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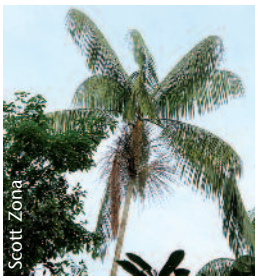
PALM NEWS

If you are a member receiving this journal, **you are also eligible to receive the monthly electronic newsletter** (which supersedes the Supplement to Palms). The newsletter features photos, information about the IPS and its affiliated chapters, updates from the field by palm explorers and even video. Don't miss an issue! As the IPS moves to more electronic platforms (in order to keep its costs and dues low), electronic links with members will become even more important. The future will likely see electronic voting in IPS elections and even electronic registration for Biennials. If you are not receiving the monthly electronic newsletter, please contact the IPS at info@palms.org with you current email address.


Carol Walker

Researchers in Egypt reported that an extract of the leaf tissue of the **date palm (*Phoenix dactylifera*) is effective in precipitating nanoparticles of pure gold** from chemical solutions containing gold ions. Gold nanoparticles are used in drug delivery, electronics, water purification and other industrial applications, but their preparation typically involves expensive chemicals and toxic waste products. Zayed and Eisa (Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy 121: 238–244. 2014) found that an aqueous extract of date palm leaves will extract nanoparticles of gold from solution. The process is said to be inexpensive and environmentally benign.


Scott Zona

Hans ter Steege and a very large number of co-authors published a very important paper in Science (ter Steege et al. Science 342: 325–334. 2013). Using a vast network of sample plots throughout Amazonia they analyzed the structure of Amazonian rain forest and showed how a very small number of tree species dominate the flora. Out of the top 20 most abundant species, seven are palms, and in the top ten, six are palms. Indeed **the most abundant species of all trees in the Amazon is a palm, *Euterpe precatoria***. This re-emphasizes the importance of palms in the Amazon basin but also in global environmental regulation, given the importance of the Amazon to the climate of planet Earth.

Two new precursory installments in the Palms of New Guinea project have just been published describing a total of 15 new species of *Calamus* from the island. Both papers are freely accessible on the web: W.J. Baker & J. Dransfield. 2014. New rattans from New Guinea (*Calamus*, Arecaceae). Phytotaxa 163 (4): 181–215 <http://www.mapress.com/phytotaxa/content/2014/f/pt00163p215.pdf> and Rudi A. Maturbongs, J. Dransfield & W.J. Baker. 2014. *Calamus kebariensis* (Arecaceae) — a new montane rattan from New Guinea. Phytotaxa 163 (4): 235–238 <http://www.mapress.com/phytotaxa/content/2014/f/pt00163p238.pdf>

The project "Cladogenesis and Niche Evolution in Madagascan Forests (MADCLADES)," starting 1 May 2014 at Royal Botanic Gardens, Kew, aims to **elucidate the evolutionary history of the diverse endemic palm flora of Madagascar**. Key questions are, "Why are there so many palm species on Madagascar?" and "Why does most of this diversity stem from the spectacular radiation of a single genus (*Dypsis*)?" The team, led by Wolf L. Eiserhardt and William J. Baker, will reconstruct the phylogeny of Madagascan palms and infer the timing and driving forces of their diversification. The results will also help solving long-standing taxonomic issues and provide a new perspective on the conservation of Madagascan palm diversity.

Beccariophoenix fenestralis

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1. Seedling of *Beccariophoenix fenestralis* showing terminal flabellum with conspicuous windows.

That there may be a third species of *Beccariophoenix* in Madagascar has long been suspected by palm growers. Before the discovery and introduction of the second species, *B. alfredii*, seedlings grown as *B. madagascariensis* presented two very distinctive morphologies, summarized in their informal names as *B. madagascariensis* "form without windows" and *B. madagascariensis* "windowed form" (Fig. 1). These names reflected the absence or presence of broad windowed seedling leaf tips.

In 1986 when a population of the charismatic *Beccariophoenix madagascariensis* was refound at Mantadia, near the type locality in the Andasibe area on the eastern escarpment of Madagascar (Dransfield 1988) it seemed inconceivable that there might be more than one species in the genus. For a couple of years, the Mantadia population was the only extant population known to botanists. Besides the type collection made before 1915, it had also been collected near the Manampanihy River by Humbert in 1948, in the extreme southeast of the island; this collection, although named, had languished in the Paris Herbarium, not properly inserted in the main Madagascar palm herbarium, and so was virtually inaccessible. Apart from a single fruit in the Bailey Hortorium, Cornell University, sent by Mardy Darian to Hal Moore for determination (but not identified), said to have been collected by a forestry officer from Taolagnaro, there were no other herbarium collections.

In 1988 Larry Noblick was shown a single tree of *Beccariophoenix* in cleared lowlands beside the road between the capital, Antananarivo, and the coastal port of Toamasina (Tamatave) just east of Ranomafana Est (Fig. 2). This tree was apparently quite well known to seed collectors. The collection Larry made differed from collections from the Mantadia area in the very short rather than extended peduncle, the inflorescences thus appearing sessile when viewed from ground level. Then a third population of *Beccariophoenix* was discovered by Henk Beentje at Sainte Luce near Taolagnaro (Fort Dauphin), it too with rather short peduncles. Shortly after these herbarium collections were made, seeds of *Beccariophoenix* were collected by commercial seed merchants and amateur growers and exported to palm enthusiasts worldwide. Soon it became apparent that there were two strikingly different seedling types within the genus and that the two types behaved differently in cultivation. It was not immediately obvious from which of the populations of *Beccariophoenix* the seedlings had originated (Dransfield 2002). Eventually we were able to establish that the palm growing near the type locality has seedlings with leaves that have narrow leaflets with the distal-most two or three joined partially but split at the base to produce inconspicuous windows. Seedlings

2. View into the crown of the type plant of *Beccariophoenix fenestralis*, Ranomafana Est, showing the infrafoliar inflorescences with short peduncles (Photo: W.J. Baker).

3. Fallen staminate flowers beneath the type tree, showing pointed petals (Photo: W.J. Baker).

from the single tree by the roadside at Ranomafana Est have broader leaflets with the distal-most (up to 30) joined to form a broad bifid fan or flabellum but partially split near the rachis to give conspicuous windows. It was a seedling of this type that was illustrated in *Palms of Madagascar* (Dransfield & Beentje 1995). Seedlings from the population at Sainte Luce have seedlings similar to those from the type locality.

In 2004 a distinctive population of *Beccariophoenix* was discovered far from the eastern escarpment humid forests, growing in the western highlands, in an area where other palm species are largely unknown, and this showed substantial, consistent differences in inflorescence, flower and fruit structure from true *B. madagascariensis* and so was duly described as *B. alfredii* (Rakotoarinivo et al. 2007). This species has a seedling morphology very similar to that of *B. madagascariensis*, i.e., inconspicuous windows. *Beccariophoenix alfredii* has not yet been reliably reported from other localities, but we have heard reports of its occurring scattered in deep river valleys in the area to the southwest of Antsirabe.

Meanwhile additional collections were made of the single Ranomafana Est tree, but we were at first unable to locate any further populations in the coastal lowlands near Toamasina. This begged the question as to whether the single tree at Ranomafana Est represented an unusual individual of *Beccariophoenix madagascariensis* or whether it represented a different species. Unfortunately, despite many attempts, Alison Shapcott (Shapcott et al. 2007) was unable to obtain results from material of the Ranomafana Est population in her genetic diversity analysis of *Beccariophoenix*. In 2005, MR together with Franck Rakotonasolo discovered another population about 17 km SW from the single tree, growing among graves. Crucially, seedlings at this site showed the broad windowed leaf of the *Beccariophoenix* from Ranomafana Est. Unfortunately, because the trees were in a graveyard, a taboo or *fady* place, it was not possible to make full collections of the adult palm, but MR was able to collect small samples of the seedling leaf.

Beccariophoenix madagascariensis has now been discovered in a number of localities between Mantadia and Taolagnaro, including an excellent healthy population of well over 1000 individuals at Vondrozo, west of Farafangana, at Befotaka, Midongy Atsimo, at Tsitongambarika (Dransfield & Rakotoarinivo 2012) and several new populations in hills around Toalagnaro. In all these populations, the seedling leaves have inconspicuous windows, i.e., the same as that found in Mantadia.

4. *Beccariophoenix fenestralis* in cultivation at the garden of William and Paula Merwin, Maui, Hawai'i, showing infrafoliar inflorescences (Photo: J. Dransfield).

Ecologically there seem to be differences in habitat between the different taxa of *Beccariophoenix*. *Beccariophoenix alfredi* is restricted to gallery forest at 1100–1200 m in a deep valley in the western highlands. *Beccariophoenix madagascariensis* occurs within a narrow band of eastern escarpment forest, occurring at about 900–1200 m elevation at Mantadia, at ca. 600 m farther south at Vondrozo, lower still at Befotaka, at ca. 300 m at Tsitongambarika and near sea level in the extreme south, just outside the tropic of Capricorn. The habitat is analogous throughout: the palm being restricted to poor

soils with an overlying thick humus layer developed on quartzite or white sands. In contrast, the Ranomafana Est population occurs in the lowlands, at ca. 60–160 m above sea level, at virtually the same latitude as the Mantadia population of *B. madagascariensis*, which occurs in a very different habitat in the highlands.

