<i>Brickellia mosieri</i> Mosier's false bonnet ¹⁴	Full sun, bare limestone, drought tolerant	Erect herbaceous perennial with slender stems and narrow, stiff linear leaves; flower heads (discoïd) white to pale yellow in open clusters.
<i>Centrosema virginianum</i> Spurred butterfly-pea	Full sun; sandy or calcareous soil, preferably with some organic content; drought tolerant.	Herbaceous perennial with trifoliolate leaves and lavender to purplish pea-like flowers; trails over open ground; climbs and can become entangled in nearby shrubs.
<i>Chamaecrista deeringiana</i> Florida partridge pea ¹⁵	Full sun; sandy/calcareous soils, drought tolerant	Perennial with several stems from woody crown, leaves fold when touched; flowers bright yellow with red stamens.
<i>Crotalaria pumila</i> Low rattlebox	Full sun, light shade; free draining sandy/calcareous soil, preferably moist; drought tolerant	Erect, occasionally decumbent with trifoliolate leaves and bright orangey yellow flowers; spreads by seeds (poisonous).
<i>Dychoriste angusta</i> Rockland twinflower	Full sun; sandy or limestone based soils; highly drought tolerant.	Delicate stems bear fine textured leaves and small blue to purple flowers; can spread to cover limited area.
<i>Echites umbellata</i> Devil's potato	Full sun; calcareous or sandy soils preferably with some organic content.	Evergreen, twining vine with dark green, glossy leaves; semi-showy, tubular white flowers having twisted propeller like petals
<i>Heliotropium polyphyllum</i> Pineland heliotrope	Prefers moist calcareous/sandy soils low in organic matter, highly drought tolerant	Decumbent to erect, slowly spreading perennial having thin stems; small yellow flowers in terminal scorpioid inflorescences.
<i>Ipomoea microdactyla</i> Man-in-the-ground	Full sun; calcareous soils	Small twining vine growing from an underground tuber; leaves may be lobed; flowers funnel shaped; petals united (sympetalous), pink to crimson.
<i>Jacquemontia curtisii</i> Pineland cluster vine ¹⁶	Full sun; free-draining calcareous soils	Decumbent occasionally climbing perennial, woody base with trailing stems, flowers five white to pink tinged petals.
<i>Liatris gracilis</i> Slender gayfeather	Full sun; dry-moist, free draining, calcareous or sandy soil; drought tolerant	Clump forming perennial wild- flower with tall narrow spikes of lavender flowers

¹⁴ In Florida endangered, restricted to Miami rock ridge.

¹⁵ In South Florida only found in Miami-Dade; *Chamaecrista fasciculata* is an annual more widely found species, differs in having yellow stamens.

¹⁶ The more familiar blue flowered *Jacquemontia pentanthos* (sky blue cluster vine) is found in moister sites at margins of hardwood hammocks.

<i>Melanthera parviflora</i> Pineland black anthers	Full sun; bare limestone/ calcareous soil. Drought tolerant	Low growing, spreading wildflower; lobed dull green leaves; white flower heads; nectar plant for many butterflies.
<i>Ocimum campechianum</i> Wild sweet basil	Full sun to light shade; calcareous soils preferably with some organic content; drought tolerant if not prolonged	Annual wildflower that freely re-seeds; aromatic leaves; mauve to purple flower spikes.
<i>Pityopsis graminifolia</i> Narrowleaf silkgrass	Full sun; sandy/calcareous soils low in organic matter. Highly drought tolerant.	Herbaceous perennial with silvery, silky stems, grass-like basal leaves, small, terminal flowers with yellow ray florets.
<i>Poinsettia pinetorum</i> Pineland poinsettia¹⁷	Full sun; free-draining calcareous soils; drought tolerant	Low-growing herbaceous perennial subulate (narrow, pointed) leaves with a proximal red blotch; insignificant flowers.
<i>Ruellia succulenta</i> Thickleaf wild petunia	Full sun/part shade; free draining sandy/calcareous soil	Low growing herbaceous perennial with year- round blue/pink, petunia-like flowers.
<i>Scutellaria havanensis</i> Havana skullcap	Full sun; calcareous soils with little organic matter; highly drought tolerant.	Perennial wildflower with diminutive white striped blue flowers.
<i>Sisyrinchium angustifolium</i> Narrow leaf blue-eyed grass	Full sun; prefers moist, calcareous/ sandy soils; limited drought tolerance.	Grass-like herbaceous plant in the Iris family with attractive, yellow- centered, bluish-purple flowers.
<i>Solidago odora var. chapmanii</i> Chapman's goldenrod	Full sun; free draining sandy/ calcareous soils, highly drought tolerant.	Erect perennial with slender stems summer/fall spikes of brilliant yellow flowers, deadhead in winter; may need to control suckers.
<i>Stenaria nigricans var. floridana¹⁸</i> Diamond flower	Full sun; free-draining calcareous soils;	Low growing, clumping, perennial with thin wiry stems; narrow linear leaves; terminal clusters of small white flowers.

