

***Coccothrinax* × *angelae*, the First Natural Hybrid of the Genus**

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Coccothrinax, a diverse genus of perhaps more than 50 species of small to medium fan palms primarily from the Caribbean basin, is especially rich in Cuba. Over the last nearly 80 years or so, several workers have investigated *Coccothrinax* in Cuba and elsewhere, including León (1939, 1946), Borhidi (1991), Borhidi and Hernandez (1993), Borhidi and Muñiz (1985), Muñiz (1978), Muñiz and Borhidi (1981, 1982), and Nauman and Sanders (1991a, 1991b), yet none produced a definitive monograph of the genus that resolved the several pressing taxonomic problems on the Island. Indeed, the number of recognized species for the genus ranges from 14 (Henderson et al. 1995) to 53 (Govaerts and Dransfield 2005). For Cuba, Moya and Leiva (2000) listed 37 species and seven subspecies. Later Moya (per. comm. 2014) recognized 54 species (38 from Cuba) and seven subspecies.

Although intergenetic hybridization between *Coccothrinax* and *Thrinax* had been reported (Nauman 1990), hybrids within *Coccothrinax*, which might contribute to the difficulty in

resolving the taxonomy of the genus, have not been recognized until recently when Suárez (2015) formally named and described *Coccothrinax × angelae*, a putative natural

hybrid between *C. crinita* subsp. *brevicrinis* and *C. miraguama* subsp. *roseocarpa* (Fig. 1). The discovery and documentation of this new putative hybrid from central Cuba was made after extensive herbarium and field work and a rigorous review of the literature, a process that began in 1999 and culminated with the naming and describing of the new hybrid in 2015.

Here we provide a review of this putative hybrid, including a description, etymology, a discussion of its distribution and ecology, threatened status, and local uses. This work is part of a larger project we are undertaking that will lead to a monograph of the palms of Cuba.

Description

Commonly known as *guano macho* or *guano barbudo*, *Coccothrinax × angelae* displays nearly no intermediate characters between each putative parent; rather, it shares several characters with either one or the other parent. Table 1 summarizes the differences and similarities among the three taxa. One parent, *C. miraguama* subsp. *roseocarpa* differs in its

smaller habit and leaf blades darker green adaxially and waxier abaxially with more but shorter segments; the two are similar, though, in inflorescence length and fruit size and color. The other parent, *C. crinita* subsp. *brevicrinis*, differs in its much longer leaf base fibers, longer inflorescence and larger, red-purple fruits; the two are similar, though, in their habit and leaves (color, waxiness, quantity and size of segments). *Coccothrinax × angelae* differs from both parents in its rigid, ascending leaf base fibers (Fig. 2). Nonetheless, additional study might show that this hybrid is actually sufficiently distinct to merit species status.

Cultivated plants of *Coccothrinax × angelae* in Cuba have been confused with one of its parents, *C. crinita* subsp. *brevicrinis*. Two plants that G.C. Rowe introduced to the Cienfuegos Botanical Gardens (formerly Atkins Gardens of Harvard University) in December, 1929 from Carso de Buenos Aires, a locality where no *Coccothrinax* now exists, were subsequently identified as *C. crinita* subsp. *brevicrinis*. However, recent studies showed that both these plants, still living in the Garden, are

1. *Coccothrinax × angelae* growing in habitat in southeastern Cienfuegos, Cuba (D. Suárez).



Table 1. Some Distinguishing Characters of the Hybrid *Coccothrinax × angelae* and its Parents.

	<i>C. crinita</i> ssp. <i>brevicrinis</i>	<i>C. × angelae</i>	<i>C. miraguama</i> ssp. <i>roseocarpa</i>
Height (m).	5–8	5–8	4–5
Leaf color.	Light green adaxially, light waxy gray abaxially	Light green adaxially, light waxy gray abaxially	Dark green adaxially, waxy gray abaxially
Leaf segments (number; length cm)	30–32; 60–70	30–32; 60–70	40–42; 40–50
Leaf-base fibers (length cm; diam. mm)	145 cm long, light brown, flexible tip	40 cm long, 2–3 mm diam., light brown, rigid and ascending tip	40 cm long, 0.5–2 mm diam., dark brown, curved tip
Inflorescence (length cm)	145	40	40
Fruit (diam. mm; color)	15–20; red-purple	5–12; pink-purple	5–12; pink-purple

actually the hybrid *C. × angelae*. Also, the National Botanical Gardens of Cuba in Havana has two plants very near the office of the Director that have been identified as *C. crinita* subsp. *brevicrinis* but which are actually *C. × angelae*.