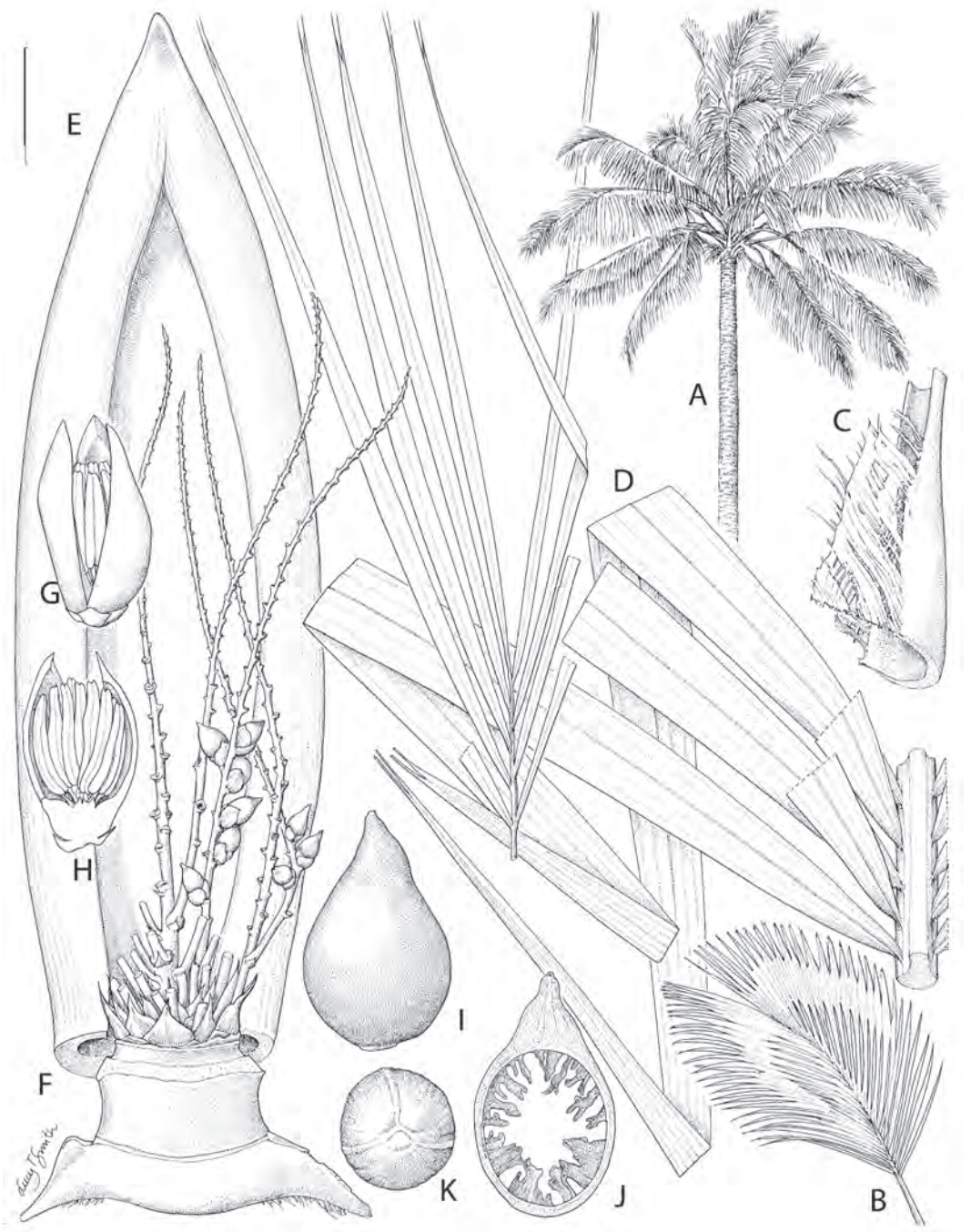
Although we have little material to work with and assess variation, we have been drawn to the conclusion that the single tree at Ranomafana Est and the small population in the graveyard nearby deserve recognition at the species level, representing a third species that we describe and name here as *B. fenestralis*, reflecting the characteristic seedling morphology. The distinctness of the new species has long been obvious to growers; the problem we have faced as palm taxonomists was to find enough material to discover robust characters, in addition to seedling morphology, which allow a clear demarcation between it and *B. madagascariensis* and *B. alfredii*.

It has become apparent that there is rather substantial variation in the form of the inflorescence throughout the range of *B. madagascariensis*, with peduncle very short (as at Sainte Luce, Taolagnaro) to elongate (as at Mantadia and Tsitongambarika). Indeed peduncle length is inconsistent within some populations (as in Vondrozo). However, the inflorescence at anthesis and even in fruit is always interfoliar. The striking sessile inflorescences of the Ranomafana Est population are always infrafoliar, and that seems also to be the case with this species in cultivation. The shape of staminate flower buds does seem to be consistent in the three species: pointed in *B. fenestralis* (Fig. 3), irregularly blunt in *B. madagascariensis* and almost fusiform in *B. alfredii*. Fruit shape, although more difficult to describe, seems also to be consistently different. Stamen number, at first promising as a discriminating character, is now seen to be rather variable in *B. madagascariensis* (18–21), *B. alfredi* (15), *B. fenestralis* (18–20)

Beccariophoenix fenestralis *J. Dransf. & Rakotoarin.*, **new species**

Robust tree palm differing from other species of the genus in the broad terminal flabellum of the juvenile leaf, displaying conspicuous windows. From *B. madagascariensis* it further differs in the infrafoliar rather than interfoliar inflorescences and the pointed rather than blunt staminate flower buds and from *B. alfredii* by the much thicker peduncular bract, the more numerous stamens (18–20 rather than 15) and the ovoid rather than oblate-rounded fruit. Type: MADAGASCAR. Toamasina. Ranomafana Est, 1 km E of Ranomafana Est on R.N. 2, 5 Nov. 1999, *W.J. Baker with J. Dransfield, A. Davis, F. Rakotonasolo & A. Rakotobe 1009* (Holotype K, isotype TAN). (Fig. 5).

Large single-stemmed tree palm. Stem erect, to 15 m tall, 34 cm diameter, dull grey brown with conspicuous leaf scars, internodes to 5 cm long, in cultivation often with a dense mass of orange-brown adventitious roots forming a boss at the base of the stem. Leaves 18–25 in crown, pinnate, marcescent in juvenile palms in cultivation, abscising neatly in adult palms, spirally arranged; leaf sheath with base of leaf axis 150–165 cm long with a true petiole only 9 cm long, 10 cm wide and 5 cm thick, adaxially channeled, abaxially rounded; sheath fibrous; whole leaf ca. 6 m long, including the apparent petiole; rachis 300–320 cm long; leaflets 150–170 on each side of the rachis, regularly arranged but held rather untidily in one plane; basal leaflets 59–68 × 1.5–1.7 cm, mid-leaf leaflets 105–118 × 6.5–7.5 cm, apical leaflets 44–46 × 1–1.1 cm; leaflets with thin white wax on both surfaces, adaxially glabrous, abaxially with abundant pale brown ramenta along midribs and with abundant minute punctiform scales along minor veins, transverse veinlets conspicuous. Inflorescence solitary, infrafoliar at anthesis; 62–90 cm long, branching to 1(–2) order; peduncle 10–15 cm long, to 25 cm wide at the very base, flattened and winged; prophyll not seen; peduncular bract to 70 × 20 cm, boat-shaped, woody, ca. 12 mm thick, adaxially smooth, deeply grooved abaxially and covered with a dense layer of reddish brown indumentum, the bract tapering to a blunt tip ca. 2.5 cm wide, the whole bract circumscissile, leaving a broad scar on the peduncle; rachis 7–9 cm long; rachillae very crowded, spirally arranged, up to 40, 35–56 cm long, occasionally branched, each subtended by a triangular striate rachis bract 1.7–2.2 × 1.0–1.4 cm, basally swollen, with scattered caducous brown scales and thin white wax, 4–7 mm diam., sometimes with a basal portion to 11.5 cm long devoid of flowers, then a portion up to 25 cm long bearing triads, distally the rachillae bearing paired or solitary staminate flowers only, flower groupings distichously arranged; rachilla bracts triangular, 1–4 × 1–2 mm. Staminate flowers pale yellow, more or



5. *Beccariophoenix fenestralis*. **A**. Habit; **B**. juvenile leaf; **C**. Leaf sheath; **D**. Mid and apical leaflets; **E**. Peduncular bract; **F**. Base of inflorescence; **G**. Staminate flower; **H**. Staminate flower in vertical section; **I**. Fruit; **J**. Fruit in vertical section; **K**. Endocarp. Scale bar A = 2 m; B = 50 cm; C, D, E, F = 8 cm; G, H = 15 mm; I, J, K = 16 mm. A, B from photographs, C, D, E, G, H from *Baker et al 1009*, F from *Noblick 5065*, I, J, K from *Britt & Randrimboavonjy 17*. Drawn by Lucy T. Smith.

less symmetrical and pointed in bud, 1.85 × 0.7 cm; sepals 3 × 2 mm, imbricate, shallowly triangular, connate at the very base; petals stiff, almost woody, 18 × 6–7 mm, elliptic with conspicuous triangular acuminate tips, drying inconspicuously striate and with thin white wax; stamens 18–20, filaments ca. 1 mm long, anthers 8–12 mm long, ca. 1 mm wide;

6. Copious development of adventitious roots at the base of a cultivated individual, garden of William and Paula Merwin, Maui, Hawai'i (Photo: J. Dransfield).

pistillode inconspicuous, conical, less than 1 mm high. Pistillate flower 15 × 9 mm; sepals distinct, 10 × 9 mm, imbricate; petals 9 × 8 mm, similar to petals, but with short valvate tips; staminodal ring ca. 0.1 mm high with ca. 9 teeth; gynoecium ellipsoidal, 13 × 4 mm. Mature fruit dark purple, obpyriform, to 4 × 2.5 cm, including the pyramidal apical beak to 9 × 12 mm, tipped with short stigmatic remains to 4 × 4 mm; epicarp smooth when fresh, becoming striate when dry, glabrous; mesocarp ca. 2 mm thick; endocarp very thin, fragile, ellipsoidal, ca. 25 × 20 mm , distally with three low ridges, pores obscure. Seed ellipsoidal, ca. 24 × 19 mm; endosperm deeply ruminate; embryo lateral. Eophyll and first few leaves lanceolate, undivided; subsequent seedling leaves with a broad apical, furcate flabellum composed of up to 30 folds, the margin deeply lobed, the lobes corresponding to the adaxial folds, basally split along the abaxial folds to ca. 2/3 to 3/4 the length of the folds, the whole thus appearing "windowed."