¹⁷ Endangered in Florida, not to be confused with the more widespread, weedy, *Poinsettia cyathophora* (painted leaf) which has wider fiddle-shaped to elliptic leaves.

¹⁸ A widely distributed polymorphic species – *S. nigricans* var. *floridana* only found in Miami-Dade and Monroe County.

<i>Stenandrium dulce</i> Pineland pinklet	Full sun to shade; moist sandy to calcareous soils low in organic matter, limited drought tolerance.	Dwarf perennial with a basal rosette of leaves, from which short stems arise bearing small pink flowers; in the absence of competition may eventually spread to form groundcover.
<i>Symphiotrichum adnatum</i> Scale-leaf aster	Full sun – light shade; sandy or calcareous soils low in organic matter.	Sprawling, low growing perennial wildflower with wiry stems and yellow flowers.
WOODY SUB- SHRUBS		
<i>Crossopetalum ilicifolium</i> Quail berry	Calcareous soils with some organic matter. Highly drought tolerant.	Attractive, prostrate, evergreen, shrubby groundcover with small, holly-like, spiny leaves and attractive red berries.
<i>Ernodea littoralis</i> Golden creeper ¹⁹	Calcareous to sandy soils; highly tolerant of drought and salt; found in pineland of Long Pine Key in Everglades otherwise more common in coastal locations; inland requires perfect drainage.	Low growing, semi-woody shrub with square, reddish brown stems; leaves shiny, coriaceous clustered toward leaf tips. Flowers: tubular white to pink with reflexed petals.
<i>Lantana depressa</i> Pineland lantana ²⁰	Calcareous to sandy soils; highly drought tolerant	Low, sprawling, woody shrublet with small, yellow to orange yellow flowers.
<i>Licania michauxii</i> Gopher apple	Full sun; sandy to free draining calcareous soils; salt and drought tolerant.	Low growing shoots with leathery leaves from a subterranean stem; difficult to transplant; propagate from fresh seed.
<i>Pentalinon luteum</i> Wild allamanda	Calcareous/sandy soils; some organic content preferable drought tolerant but thrives more in evenly moist soil.	Scandent shrub, new stems loosely twining; leaves shiny, margins revolute; year-round terminal clusters of showy, bright yellow, funnelform flowers.
<i>Senna mexicana var. chapmanii</i> Bahama senna	Calcareous soils; tolerant of all but the most extended drought	Fast growing, low, sprawling shrub, with bipinnate leaves and terminal clusters of showy yellow flowers.
<i>Vaccinium myrsinites</i> Ground Blueberry ²¹ .	Acid, sandy soils overlying lime stone depressions. Drought tolerant.	Slow growing (to 2') rhizomatous shrub; clusters of white to pink flowers

¹⁹ *Ernodea littoralis* is commonly found in coastal sites of South Florida; the related *E. cookeri* is a severely threatened species found in pineland on Miami's limestone ridge.

²⁰ Most plants offered for sale have hybridized to varying degrees in the wild with the invasive, exotic *L. camara* ; for restoration projects use material of known genotype.

²¹ Found throughout Florida; in sand pine scrub slowly spreads via rhizome to cover extensive areas. Past association with sandy depressions of northern most section of Miami rock ridge .

<i>Zamia integrifolia</i> Florida coontie ²²	Full sun/light shade; sandy or calcareous soil preferably with some organic matter; highly drought tolerant.	Low growing cycad with stiff pinnate leaves from a subterranean stem; separate male and female cone bearing plants; poisonous.
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²² Florida coontie susceptible to chewing damage from atala butterfly, more so when grown en masse; seeds poisonous; *Z. floridana* and *Z. pumila* are both synonyms.

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