

**KEYS TO THE FLORA OF FLORIDA: 23,
OPUNTIA (CACTACEAE)**

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ABSTRACT

Opuntia (Cactaceae) is represented in Florida by 9 species, one of which has 2 varieties. All but one (*O. cochenillifera*) are native. Two species (*O. corallicola*, *O. triacantha*) are rated as endangered, one species (*O. stricta*) as threatened. Nine additional species have been reported for the state, but are believed not to persist outside of cultivation. An amplified key is given to the Florida taxa. *Phytologia* 91(3): 383-393 (December, 2009).

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The genus *Opuntia* (Cactaceae) has many acquaintances but few friends. If the abundant needle-like spines did not inhibit close contact, the innumerable minute glochids served as a reminder that one intimate experience is sufficient. And even for the dedicated botanist, the fleshy pad-like stems invariably lose much of their diagnostic character when prepared for the herbarium. Thus, it is inevitable that only a few resolute students of the prickly pears would determine the species to be recognized and the features by which they are distinguished.

Four authors, in three major publications, have attempted to bring understanding to the Florida cacti. Nathaniel Lord Britton and James Nelson Rose produced an illustrated and descriptive study of the plants throughout the Americas (The Cactaceae. 1920). John Kunkel Small, a colleague and employee of Britton's, brought a close focus with detailed descriptions and keys to the cacti of the Southeast (Jour. N.Y. Bot. Gard. 22: 20-39. 1919; Manual S.E. Flora. 1933). Small

later expanded his floristic treatment by discussion of biogeographic implications (Jour. N.Y. Bot. Gard. 36: 1-11, 25-36. 1935). And Lyman Benson, a lifelong student of the family, duplicated and updated Britton & Rose's pioneer work (Cacti of the United States and Canada. 1982).

More recent studies have added detail in narrower fields: Barry L. Snow (Cactus & Succ. J. 53: 177-182. 1981), a history of the discovery and naming of southeastern cacti; and Daniel F. Austin, David M. Binninger & Donald J. Pinkava (Sida 18: 527-534. 1998), an analysis of the Florida semaphore cactus, *O. corallicola*. A thesis by J. D. Doyle (Univ. of North Carolina. 1990) has addressed the *O. humifusa* complex, though recognizing only a single taxon. Richard P. Wunderlin & Bruce F. Hansen (Guide to the Vascular Plants of Florida. 2003) have given a brief synopsis, closely patterned after Benson, of the Florida species.

The philosophies of Small and Benson, as measured by the numbers of species they recognized, could scarcely be more different. The indefatigable Small (1933) recorded 28 species within the state, while the California-based Benson (1982) found only 10. These differences are partly based on Small's practice of describing in detail and then naming as species each population he found to differ, while Benson treated Small's novelties as minor variations or hybrids unworthy of specific recognition.

But the time spent in the field by these two men was also very different. Small, for three decades, made almost annual trips to Florida, traveling throughout the state and studying its flora, while Benson is not documented as having made more than a single exploratory visit. Often Benson (1982) cited his examination of Small's own specimens (NY) as the basis for his assignment of taxa to hybrid status, not his own study of Florida populations. And Benson often included non-native species in the state, based solely on early Small collections, without himself having found them extant.

During the 1910s and 1920s Small and his friends gathered and cultivated numerous selections of *Opuntia* from throughout the state in the "cactus garden" of the Charles Deering estate, Dade Co. (See Small (1919) for photographs and descriptions made at "Buena Vista.") Small's observations of these plants, under uniform conditions of cultivation, give weight to the conclusions of his published studies.

But neither the detailed records of Small, nor the modern but abbreviated treatment by Benson (or the synopsis by Wunderlin & Hansen), permit a satisfying understanding of these Florida cacti. Perhaps the most disquieting indication to the visiting northern botanist that all is not yet resolved within Florida *Opuntia* is a visit to the quiet "pine islands" of the Ocala National Forest, in the north-central peninsula, where he sees sturdy tree-like cacti, to 1.5 meters or more in height, and is told that they are the same species as the obscure, wholly prostrate *O. humifusa* that he knew in the northern states.

This single observation is a direct introduction to the most intractable problem involving taxonomy of the Florida *Opuntia*. Within the Southeast the complex centered around *O. humifusa* was divided by Small into several species. *Opuntia humifusa* s.s. -- its type was from Kentucky -- is widespread across the northern states, but by Small was found to extend into the Southeast only along the Appalachian highlands. In contrast, on the southeastern and gulf coastal plains and across northern Florida, he recognized one widespread species, *O. pollardii*. (His *O. lata*, endemic to the lime sink region of northern peninsular Florida, appears indistinguishable.) Southward in the peninsula, Small encountered more variability. He found a tall plant, "with a stem 1-2 m. tall or more, becoming 1-2.5 dm. in diameter" (1919), best developed on the sands (now the Ocala National Forest) on the west side of Lake George, Volusia Co.; this he named *O. ammophila*. From the central peninsula southward, Small recognized something intermediate between *O. pollardii* and *O. ammophila*, with stems more diffused, not forming a trunk; he named it *O. austrina*.