Specimens examined: MADAGASCAR. Toamasina. Ranomafana Est, 1 km E of Ranomfana Est on R.N. 2, 18°58'5.76"S 48°51'16.86"E. Highly disturbed remnant vegetation with lateritic soils rich in organic matter, elevation 60 m, 12 Aug 1995, *Larry Noblick with B. Fischer & R. Todivelo 5065* (FTG, K); 5 Nov. 1999, *W.J. Baker with J. Dransfield, A. Davis, F. Rakotonasolo & A. Rakotobe 1009* (K, TAN); 8 March 2003, *A. Britt with T. Randrimboavonjy AB17* (K, TAN). Brickaville, Ambilanimana, Ranomafana Est, 10°1'6"S 48°48'49"E, alt 166 m, secondary vegetation, 5 Sept. 2005, *M. Rakotoarinivo with F. Rakotonasolo RMJ168* (K, TAN).

Distribution. East Madagascar, known only from Ranomafana Est, Ampasimanolotra.

Habitat. Lowland area with slightly undulating hills, 60–160 m elevation. Known sites are in highly degraded vegetation. The species colonizes either slopes or areas along watercourses. According to MR's guide, the species was abundant around Ambilanimana along the river Iaroka, but the population was destroyed by cyclone Geralda in 1994. Now, the remnant population is composed exclusively of some un-trunked and juvenile individuals.

Vernacular name. *Zarina* (Betsimisaraka).

Conservation Status: Critically Endangered [CR B2ab(i,ii, iii)+D]. Known only from Ranomafana Est area, where the population appears to be composed, at the moment, of only two mature individuals separated from each other by about 6 km and some juvenile individuals. The area of occupancy is estimated to be less than 1 km^2 in total, and the species is highly threatened with habitat loss,

7. Almost mature fruit, garden of William and Paula Merwin, Maui, Hawai'i (Photo: J. Dransfield).

although the occurrence is already recorded exclusively in an area under intense human pressure. The decline of the population of this palm may be related to the report of its utilization in the past as an edible palm-heart (pers. comm.)

Notes: According to Jeff and Suchin Marcus, *Beccariophoenix fenestralis* out-performs other species of the genus in cultivation in Hawaii, growing much more rapidly. Trees planted in the early 1990s are bearing seeds. In contrast *B. madagascariensis* is very slow, in fact too slow to be a useful horticultural subject. *Beccariophoenix alfredii* appears to have great potential in cooler and drier areas than Hawaii.

Many cultivated individuals of *B. fenestralis* have now reached maturity and have begun to flower and fruit abundantly (Figs. 4, 6 & 7). A specimen in National Tropical Botanic Garden in Kauai (NTBG 970355) has been vouchered by David Lorence and preserved in the herbarium there under the collector number *D. Lorence DL10428* (D. Lorence, pers. comm.).

Acknowledgments

We are grateful to Bill Baker for discussion and Jeff and Suchin Marcus for many details of the palm in cultivation. Lucy T. Smith prepared the analytical plate.

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A Subtropical Quest to Discover Wild *Trithrinax*

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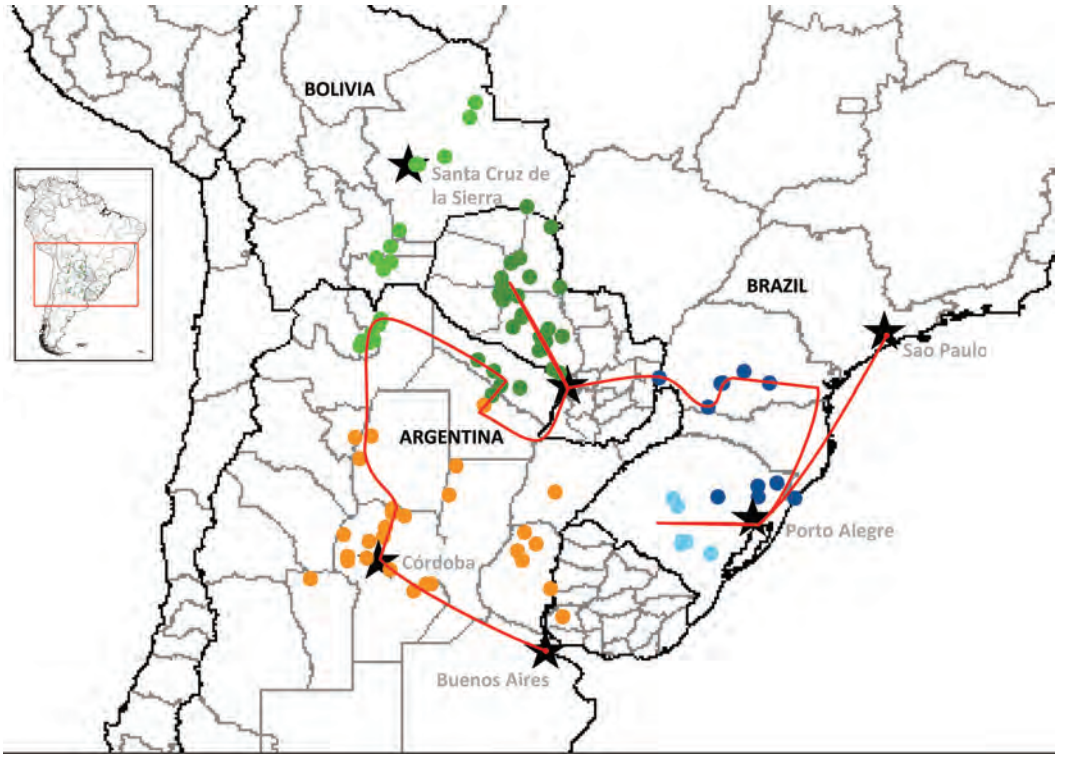
This paper describes fieldwork partly funded by the IPS Endowment Fund aimed at collecting and understanding fan palms in the genus *Trithrinax*.

Trithrinax Mart. was until very recently one of the few neotropical palm genera lacking a modern taxonomic revision, the last one by the Italian palm expert Odoardo Beccari published posthumously in 1931. In the Conservatoire et Jardin Botaniques of Geneva I decided to tackle different interesting questions about this palm genus, the most striking one probably being why was the genus forgotten for such a long time? Is it because of its reduced number of species, potentially less interesting as a scientific challenge for palm experts? Is it because it is a palm group endemic to the southern subtropics of South America, and then less exotic to deal with when compared with tropical and more "exotic" palms? Is it because most of the species grow in hardly accessible thorny dry forests? Or is it finally because *Trithrinax* species are difficult to collect due to the presence of dangerously-spiny leaf-sheaths? I could not guess what the right answer was without starting the revision itself, and now that I successfully accomplished the work (Cano et al. 2013) I would check "all of the above" and add many other reasons that I discovered during this adventure.

By the time I started the revision in 2010, three species – *T. brasiliensis* Mart., *T. campestris* (Burmeist.) Drude & Griseb. and *T. schizophylla* Drude – were accepted for the genus (Henderson et al. 1995, Govaerts & Dransfield 2005, Dransfield et al. 2008). Meanwhile, *T. acanthocoma* Drude was proposed as a synonym of *T. brasiliensis* and *T. biflabellata* Barb. Rodr. was proposed as a synonym of *T. schizophylla*. My goals were to define the real number of species composing the genus and to evaluate the taxonomic status of these synonyms. In order to do so, a visit to the natural populations of *Trithrinax* was mandatory. I needed to collect complete herbarium specimens of each species and to take abundant pictures of the palms in their natural environments. So, an expedition was planned (Fig. 1), my bags were packed, and I took a plane from Geneva to Sao Paulo on the 13th of February 2011.

From the beginning I was in contact with the well-known Brazilian botanist Harry Lorenzi, who had recently published the interesting and nicely illustrated book "Brazilian Flora: Arecaceae (Palms)" (Lorenzi et al. 2010). I wanted to visit his living palm collection in the Jardim Botânico Plantarum. Thus, I took a bus for two hours to Nova Odessa, where I was received by Lorenzi, who kindly hosted me for two days and showed me his magnificent garden, specialized in the Brazilian flora. It was a perfect introduction for my trip, very useful



1. Itinerary followed during my fieldwork trip to Brazil, Paraguay and Argentina (red line). Stars represent the main cities and dots represent *Trithrinax* taxa (light blue *T. brasiliensis* var. *brasiliensis*, dark blue *T. brasiliensis* var. *acanthocoma*, light green *T. schizophylla* var. *schizophylla*, dark green *T. schizophylla* var. *biflabellata* and orange *Trithrinax campestris*).

to prepare myself for the real fieldwork of the next days.

My next destination was Santa Maria (Rio Grande do Sul), a small city in southern Brazil. I arrived there on the 17th, and met Kelen P. Soares who had worked with *Trithrinax* for his forest engineering studies in the Universidad Federal de Santa Maria. He showed me the most important localities for *Trithrinax brasiliensis* (Fig. 2), known by local people as *burity*. I also met Dr. Ademir Reis, curator of the Barbosa Rodrigues Herbarium, who joined our expedition. For three days we visited extraordinary places such as Quevedos, a mountainous locality near the green Toropi River, or Guaritas, near Caçapava do Sul, where we had to climb on to rocks to find *burity* and had the chance to enjoy the spectacular landscape around us. I was able to see this palm in places where mature palms were still well conserved. However, I also noticed sadly strong habitat destruction in nearby areas, where there was evident a lack of seedlings and saplings due to anthropogenic fires and cattle. Thanks to Kelen's knowledge and to the collections we made, I could observe the main distinctive characters of *Trithrinax brasiliensis*, namely solitary, rarely taller than three meters, with thin, flexible leaf blades and unarmed, deeply bifurcated segments.