Habit, Stem, and Leaves: *Coccothrinax × angelae* grows to about 8 m tall and, like nearly all members of its genus, has a solitary, cylindrical stem to 8 cm in diameter (Fig. 1). Mature specimens often show vertical cracks in the proximal portion of the stem. Leaves have oblong-obovate bases up to 70 cm long, with the free part up to 40 cm long. They are triangular-obtuse at the apex and have along each margin a network of coarse fibers in two layers. These fibers, to 25 cm long, are rigid and ascending distally. Petioles are up to 155 cm long and 1.4 to 1.8 cm wide. The orbicular blades have 30 to 32 segments of which the central ones, the largest, are 60 to 70 cm long and 4 to 5 cm wide. Segment tips are bifid and rigid to slightly drooping. Blades are light green adaxially and with a coating of white wax and glabrescent ferruginous indumentum abaxially. The hastula is dark brown, triangular, rigid, and up to 1.5 cm long.

Inflorescences and Fruits: The interfoliar inflorescences of *Coccothrinax × angelae* are relatively short, only up to 40 cm long. Downward curved in fruit, they have 4 to 6 first-order branches, each one with 27 to 30

rachillae up to 5 cm long (Fig. 3). The flowers were not seen. Ripe fruits are pink to purple, globose, 5 to 12 mm in diameter. The rounded, dark-brown seeds are 3 to 5 mm in diameter, slightly compressed, 5-lobed, and with ruminant endosperm.

Etymology

The specific epithet honors the late Dra. Ángela T. Leiva Sánchez, who was director of the National Botanical Gardens of Cuba from 1972 until her passing in June, 2014 and who dedicated many years of her life to the study and conservation of Cuban palms.

Distribution and Ecology

Although unrecognized as a hybrid at the time, Borhidi (1991) noted that this taxon (*Coccothrinax × angelae*) was endemic to Casildense in Yaguanabo Valley in south central Cuba. There it occurred on hills and slopes at mostly low elevations, commonly on nutrient-poor calcareous rocks at La Yaba, La Vega, Las Campanillas, Yaguanabo Arriba, and San Juan, all on the Guamuhaia massif in Cumanayagua Municipality, Cienfuegos Province, about 45 km southeast of the city of Cienfuegos.

In habitat *Coccothrinax × angelae* occurs in seasonally dry, rather open, semideciduous forest from 90 to 312 m elevation although one record puts it as low as 8 m elevation.



2. Leaf base fibers of *Coccothrinax × angelae* showing their rigid, ascending nature (D. Suárez).

Companion plants include *Albizia* (*Samanea*) (*ceiba*), *Cordia gerascanthus* (*varía*), *Erythroxylum saman* (*algarrobo*), *Annona squamosa* (*anón*), *havanense* (*jibá*), *Eugenia axillaris* (*guairaje*), *Bursera simaruba* (*almácigo*), *Ceiba pentandra* (*ceiba*), *Gymnanthes lucida* (*yaití*), *Harrisia taylori* (*jijira*),



3. Inflorescences of *Coccothrinax × angelae* showing downward-curved nature and pink-purple fruits (D. Suárez).

Sabal maritima (guano cana), and *Zanthoxylum caribaeum* (bayúa). The exotic, invasive *Dichrostachys cinerea* was observed at all localities.

Both parents are always present with *Coccothrinax × angelae* nearly everywhere it occurs. At one locality, the parent *C. crinita* subsp. *brevicrinis* is currently not present but it once occurred there; unfortunately, human activity recently extirpated it from that locality. This hybrid could possibly affect survival of *C. crinita* subsp. *brevicrinis*, in particular, by reducing its reproductive capability due to genetic erosion through production of hybrid seeds, decreasing population numbers, and increasing spatial competition. Further study is needed to confirm this possibility.

Animals, including several birds and at least two introduced mammals, the wild boar (*Sus scropha*) and deer (*Odocoileus virginianus*), consume fruits of *Coccothrinax × angelae* and help to disseminate the seeds and propagate the hybrid. Indeed, excrement from these animals nearly always contains viable seeds.

Bats (*Chiroptera* spp.) and rodents (*Capromys pilorides* and *Mysateles prehensilis*), eat the external part of the fruit, which also contributes to dissemination of the seeds.

Threatened Status

According to the IUCN threatened species status, *Coccothrinax × angelae* should be considered Critically Endangered (CR) (based on the criteria A2+ 3 abcde; B1+ 2 abc; C1+2 ab; D1+ 2.) because of its limited distribution, extremely fragmented populations, and severe threats from fire and over-harvesting of leaves for handicrafts.

Uses

Local people use *Coccothrinax × angelae* for several purposes. Trunks are used in the construction of crude houses and other structures. Leaf base fibers are used to make brushes for washing and painting, brooms, and for filling pillows and mattresses; they are also fashioned into crude filters to strain fruit pulp and sift flour. Leaves are used to thatch roofs and can be fabricated into unusually strong rope for securing cattle.

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