Of these four taxa, Benson (1982) recognized three. He gave no consideration to the differences separating the coastal plain plant from the northern plant; he treated both as *O. humifusa*. But within Florida, though he seems to have had little understanding of *O. ammophila* (he limits its height to 30 cm.), he granted it varietal rank under *O. humifusa*. Likewise, separating *O. austrina* by its elongate joints, he accorded it similar varietal rank. (Wunderlin & Hansen (2003) were even less discerning. Under their aggregate *O. humifusa* they assigned 14 names, essentially folding all the variability reported by Small into a single undivided species.)

A modest transplant experiment has been run by the present author. In 2001, plants from a robust colony (Fort Wool, at the mouth of the James River, Eastern Virginia) of undoubted *O. humifusa* s.s. were transplanted to Florida (Alachua Co.) and placed among local plants identified as *O. pollardii*. Competition was avoided by regular weeding. Year by year the northern plants declined, first losing their few spines (the Florida plants were far more spiny), then their dark green coloration, then dying. None flowered nor fruited, nor produced any further joints. The last northern plant disappeared in 2008. The Florida plants prospered, in some years beset by woolly aphids, but flowering and fruiting annually.

The ease with which Benson (and others) has accepted the unity of the northern *O. humifusa* with the appreciably different coastal plain *O. pollardii* may lie in the similarity of the characteristic prostrate habit of *O. humifusa* with the prostrate or scarcely erect posture of young *O. pollardii*. If only vegetative characters are seen, the differences may be overlooked. The spines of *O. humifusa* are few or lacking (less than 1 cm. long) [vs. 2-3 cm. long with *O. pollardii*]. If leaves have not been shed, they are much smaller (2-3 mm. long) [vs. 6-8 mm. long]. Most striking, prostrate but mature plants of *O. humifusa* fruit abundantly, while young prostrate plants of *O. pollardii* never bear fruit. When present, the fruits of *O. humifusa* are significantly smaller (1-1.5 cm. long) [vs. 2-2.5 cm. long].

But even with *Opuntia pollardii*, adequately distinguished, the differences between that species and *O. ammophila* and *O. austrina* remain unclear. Solitary individuals may easily be mistaken one for the other. Indeed, with further study, specific rank may be found unmerited. But for the purposes of the field taxonomist, recognition of these taxa as discrete species seems preferable than to disregard their apparent differences.

All names used for Florida *Opuntia* have been addressed here, usually by assigning those thought to be redundant to the accepted species they most resemble. Clearly, if hybridization is present, such assignments are deceptive in part, for a second parent must also be involved. There is much room for future investigation, where close observation -- or controlled hybridization -- will permit more exact matching of these names with their true allegiances.

One name especially merits further examination. On the Middle Cape of Cape Sable, Monroe County, Small (1919) found a cactus with "finely banded" and "closely spirally twisted" spines; he appropriately named it *O. zebrina*. Benson (1982) has dismissed this as a synonym of *O. stricta* (as did Wunderlin & Hansen, 2003). But George Avery (pers. comm., Mar 1965) reported finding plants that matched Small's description on Big Pine, Boot, and Sugarloaf keys. One is always reluctant to accept species of the Keys as endemic, because of the brief time span the land has been emergent. But here, for simple convenience, *O. zebrina* is merely noted under *O. stricta* var. *dillenii*.

An issue has arisen that may well cast much of the present information regarding *Opuntia* into irrelevance. This is the appearance in Florida of an Argentine phycitine moth (*Cactoblastis cactorum*) whose larvae feed exclusively and voraciously on the larger plants of this genus (D. H. Habeck & F. D. Bennett, Ent. Circ. 333, Fla. Dept. Agric. & Cons. Serv. 1990). *Opuntia stricta*, once a common east coast species, is now greatly reduced, as are other Florida cacti, by the large orange and black larvae who burrow within the succulent pads and stems. Plants on Merritt Island, Brevard Co., seemingly little

afflicted in Feb 2000, were almost entirely destroyed by July 2000. Curiously, the fruits had matured and seemed normal even as the supporting pads were hollowed out by the rapacious larvae.