Having observed all critical characters in the field I was ready to compare this palm with the synonym proposed by most authors – *Trithrinax acanthocoma*. My next step was to travel to the city of Curitiba, where I met Mario A. Virmond, a forest engineer who showed me several populations of *T. acanthocoma* in the Brazilian state of Paraná. He started by showing me all the cultivated *Trithrinax acanthocoma* in the city. I was deeply surprised when I saw those seven meter palms, evidently much taller than the ones I saw in Santa Maria. I thought it was an exception given that those were cultivated individuals; however, in our next stops, Turvo, Pato Branco and Laranjeiras do Sul, I confirmed that this palm could really reach impressive heights, up to 15 m also in the wild (Fig. 3). That was not the only difference I noticed. The base of the stem displays a long (1–3 m long) cone of aerial-roots, the leaves have a thicker blade and many more segments, the latter presenting spiny,

2. Trithrinax brasiliensis var. *brasiliensis* and the author, near Santa Maria, Rio Grande do Sul, Brazil.

3. *Trithrinax brasiliensis* var. *acanthocoma* in Turvo, Paraná, Brazil. Note the cone of aerial roots.

shortly-bifurcated apices. I noticed also that although the vegetative organs of both taxa showed several remarkable differences, the inflorescences and the flowers were rather similar.

Trithrinax acanthocoma was also reported in a locality in the border of Brazil and Paraguay, so we crossed the State of Paraná and reached the City of Puerto Iguazú, where I said goodbye to my friend Mario and crossed the border to the Paraguayan City of Ciudad del Este. Irene Gauto, a palm biologist who studied the diversity, distribution and conservation status of Paraguayan palms while in Geneva (Gauto et al. 2011), her husband Pier Cacciali and Guillermo Caballero Marmori (curator of the ITAIPU herbarium) were waiting for me and we all headed to the Refugio Biológico Pikyry. A very sad sight was waiting for us there; in the middle of a soya (soybean) crop, two old *T. acanthocoma* individuals were the last representatives of *T. acanthocoma* in Paraguay (Fig. 4).

I continued my travel hoping to get better news concerning *Trithrinax* species growing in the Paraguayan Chaco. On the 26th, I ventured through this wild, hot, and spectacular region. After seven hours drive, I finally arrived at the private natural reserve *Estancia Salazar*. There, I was helped by a local guide and I found my way through a thorny dry forest where I saw for the first time the slender, caespitose and short palm I was looking for – *Trithrinax biflabellata* (Fig. 5). I could observe its leaves, which presented fewer segments than those I saw in Brazil, the lamina divided in the middle by a deep split. My guide explained to me that the leaves and the spines of this palm are used to make handicrafts such as baskets, fans and a variety of useful objects, and that the palm heart or *palmito* is eaten by local *Guaraní* indigenous people. I continued my journey through the wild Chaco and traveled several kilometers towards Filadelfia in the Department of Boquerón. This outstanding region showed me its richness in birds, reptiles, mammals and arthropods. I even could observe a big tapir crossing the road a few meters in front of our car. But animals were not the target of my mission, and thankfully the Chaco also showed me fertile individuals of *Trithrinax biflabellata*. There I could identify the distinctive net-like peduncular bracts and the contorted corolla that characterize this palm.

I drove back to civilization, and from Asunción I caught a bus to Corrientes (Argentina) on the 4th of March. In the Corrientes herbarium of the Instituto de Botánica del Nordeste (IBONE), I met with the legendary Argentinian botanist Dr. Antonio Krapovickas, whose palm collections were very useful for my revision and whose knowledge about *Trithrinax* is very extensive. He kindly recommended me the best places to observe the Argentinian populations of *Trithrinax*. I was ready to go back to the field and, guided by Luis Ventura, a seed merchant, I travelled throughout the Argentinian Chaco, in the provinces of Chaco and Formosa. Again, I observed the slender *Trithrinax biflabellata*, usually surrounded by magnificent individuals of *Chorisia speciosa* (Malvaceae) and *Opuntia quimilo* (Cactaceae). I then reached the westernmost region of Argentina, near the Bolivian border, and visited the localities of Embarcación, Pichanal (Salta) and Chalicán (Jujuy). I noticed that individuals of *Trithrinax* in that area were more robust, with wider stems, many more leaves and thicker laminas, these with more segments and spiny apices. I realized that I was in front of *Trithrinax schizophylla* (Fig. 6) and to me it was evident that these palms were very different from those I saw in the Chaco (*T. biflabellata,* considered by several authors as a

4 (top). Last wild individuals of *Trithrinax brasiliensis* var. *acanthocoma* in the Refugio Biológico Pikyry (Alto Paraná, Paraguay), surviving in a soya crop. 5 (bottom). *Trithrinax schizophylla* var. *biflabellata* in the private natural reserve Estancia Salazar, Presidente Hayes, Paraguay.

synonym of *T. schizophylla*). I additionally noticed some similarities between the two palms; the leaves presented bifurcated laminas and the inflorescence and flowers showed relatively the same morphology. One of the populations I visited in Chalicán was close to a farm, where some of the constructions were thatched with leaves of *Trithrinax schizophylla*.

6. *Trithrinax schizophylla* var. *schizophylla* in Embarcación, Salta, Argentina.

My last target was *Trithrinax campestris* (Front Cover), and in order to visit wild populations I travelled south to Pozo Hondo (Santiago del Estero). I soon learned that this palm is a record maker within the genus; the leaf-blade is much harder and thicker than in the rest of the genus, it is definitely the fiercest representative of the group, combining long and nasty leaf-sheath spines with extremely spiny and woody segment tips. I learned that when you collect this palm you must be extremely careful in order to avoid the spines

getting into your eyes. Despite all these scary characteristics this is, in my opinion, also the most beautiful and elegant *Trithrinax*, with its marcescent leaves covering the stem and its greyish-silvered shiny leaf-blade. I kept driving south and I saw these palms in different areas near the road between Santiago del Estero and the city of Córdoba. On my last fieldwork day (March 9), I visited a beautiful population of *T. campestris* near Chilibroste (Córdoba). There, the palms presented big, heavy infructescences. To quench my curiosity, and knowing that they are not toxic, I tasted a bit of one of those yellow, juicy drupes. It was not a good idea as the flesh was bitter and astringent. Later I was told that the fruits are used to prepare alcoholic beverages.

In order to take my plane back to Switzerland, I traveled to Buenos Aires, and before leaving, I enjoyed what I believe was a very much deserved typical *asado argentino*.

It was a month of hard work, during which I learned a lot, but certainly not all the secrets, about *Trithrinax*. Based on my observations and on the analysis of several herbarium specimens, I concluded that *Trithrinax acanthocoma* is a variety of *T. brasiliensis*, and that *T. biflabellata* is a variety of *T. schizophylla* (Cano et al. 2013). These taxa present evident differences and should not be treated as synonyms. I also noticed that all the species of the genus are threatened specially due to habitat destruction; the natural populations are being replaced by soya and corn crops and by fields to feed cattle. I hope that local authorities will implement conservation strategies, as suggested by Irene Gauto for Paraguayan species, in order to stop the reduction of wild populations of these beautiful palms.

Acknowledgments

This study was kindly funded by the International Palm Society Endowment Fund, whose support was fundamental for my field and lab work. The Augustin Lombard grant from the SPHN Society of Geneva and the Commission of the travel grant of the Académie des sciences naturelles Suisse also funded this work. For precious help during fieldwork I would like to thank H. Lorenzi (HPL), A. Reis (UFSC), K.P. Soares, M. Virmond (and co-workers), R. Degen (FCQ), I. Gauto (Guyra Paraguay), C. Palacios, P. Cacciali, R. Eaton (Estancia Salazar), G. Caballero-Marmori (ITAIPU), E. Rempel, Luis A. Ventura, N. Deginani (SI) and M. Belgrano (SI). For various scientific and logistic contributions to this work we thank K.P. Soares, A. Chautems (G), N. Fumeaux (G) and M. Gonzalez.

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A New Record of *Coccothrinax readii* for Belize

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***Coccothrinax readii* is recorded for Belize for the first time.**

Coccothrinax readii was described by Hermilio J. Quero (1980) following a study of the palms of the Yucatan Peninsula, Mexico, based on thorough collecting throughout the entire region. Among the collected material there was a medium sized solitary palm with palmate leaves that had silver color on the abaxial leaf surface. These individuals had entire petiole bases, and their stems were covered by a fiber layer forming a grid pattern (Fig. 1). This new palm species described by Quero (1980) grows in Mexico along the northern coast of Yucatan from the eastern coast of Quintana Roo to the Chetumal Bay (Fig. 2). Several historical collections from the late 19th and early 20th centuries (*Gaumer 23350*, *Schott 293*, *721*) were originally assigned to *Thrinax argentea* Lodd. ex Schult. & Schult.f. (Millspaugh 1898) or *C. argentea* (Lodd. ex Schult. & Schult.f.) Sarg. ex Becc. (Standley 1930).

In Mexico, *C. readii* grows in dense stands in coastal dune scrub along the Yucatan coast (Fig. 1) and is less abundant in the lowland flooded forest or semi-deciduous forest along Quintana Roo. Quero (1980) considered this species to be taxonomically similar to *C. jamaicensis* Read, and he enumerated a long list of morphological traits that differentiate the two species. However, we believe that *C. readii* is also morphologically similar to *C. argentata* (Jacq.) L.H. Bailey. The goal of our study was to confirm the presence of the genus in Belize and to determine if this country harbors *C. argentata* or *C. readii*.

During a short visit to the Shipstern Nature Reserve (7 and 8 April 2013) (located in northern Belize in the Corozal District) we located nine individuals of *C. readii* (four on the Botanical Trail, three on the Thompson Trail, and two in the Eastern Survey Line). A second report for this species in the Orange Walk District of Belize could not be confirmed, but J. Meerman (pers. comm.) indicated that this is an erroneous record, possibly associated with *Cryosophila stauracantha* (Heynh.) R. Evans, a species that also received the name of *Cryosophila argentea* Bartlett in Belize. Meerman (pers. comm.) confirmed that *C. readii* also grows in northern Ambergris Caye in Bacalar Chico National Park (Corozal District).

Coccothrinax readii *H.J. Quero R., Principes 24: 118. 1980.*

We are certain that the wild populations of *Coccothrinax* located on the Shipstern Nature Reserve belong to the argentata group of the

1. *Coccothrinax readii*. A. Adult individuals of 5 or 6 m in height with their characteristic glaucous undersides of the leaves, in semi-deciduous forest of Quintana Roo, near Caobas. B. Details of the entire petiole bases covered by a fiber forming a grid. C. Detail of the abaxial surface of the sheath. D. Detail of the glaucous abaxial surface of the leaves. E. The palm in the coastal dunes of Yucatan, next to Celio Moya. F. Adult individual two meters high in the semi-deciduous forest of the department of Corozal (Belize), beside it, José Alvarado (left) and Lester Delgado (right), Shipstern Nature Reserve. G. General view of the coastal dune scrub in Yucatan. H. General view of the semi-deciduous forest, note on the right the trunk of a medium size tree of *Manilkara zapota* (Sapodilla) at Shipstern Nature Reserve.

Table 1: Some morphological characters of five species of the *Coccothrinax argentata* group and *C. readii* from Belize.

	C. argentata	*C. jamaicensis*	*C. litoralis*	*C. proctori*	*C. readii* Mexico	*C. readii* Belize
Trunk diameter (cm)	up to 13	(5) 6.4–20	15–20	?	3–5 (5.5)	5–6
Palman length (cm)	4–15 (20)	(15) 19–36	20–40	(15) 18–30	13–30	22–26
Segment length (cm)	30–50 (70)	50–102	70–100	60–100	40–70	45–74
Number of leaf segments	15–44	35–38	40–45	39–48	39–54	33–42
Sheath free strand tips (cm)	?	2–4	4	?	3–6.8 (9.5)	8–11
Hastula apex at maturity	Not bifid	Not bifid	Not bifid	Not bifid	Bifid	Bifid
Hastula length (mm)	?	4.1–15 (18)	2–3	5–10	up to 7.5	10–13
Pedicel length in fruit (mm)	1–3	(1) 2–6.2	1–3	(0.5) 1–4 (5.4)	2–6.5	3–5.5

C. argentata complex (Nauman & Sanders 1991). This group includes eight species from which we discarded three species (i.e., *C. fragrans* Burret, *C. inaguensis* Read and *C. victorini* León) because they have lamina abaxially green or gray-green with indumentum or deciduous or absent. Table 1 provides details pertinent to the morphological traits of the remaining five species of this group (i.e., *C. argentata*, *C. jamaicensis*, *C. litoralis* León, *C. proctorii* Read and *C readii*; for the last we include data from plants from Belize). For *C. argentata*, data are from Nauman and Sanders (1991); for the other species we consulted the original descriptions in León (1939), Quero (1980), Read (1963) and Read (1980). *Coccothrinax readii* is a distinctive species with a very thin trunk (like *C. argentata*), a bifid hastula (a diagnostic character) and with the segment to palman length ratio of 2.8–3.0 (similar to *C. jamaicensis*).

Distribution: In Mexico and Central America the genus is present only in the Yucatan Peninsula (Quero, 1980). It does not occur in Guatemala (Standley & Steyermark 1958), Nicaragua (Steven et al. 2001), Costa Rica (Hammel et al. 2004) or Panama (Correa et al. 2004). Spellman et al. (1975), Balick et al. (2000) and Govaerts and Dransfield (2012) did not include the genus in Belize. However, it seems that these authors were not aware of work by Standley and Record (1936), who reported *C. argentea* for this country, although without locality (probably in the northern plains). Meerman (1993), in his floristic list of the Shipstern Nature Reserve, mentioned that *C. readii* was likely to occur in this area. Five years later, Bijleved (1998) confirmed Meerman's (1993) expectations and reported four individuals of *C. argentata* for Belize (Corozal District). In Honduras, *C. jamaicensis* is also present in Swan Islands, about 250 kilometers northeast of the Honduras mainland (Nelson & Proctor 1994). Summarizing, *C. readii* occurs in Mexico (Quintana Roo and Yucatan States) and Belize (Corozal Department), and *C. argentata sensu stricto* does not occur in either of these two countries.

Material examined: Belize: Distrito Corozal: Carretera Chunox-Sarteneja, 6 km antes de Sarteneja y pasando el centro de visitantes de la Reserva Natural Shipstern, en el límite oriental de la reserva, en el camino llamado "Eastern survey line," 18°19'10.26"N, 88°10'39.42"W, 2 msnm, (fr., pasada), 8 abril 2013, *R. Duno & C. Moya 2541* (CICY).

2. The distribution (shaded) of *Coccothrinax readii* in Belize and Mexico.

Vegetation: The plant community of the Shipstern Nature Reserve corresponds to a deciduous forest with species such as *Beaucarnea pliabilis* (Asparagaceae), *Bursera simaruba* (Burseraceae), *Gliricidia maculata* (Fabaceae), *Thrinax radiata* (Arecaceae) and *Vitex gaumeri* (Lamiaceae) as well as elements of a more evergreen forest like *Manilkara zapota* (Sapotaceae) and also species of the coastal dune scrub like *Bravaisia tubiflora* (Acanthaceae). The flora and vegetation of the whole reserve was assessed by Meerman (1993) and Bijleveld (1998).

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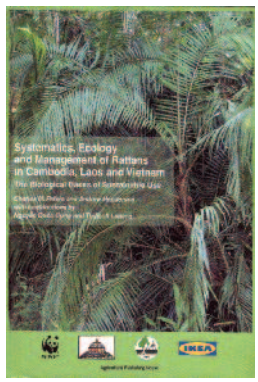
PALM LITERATURE

SYSTEMATICS, ECOLOGY AND MANAGEMENT OF RATTANS IN CAMBODIA, LAOS AND VIETNAM. THE BIOLOGICAL BASES OF SUSTAINABLE USE – Charles M. Peters and Andrew Henderson with contributions from Nguyen Quoc Dong and Thibault Ledecq. WWF/IKEA/NYBG. 2014. Pp. 234, numerous maps and color photographs throughout. Agricultural Publishing House. "Not for sale" – available as a free digital download at http://wwf.panda.org/who_we_are/wwf_offices/laos/newsrom/?216070/wwf-launches-first-ever-book-on-mekong-rattan-species



This attractive book, available in English, Khmer, Vietnamese and Lao language versions, aims to help both naturalists and those in the rattan industry to identify rattan species, while providing guidance in maximizing yields and achieving sustainable production of rattan resources. It is really useful to have so much information on Indochinese rattans available in a single volume. The book is divided into five chapters. Chapter I provides a brief description of the region and major biophysical factors that control rattan distribution and abundance, and also a brief outline of rattan trade. Chapter II, the botanical foundation of the work, is a field guide to the rattans of Cambodia, Laos and Vietnam and includes a dichotomous key to 65 different rattan species. Each species is represented by a double page spread with text on the left hand side – local names, brief descriptions, distribution and habitat, flowering and fruiting behavior and uses, and facing it on the right hand page a map and three diagnostic photos, usually illustrating sheathed stem, leaf and some part of reproductive material. Chapter III discusses rattan ecology, presenting data on the density, size-class distribution and annual growth of selected species and conservation assessments. Chapter IV provides data collection protocols and analyses required to define a sustainable harvest of wild rattan, together with a discussion of impact monitoring and periodic harvest adjustments. Chapter V examines the future of the rattan trade in the region. The authors boldly claim that the book is unique in addressing all these aspects of rattan in a single volume.

The press release for the book cited above (and the source of a free digital download) makes a bold statement – "the first ever book on Mekong rattan species" – that invites closer scrutiny. First ever? Surely not! The book is pre-empted by Evans et al. (2001) *Field Guide to the Rattans of Lao PDR* published in English and Lao. Although the Lao book's title suggests it covers just the Lao PDR, it covers the entire area of Lao PDR, Vietnam and Cambodia and neighboring parts of China and Thailand and includes accounts of 51 species. Where the earlier book differs is that it lacks the species that Henderson and his co-workers have described from the region since 2001 and also lacks the material on ecology, data collection protocols and trade and harvest. At one point

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Palms of Eastern Yucatan Peninsula, Mexico: Changes along a Rainfall Gradient

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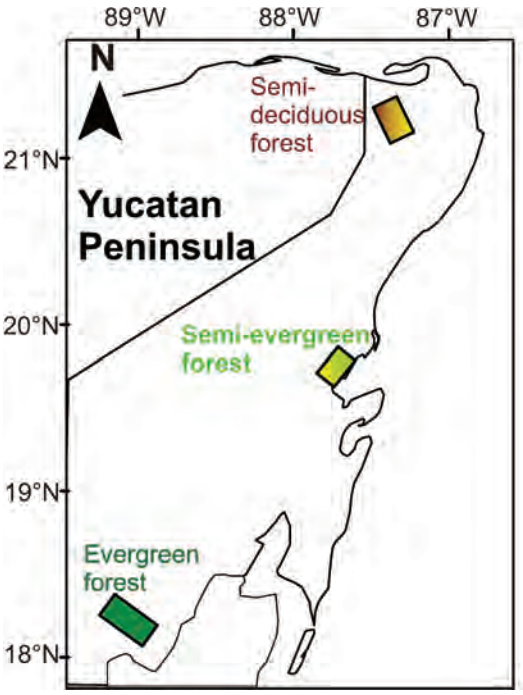
There are about 20 species of palms on the Yucatan Peninsula, the easternmost part of Mexico towards the Caribbean Sea. Yucatan is near the northern limit of palm distribution in tropical America and located exactly where dense and diverse rainforests of Central America give way to more open and drier seasonal and species-poor forests. We visited this transition zone to see how species-rich palm communities change to species-poor palm communities. Such observations are important for understanding the forces that underlie and shape diversity patterns, not only of palms but of species in general.

catecan palms are conspicuous in the vegetation. In some places single species dominate the landscape, which is then given names that follow the common names of the very abundant palms; *botanales* for open savannas dominated by species of *Sabal, corozales* for dense forests dominated by *Attalea cohune*, *tasistales* for swampy vegetation dominated by *Acoelorrhaphe wrightii*, etc. (Miranda 1958, Rzedowski 1978). But in most places palms are intermingled with trees and other plants to form a vegetation that is not dominated by a single species (Miranda 1958). This is an account of the composition of palm communities and also provides information about palm abundances, which is important in relation to their high economic value; many palms are heavily used for thatch (*Sabal*), house construction (*Thrinax*), utensils (*Sabal)* (Fig. 1) and a variety of other purposes (Quero & Flores 2004, de la Torre et al. 2009). Knowing palm distributions and frequencies also contributes to understanding their conservation status in Yucatan. Half of Yucatecan palms have been listed in the Mexican classification of threatened species (DOF 2010).