OPUNTIA Mill. ⁱ

1. Petals orange-yellow to bright red; plants erect, tree-like, much-branched; seeds with bristly hairs on side surfaces.
(subgen. **Consolea**)

2. Spines several per areole, diffusely spreading; petals small (1-1.5 cm. long), appressed to stamens, orange-yellow in bud, soon turning red; flowers ±2 cm. dia. Erect tree-like shrub, to 3 m., with lateral spreading (semaphore-like) joints. Tropical hammocks. Florida Keys (Monroe Co. - Little Torch, formerly Key Largo, Big Pine); very rare (<12 plants in 1994). All year. Endemic. ENDANGERED (State listing). [*Consolea corallicola* Small; *Opuntia spinosissima*, misapplied]
FLORIDA SEMAPHORE CACTUS.

Opuntia corallicola (Small) Werderm. in Backeb.

2. Spines few or none; petals larger (2-2.5 cm. long), erect, bright red; flowers ±3 cm. dia. Erect tree-like shrub, to 2 m. Dooryards, waste areas. South peninsula (north along east coast to Brevard Co. - Merritt Id.); rare. All year. Joints readily detach and become rooted. [*Nopalea cochenillifera* (L.) Salm-Dyck]
COCHINEAL CACTUS.

* **Opuntia cochenillifera** (L.) Mill.

1. Petals yellow; plants erect to decumbent or prostrate, relatively little branched; seeds without bristly hairs. (subgen. **Opuntia**)

3. Spines yellow, at least when young, stout (to 1.5 mm. thick).
4. Joints broad (6-12 cm. broad); mature spines terete at base, yellow until aged. Coastal dunes, shell middens. Robust erect or diffuse shrub, to 2 m. South and central peninsula (north to Nassau, Levy cos., disjunct to panhandle (Wakulla, Walton cos.); formerly abundant. Spring-summer. Threatened (State listing). Once, the abundant fruits were an important food for the Florida natives. In the late 1990s the larvae of a foreign moth destroyed a great majority of this species (as well as other

species of *Opuntia*); only isolated plants now remain.
SHELL-MOUND PRICKLY PEAR, TUNA.

Opuntia stricta (Haw.) Haw.

a. Spines few. [*Opuntia Bentonii* Griffiths; *Opuntia keyensis* Britt. & Small] var. **stricta**

a. Spines abundant, prominent. [*Opuntia atropacensis* Small; *Opuntia Dillenii* (Ker-Gawl.) Haw.; *Opuntia nitens* Small; *Opuntia tenuiflora* Small; *Opuntia tunoidea* Gibbes] *Opuntia zebrina* Small [spines banded], on the lower Keys, may be distinct. var. **dillenii** (Ker-Gawl.) Benson

4. Joints narrow (3-6 cm. broad); mature spines often flattened at base, gray in 2nd year (yellow when young). Low shrub, to 0.8 m. Openings and edges of tropical hammocks. Florida Keys (Monroe Co. - Big Pine, Ramrod, Grassy); rare. All year. [*Opuntia ochrocentra* Small in Britt. & Rose]

Opuntia cubensis Britt. & Rose

3. Spines brown to gray, relatively slender (<1 mm. thick).

5. Joints (=pads or stem segments) readily detaching.

6. Joints elliptic to subcylindric (1.0-1.5 cm. broad); fruit with apex plane or shallowly concave. Prostrate creeping sub-shrub, to 0.1 m. Coastal dunes, dry pinelands. Panhandle coast (east to Jefferson Co.), disjunct to northeast Florida (Nassau to St. Johns cos.), further disjunct to lower gulf coast (Sarasota Co.); infrequent. Summer. The joints famously detach from the plant and adhere (via their retrorsely barbed spines) to innocent passers-by. [*Opuntia Drummondii* Graham; *Opuntia impedita* Small in Britt. & Rose; *Opuntia pisciformis* Small in Britt. & Rose; *Opuntia Tracyi* Britt.]

JOE-JUMPER.

Opuntia pusilla (Haw.) Haw.

6. Joints obovate to suborbicular (3-4 cm. broad); fruit with apex (umbilicus) deeply concave. Prostrate shrub, to 0.2 m. Rocky hammocks. Florida Keys (Monroe Co. - Long, Big Pine); rare. Spring. ENDANGERED (State listing). [*Opuntia abjecta* Small in Britt. & Rose]
KEYS JOE-JUMPER. **Opuntia triacantha** (Willd.) Sweet

5. Joints firmly cohering.

7. Stem stiffly erect, lower trunk subcylindric and unbranched, branched above. Tree-like shrub, to 1.5 m. Dry pinelands, both Longleaf (*P. palustris*) and Sand Pine (*P. clausa*). Central peninsula (Marion, Lake - Ocala N.F.); locally freq. Spring. Endemic. [*Opuntia humifusa* (Raf.) Raf. var. *ammophila* (Small) Benson]
OCALA PRICKLY PEAR. **Opuntia ammophila** Small