The Yucatan Peninsula (Fig 2; 17°00'–21°45'N, 86°30'–89°30'W) covers 150,000 km^2. The annual rainfall varies from 500–2200 mm along a north–south gradient and the average

1. Palm uses in Yucatan. A. Leaves of *Sabal yapa,* harvested to be used for thatch. B. Felled stems of *Thrinax radiata,* which are commonly used for house construction and lobster traps by the local population. C. Typical Maya house made out of *Thrinax radiata* (the walls) and *Sabal yapa* (the roof). D. Brooms made out of the leaves of *Sabal yapa*.



2. Sites where we observed the palm communities in three forests located along the east coast of the Yucatan peninsula with a rainfall gradient from 1200 mm precipitation per year in the north to 1500 mm precipitation per year in the south.

annual temperature varies from 25–28°C (Herrera-Sansores 2011). The peninsula is made up of a marine limestone plateau uplifted between the Miocene (24 MY) and the Plio-Pleistocene (3.2-2 MY) and no part reaches above 350 m (Bautista et al. 2011). The limestone forms a karst landscape with subterranean drainage, caves and sink-holes. This plateau is covered by semi-deciduous forest in the northern parts, semi-evergreen forests in the central parts and evergreen forests in the south (Sánchez & Islebe 2002). Along the coastline a series of halophytic vegetation types including coastal dunes with low bush, mangroves and humid savannas dominate (Miranda 1958).

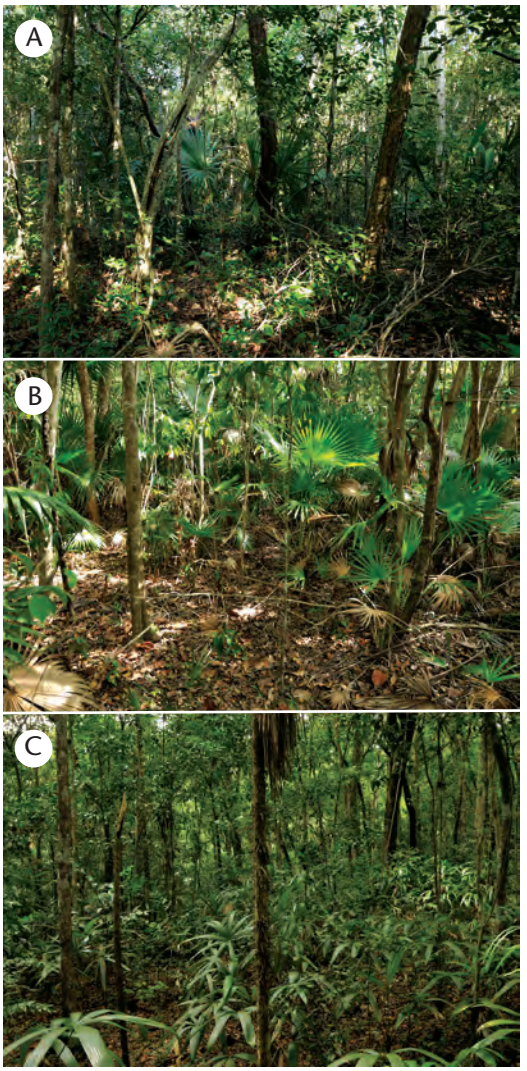
In February 2010, we observed the palm communities at three sites along the rainfall gradient in the eastern Yucatan peninsula in the state of Quintana Roo, one in the north in the semi-deciduous forest, one in the center in the semi-evergreen forest and one in the south in the evergreen forest (Fig 2). We looked for forest with as few signs of human disturbance as possible, and we then went on to locate and identify all palm individuals along a line transect. We counted all individuals including seedlings, juveniles and adults.

Palm communities

Semi-deciduous forest (Table 1; Figs. 3A) – In the northern semi-deciduous forests our observations were in the nature reserve Yum Balam, north of the town of Kantunilkin and south of the coastal village Chiquilá. We found a palm community consisting of three species: *Chamaedorea seifrizii* (Fig. 4A), *Sabal yapa* (Fig. 4B) and *Thrinax radiata* (Fig. 4C). The overall density of palms in this forest was 2411 individuals per hectare. The cespitose pinnately leaved *Chamaedorea seifrizii* with 681 individual per hectare reached four meters tall and thrived in the understory. This species was more abundant in these dry forests than in the more humid forests investigated further south on the peninsula. The other two species of palms both had solitary stems and palmate or costapalmate leaves and both reached the forest canopy. *Thrinax radiata* was found with an average density of 1173 individuals per hectare and *Sabal yapa* with 557 individuals per hectare. Because of their larger size, these two species in the subfamily Coryphoideae visually dominated the forests. The dominance of coryphoid palms in drier vegetation types is commonly found in other parts of Central America and the Caribbean (Bjorholm et al. 2006).

Semi-evergreen forest (Table 1; Fig. 3B) – This forest type was accessed in the Sian Ka'an Biosphere Reserve, some 25-50 km northeast of the town of Felipe Carrillo Puerto. The overall density of palms there was 2099 individuals per hectare. In addition to the three species encountered in the drier forests to the north we found, *Coccothrinax readii* (Fig. 4D), with a density of 722 individuals per hectare which made it the second most abundant palm in this forest type. This beautiful species has palmate leaves with a silvery glossy undersurface. It is unarmed and reaches up to six meters tall occupying the mid-canopy layer of the forest. The forest is, however, dominated by the other coryphoid palm *Thrinax radiata* which had 1116 individuals per hectare in our transects. *Chamaedorea seifrizii* (146 ind./ha) and *Sabal yapa* (115 ind./ha) are both common but less abundant.

Evergreen forest (Table 1; Fig. 3C) – This forest type we observed 34-70 km southeast of the small town of X-Pujil in the so called "area of integrated management" named Caobas. There the forest is lush, dense and tall as a rainforest. It grows on a hilly terrain on soils that are



3. The three forest types in which palm communities were studied in the eastern Yucatan peninsula. A. Semi-deciduous forest in northern Quintana Roo near Kantunilkin, with juvenile individual of *Sabal yapa* in the center. B. Semi-evergreen forest in the Sian-Ka'an reserve with many juvenile *Thrinax radiata* in the understory. C. Evergreen forest in southern Quintana Roo with a dense population of *Cryosophila stauracantha* juveniles and a spiny stem of adult individual of the same species.

much deeper and of older geological origin than the more northern forests we visited. In total we found 7396 palm individuals per hectare in the evergreen forest, which is more than three times as many as in the drier forest types. We found nine different palms in this forest: The most common palm species is the up to 10 meters tall *Cryosophila stauracantha* (Fig. 5A), which has 5524 individuals per hectare; it is solitary, has palmate leaves that are glossy below, and it is heavily armed with 10 cm long root-spines on the stem and reaches the mid-canopy of the forest. Although it is not a climbing palm, its stem often leans against the other vegetation. *Chamaedorea oblongata* (Fig. 5B) is a small palm (< 4 m) like its congener *C. seifrizii,* but it has a solitary growth form and much broader leaflets. *Desmoncus chinantlensis* (Fig. 5D) is a spiny palm with the distal pinnae transformed to hooks, which it uses to cling to the vegetation and grow all the way into the forest canopy, where it flowers and fruits in the better light conditions found there. We also found *Attalea cohune* (Fig. 5E) in the evergreen forest; this is a giant palm with tall stems to 25 m tall and 40 cm in diameter and a crown of enormous, erect, pinnate leaves that reach the forest canopy. It was commonly fruiting, and its fruits – up to eight cm long – are the largest of all wild palm fruits in our study area. *Sabal mauritiiformis* with its large costapalmate leaves and tall stems also reaches the forest canopy; it is a solitary, unarmed palm with very long inflorescences that project out of the crown. *Sabal yapa* (Fig. 4B), which is common in the drier forest types, is here much less abundant. *Bactris major*, a mid-canopy palm, grows in dense stands that may cover large areas that are then called *jahuactales*; *B. major* (Fig. 5C) has elegant pinnate leaves that contrasts to the heavy armature of spines on stems, leaves and especially the peduncular bract. *Gaussia maya* (Fig. 5F) is a mid-canopy, pinnately leaved palm found in moderate densities. The greater number of species found in the evergreen forests compared to the drier types coincide with a larger variation in life forms and morphology of the palms (Orellana 1992).

Ecological features of the palms

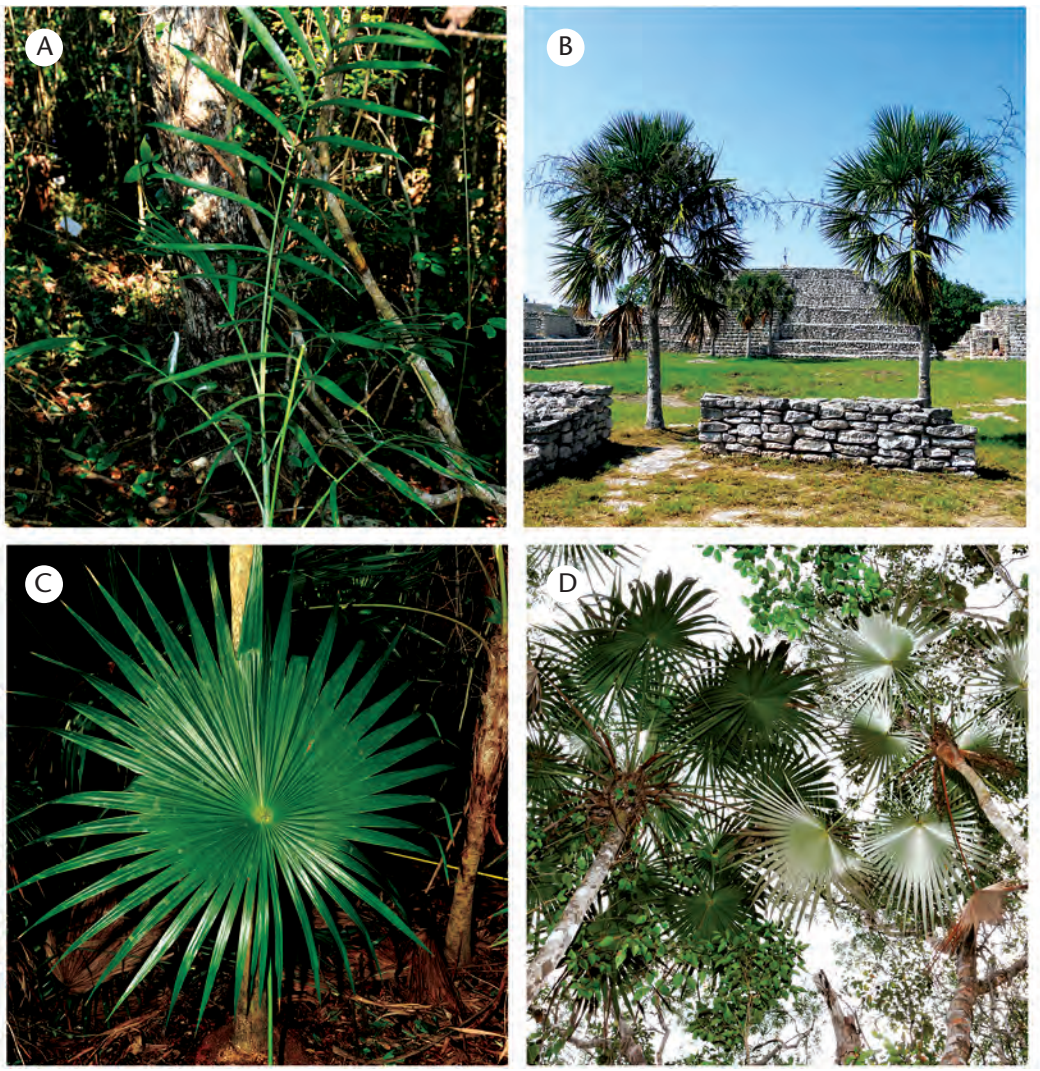
Species ranges – In general the palm species encountered are widely distributed in the southeast of Mexico, Central America, northern South America and the Caribbean. Only *Coccothrinax readii* (Quero 1980) is endemic to the study area but it is very closely related with the more wide ranging Caribbean *C. argentata*, and the name *C. readii* was actually treated as a synonym in the field guide to American palms (Henderson et al. 1995).

Species richness – The palm communities of the northern Yucatan peninsula with 3 or 4 palm species are among the poorest in tropical America. The communities in the southern part are comparable in species richness to some South American sites, such as the valleys of

Table 1. The 11 species of palms that we registered along the east coast of the Yucatán peninsula giving their average densities in the three forest types examined and in addition their habitat, uses and level of ecological risk.

	Density ind./ha					
	Semi-deciduous	Semi-evergreen	Evergreen	Habitat[1,2]	Uses[3]	Threat[4]
Thrinax radiata Schult. & Schult. f.	1173	1116		Sdtf, Setf, CoDu	1–4	T
Chamaedorea seifrizii Burret	681	146	23	Sdtf, Setf, Etf	1–3,7	NL
Sabal yapa Becc.	557	115	1	Dtf, Sdtf, Setf (SV)	1–4,6,7	NL
Coccothrinax readii H.J. Quero		722		Setf, CoDu	1,3	T
Bactris major Jacq.			27	Setf (FA)	1,4	PR
Gaussia maya (O.F. Cook) H.J. Quero			39	Setf, Etf	1,3	T
Attalea cohune Mart.			129	Setf (SV)	1	NL
Desmoncus chinantlensis Liebm. ex Mart			209	Setf, Etf	1,3	NL
Sabal mauritiiformis (H. Karst.) Griseb. & H. Wendl.			378	Setf, Etf (SV)	1,2,4	NL
Chamaedorea oblongata Mart.			1067	Setf	1,3,6	T
Cryosophila stauracantha (Heynh.) R. Evans			5524	Setf, Etf	1	T

References: [1]Orellana (1992), [2]Quero & Flores (2004), [3]de la Torre et al. (2009), [4]DOF (2010). **Habitat:** CoDu = coastal dune, Dtf = deciduous tropical forest, Sdtf = semi-deciduous tropical forest, Setf = semi-evergreen tropical forest, Etf = evergreen tropical forest, SV = secondary vegetation, FA = flooded area. **Uses:** 1 = Construction, 2 = Medicinal, 3 = Ornamental, 4 = Food, 5 = Fuel, 6 = Crafts, 7 = Social. **Threat:** PR = species that require special protection, T = Threatened, NL = not listed.



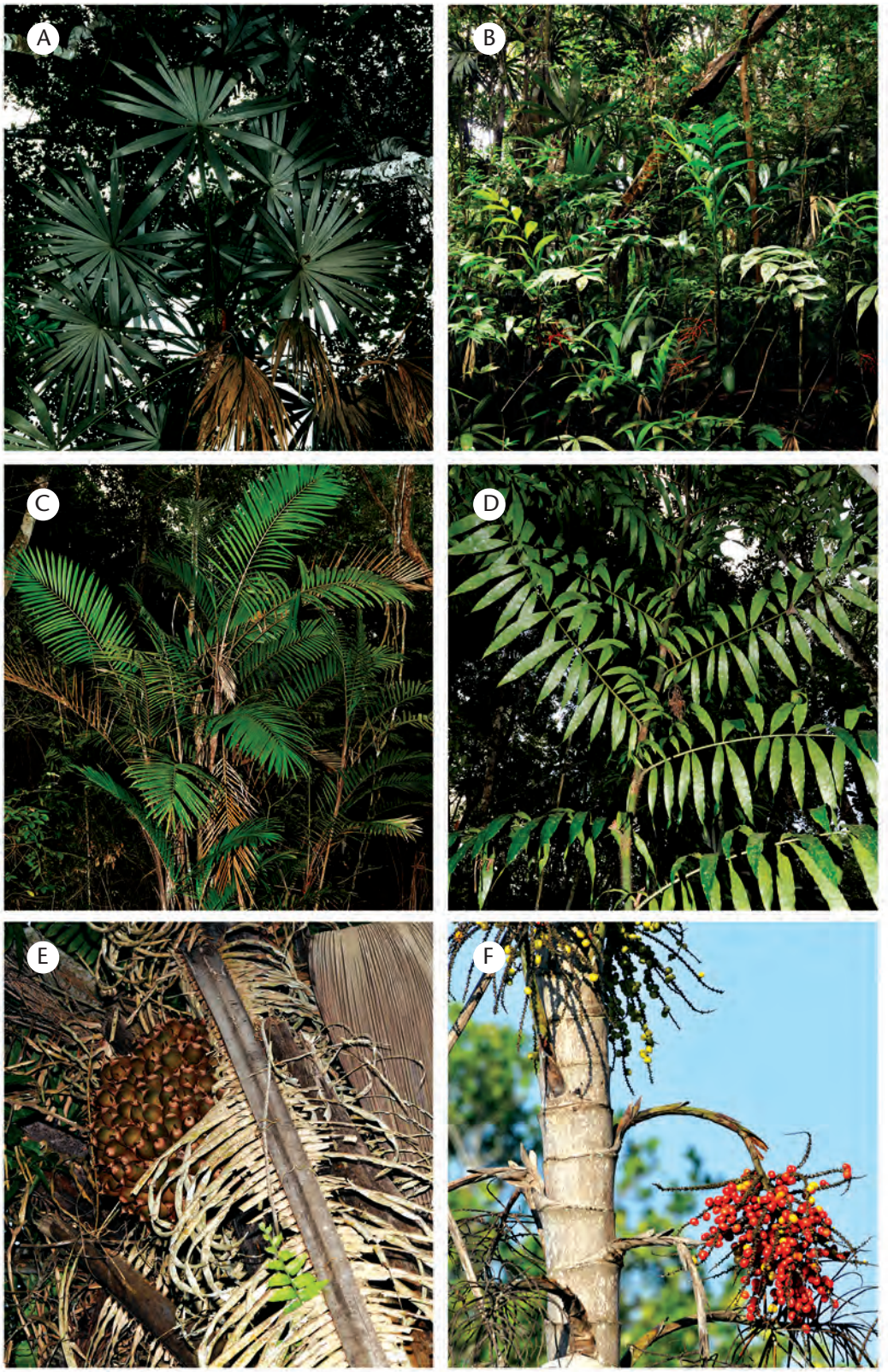
4. Palm species in the semi-deciduous and semi-evergeen forest on Yucatan peninsula. A. *Chamaedorea seifrizii* showing the narrow leaflets. B *Sabal yapa* showing its solitary habit, and crown of costapalmate leaves among which the large inflorescences protrude. C. *Thrinax radiata* leaf showing its palmate shape. D. *Thrinax radiata* (left) with green leaf undersurface and *Coccothrinax readii* (right) with silvery leaf under-surface.

the Mokoti River in Brazil and the Waki River in French Guyana (Salm et al. 2007, Kahn & de Granville 1992). In a study of palm species richness across tropical America based on range maps for palm distributions, the Yucatan peninsula had an estimated species richness of about 15 (Bjorholm et al. 2005). This suggests that the actual species richness in our study area is driven less by general and regional conditions and more by local environmental factors such as the rainfall and the very thin soils both of which limit available water and possibly nutrients.

Abundances – It is noticeable that the number of palm individuals per hectare found in the dry species poor palm communities in our study area are similar to what has been found elsewhere in tropical America (Alvarado-Segura et al. 2012), including very palm rich parts of the Amazon basin such as the Ucayali river valley described by Balslev et al. (2010). The

opposite page:

5. Palm species in the evergreen forest of southern Yucatán peninsula. A. *Cryosophila stauracantha* adults showing its palmate leaves with silvery under-surface. B. *Chamaedorea oblongata* in the understory. C. *Bactris major* growing in the mid-canopy and usually associated with wet and swampy places. D. *Desmoncus chinantlensis*, a climbing and spiny palm. E. *Attalea cohune,* the largest of all palms in Yucatan, reaches the canopy with its large, erect and pinnate leaves. F. *Gaussia maya* is a midstory palm.