7. Stem branched from base, not tree-like.

8. Joints elongate (length 2-3x width); stem sprawling, often ascending on adjacent vegetation. Sprawling or erect shrub, to 1 m. Thickets, brushy dunes, mangrove edges. South peninsula (north to Hillsborough, Brevard cos.); infrequent. Spring-summer. Endemic. [*Opuntia compressa* (Salisb.) Macbr. var. *austrina* (Small) Benson; *Opuntia cumulicola* Small; *Opuntia humifusa* (Raf.) Raf. var. *austrina* (Small) Dress; *Opuntia polycarpa* Small; *Opuntia turgida* Small in Britt. & Rose] A catch-all taxon, very probably including numerous hybrids.
HAMMOCK PRICKLY PEAR. **Opuntia austrina** Small

8. Joints broadly orbicular to obovate (length 1.2-1.8x width); stem prostrate or briefly ascending. Semi-prostrate to spreading shrub, to 0.3 m. Sandy waste areas, roadbanks, dry pastures. Panhandle and north Florida, south to mid-peninsula (Highlands Co.); common. Spring-summer. [*Opuntia lata* Small]
COASTAL PLAIN PRICKLY PEAR.

Opuntia pollardii Britt. & Rose

Excluded names:

Opuntia brasiliensis (Willd.) Haw.

Brasiliopuntia brasiliensis (Willd.) Berger

Distinctive "polelike trees." Reported by Britton & Rose (1919) who noted, "Dr. Small has found this plant established after planting on shell mounds and waste places in southern Florida"; by Small (1919), to "5 m. tall or more," from "woods, eastern peninsular Florida," specifically from "a shell mound south of Daytona," Volusia Co.; and by Long & Lakela (1972). Small's identification of this distinctive non-native species was probably correct, though no specimen was preserved. But the plants, as well as habitat, are long gone. The photos of Britton & Rose were of Cuban plants.

Opuntia eburnispina Small in Britt. & Rose

A Cape Romano, Monroe Co., plant, apparently not re-collected (Britton & Rose, 1923; Small, 1933). Perhaps close to *O. cubensis*. Benson (1982) suggested it to be a hybrid involving *O. humifusa* (= *O. austrina*?) or perhaps *O. stricta*, though the similarities are not apparent.

Opuntia ficus-indica (L.) Mill. Indian Fig

Reported as naturalized by Small (1919; 1933), and by Wunderlin (1998). Widely cultivated as a door-yard novelty and persisting short-term. The fruits are abundant and are often scattered, but seedlings have not been reported, and the pads do not detach readily. No naturalized populations are known.

Opuntia humifusa (Raf.) Raf. Northern Prickly Pear

Opuntia compressa (Salisb.) Macbr.

Opuntia Opuntia (L.) Karst.

Exclusion of this northern species from Florida is dependent upon the judgment that plants of typical *O. humifusa* do not occur within the state, most plants so assigned being the more robust, upright, larger-fruited *O. pollardii*. Dress (1975) pointed out that Salisbury's basionym is superfluous, and that *O. humifusa*, though later, is correct.

Opuntia leucotracha DC. Aaron's-beard Cactus

Reported by Small (1925; 1933) as naturalized near Rio, south of Ft. Pierce, Martin Co., with the suggestion it was introduced by "pioneers during Seminole War times." Benson (1982) confirmed

Small's spm., as collected in 1918. Retained by Wunderlin (1998), without further data. The station has long since been obliterated by development.

Opuntia lindheimeri Engelm.

A western species, perhaps once introduced. Small (1927; 1933) reported it west of Hallandale, Broward Co., "especially about old settlements and homesteads." Not seen by later observers.

Opuntia magnifica Small

Described by Small (1925) from the south end of Amelia Id., Nassau Co. A large plant, to 2 m. in height, with very slender, flexible spines. Small suspected it to be an introduction, but Benson (1982) placed it with *O. stricta*. Not found in recent search.

Opuntia turbinata Small

Described by Small (1933) from Ft. George Id., Duval Co. Benson (1982) indirectly placed it with *O. stricta* var. *dillenii*. But the small, near-globose berries suggest some other alliance. Apparently never recollected.

Opuntia vulgaris Mill.

Opuntia monacantha (Willd.) Haw.

South American; reported by Benson (1982) as introduced in Polk (Crooked Lake, Lake Alfred) and Highlands cos., but only as hybrids with *O. ammophila*. Since *O. vulgaris* itself is unknown in the state, a correct identification (from herbarium materials!) is unlikely.

i. This paper is a continuation of a series begun in 1977. The "amplified key" format employed here is designed to present in compact form the basic morphological framework of a conventional dichotomous key, as well as data on habitat, range, and frequency. Amplified keys are being prepared for all genera of the Florida vascular flora; the present series is restricted to genera where a new combination is required or a special situation merits extended discussion.