A
B
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E
F

wet evergreen forest in our study area had palm densities (7396 ind./ha) that are comparable to the most dense palm communities in the Amazon basin, where the upper record is 9865 ind./ha in the lower Ucayali River valley (Kahn & de Granville 1992) and the second highest record is 6975 ind./ha along the Urituyacu River in northern Peru (Normand et al. 2006). This clearly shows that when the environmental conditions for palms growth limits the number of species that can thrive, the species that remain may compensate and produce higher abundances individually. But it must be remembered that in very species-rich palm communities many of the species are often represented by only few individuals that do not contribute much to the overall abundance of palms, so one should not expect a proportionality between species numbers and overall abundances.

Changes along the gradient – Although our transects were placed along a latitudinal gradient (Fig 2; 18–21°N latitude), associated with gradual change in rainfall, age of bedrocks and depth of the soils (Morrone 2005), only two species occurred along the entire gradient: *Chamaedorea seifrizii* and *Sabal yapa*. Perhaps the changes in species composition, richness and abundance observed along the gradient are caused by some thresholds in annual precipitation and seasonality. Even if the two driest sites are 150 km apart they share environmental conditions, which in turn are different from the most humid site in the evergreen forest in the south. Our observation suggest that the great phytogeographic barrier is between a southern wet vegetation with rich palm communities with as many as nine species, mostly of the arecoid subfamily, and on the other side, the drier forest types in the central and northern parts with fewer species (3 or 4) that are mostly of the coryphoid palm subfamily. This pattern is similar to that found in other taxonomic groups in Yucatan, such as legumes, trees, and reptiles (Lee 1980, Ibarra-Manríquez et al. 2002, Duno de Stefano et al. 2012).

Yucatecan palms not registered in our transects

In our 45 transects we encountered 11 of the 20 species that are known to occur in the Yucatan peninsula. Some of the species not encountered are quite common, but occur in specialized habitats that we did not visit. *Acoelorrhaphe wrightii* is cespitose with palmate leaves and spiny petioles. It is very common and abundant in occasionally flooded areas. Where it grows it is usually dominant and the vegetation with high abundance of *Acoelorrhaphe wrightii* is called *tasistales* for the local name of this species (*tasiste*). *Pseudophoenix sargentii* is a solitary palm with pinnate leaves that grows in coastal dunes and in medium stature semi-deciduous forests. Other palms that did not enter our transects include *Acrocomia aculeata,* which is a very spiny, pinnately leaved, medium-sized palm that is very common in disturbed sites. Other Yucatecan palms simply do not reach the state of Quintana Roo where we studied the palm communities (*Attalea butyracea, Sabal mexicana, Roystonea regia*). Finally *Sabal gretherae* is described from a single locality in the north of Quintana Roo where it forms a dense population in a very disturbed site. Its distinction from *Sabal mexicana* is doubtful (Henderson et al. 1995), although its karyotype is different (Palomino & Quero 1992). *Sabal gretherae* is closely related to *S. guatemalensis* and *S. mexicana* and it is by no means clear if the group should best be treated as one, two or three species.

Conservation

From a conservation perspective it is noticeable that five species (*Thrinax radiata, Coccothrinax readii, Gaussia maya, Chamaedorea oblongata, Cryosophila stauracantha*) which have previously been classified as threatened (DOF 2010) were abundant at the places we visited, *Gaussia maya* being an exception (Table 1). This points to the eastern Yucatan peninsula as an important area for the conservation of palms. Two of the species classified as threatened (*Thrinax radiata, Cryosophila stauracantha*) were actually quite abundant. Nevertheless, regardless of their abundance, the fragmentation of their habitat through agriculture, cattle farming and tourist activities threatens their ecological stability and makes them more vulnerable to natural disasters such as hurricanes and forest fires.

Acknowledgments

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Gutiérrez, in Tres Garantías and finally Reinaldo Guzmán and Guillermo Huchim, in Caobas. We are also grateful to Paola Marfil for technical assistance.

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continued from p. 76

in the Peters and Henderson book, Evans et al. 2001 is acknowledged along with a more geographically restricted guide for Cambodia (Khou Eang Hourt 2008 – mentioned in text but missing from Literature Cited). However, no mention is made of the substantial careful systematic monograph of Indochinese rattans published by Evans et al. (2002) that is fundamental to understanding the taxonomy of rattans in this region.

The bulk of the book, in fact pages 19–168, is taken up by the field guide (Field guide? At 24 × 16.5 cm, this may not be the most convenient size for the field and gloss paper throughout invites problems with dampness). There is an all too brief glossary with important terms missing (no mention of ruminate and homogeneous, which pops up almost immediately in couplet 2 in the key, for example). The key would have benefitted from clearer formatting. I regret the fact that species are arranged alphabetically – easy to find your way around if you are already familiar with the species, but not if you are trying to identify species you are not certain of and where closely related species are scattered through the 149 pages. Perhaps this could have been offset if related species were discussed in the text under each species – but they are not. This is most unfortunate, especially when there is almost always plenty of blank space at the end of each species. This is the great strength of the Evans et al. field guide where related species, most similar species or species that could be confused with the species under question are always indicated and quick notes provided on how they differ. In the end, I suspect that most users of the new book will try to identify species by thumbing through the photos. The color photographs are indeed supremely useful and should allow easy comparison between species. I have to applaud the collection of high quality photographs, the vast majority taken of living specimens and representing no mean feat. The maps are impressive, but with color background and orange-red dots they will be largely unreadable by anyone with red/green color blindness. There is much to be said for simple gray scale or black and white maps with black dots.

Chapter III includes much of real interest, in particular the results of inventories of rattans and cane lengths from various forest areas within the region. The results, not surprisingly, clearly show the scarcity of harvestable cane of the elite species. A table in Chapter III summarizes extent of occurrence data from which IUCN conservation criteria can be derived. Astonishingly these criteria (Critically Endangered, Endangered, Vulnerable etc.) are not clearly indicated. It would have been so easy to add these assessments to each species in Chapter II. The development of protocols for rattan inventories, refined from the experiences of previous workers and his own extensive experience presented by Charles Peters in Chapter IV should be immensely useful to future workers needing to make assessments of the standing crop of rattan and potential yields.

One aspect of rattans almost completely missing from this book is rattan cultivation; brief mention is made under six of the 65 species accounts that they are planted, but that is all. It seems strange that a book aimed at the sustainable management of rattan does not discuss cultivation in any more detail. The large scale intensive cultivation of *Calamus tenuis* and other species for palm hearts is unique to the Mekong area and northeastern Thailand and deserves detailed mention along with attempts to grow *Calamus tetradactylus* and other species on a plantation scale.

Anyone working with rattan in the Indochinese region will need this book, but I suggest that for rattan identification they will also continue to find the earlier field guide by Evans et al. invaluable for its clever design and ease of use.

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Four New Natural Hybrids of *Syagrus* from Brazil

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In this paper we describe four new natural hybrids of *Syagrus* found between 2007 and 2013 in the states of Minas Gerais and Bahia in Brazil.

Hybridization between species of *Syagrus* is apparently not an uncommon occurrence in natural habitats where some species grow together (Glassman 1970). Six natural hybrids have been described to date: *Syagrus* × *camposportoana* (Bondar) Glassman, *S.* × *costae* Glassman, *S.* × *matafome* (Bondar) A.D. Hawkes, *S.* × *mirandana* Noblick, *S.* × *tostana* (Bondar) Glassman, *S.* × *teixeiriana* Glassman. Five others were created artificially or accidently by man: *S.* × *montgomeryana* Noblick ex Hodel, *S. coronata* × *S. picrophylla*, *S. picrophylla* × *S. romanzoffiana*, *S. romanzoffiana* × *S. yungasensis* and *S. schizophylla* × *S.* × *montgomeryana* (Glassman 1987, Noblick 2010, Hodel 2011, Noblick 2012).

Natural hybrids and artificial hybridization between *Syagrus* species are currently highly valued by growers and gardeners because they expand the landscaping potential of the genus (Hodel 2011); one reason is that the plants generated offer greater adaptability to climate and soil changing and are usually faster growing than pure species.

The Brazilian states of Minas Gerais and Bahia have a great diversity of *Syagrus* species, and the following taxa have been recorded: *S. allagopteroides* Noblick & Lorenzi, *S. angustifolia* Noblick & Lorenzi, *S. botryophora* (Mart.) Mart., *S. campestris* (Mart.) H. Wendl., *S. comosa* (Mart.) Mart., *S. coronata* (Mart.) Becc., *S. duartei* Glassman, *S. evansiana* Noblick, *S. flexuosa* (Mart.) Becc., *S. glaucescens* Glaz. ex Becc., *S. glazioviana* (Dammer) Becc., *S. gouveiana* Noblick & Lorenzi, *S. graminifolia* (Drude) Becc., *S. harleyi* Glassman, *S. itacambirana* Noblick & Lorenzi, *S. kellyana* Noblick & Lorenzi, *S. macrocarpa* Barb. Rodr., *S. mendanhensis* Glassman, *S. microphylla* Burret, *S. minor* Noblick & Lorenzi, *S. oleracea* (Mart.) Becc., *S. pleioclada* Burret, *S. pseudococos* (Raddi) Glassman, *S. romanzoffiana* (Cham.) Glassman, *S. ruschiana* (Bondar) Glassman, *S. santosii* K. Soares & C.A. Guim., *S. schizophylla* (Mart.) Glassman, *S. vagans* (Bondar) A.D. Hawkes and *S. werdermannii* Burret (Noblick & Lorenzi 2010, Noblick 2010).

Syagrus × altopalacioensis K. Soares & L.C. Assis **nothosp. nov**. (*S. pleioclada* × *S. duartei*).

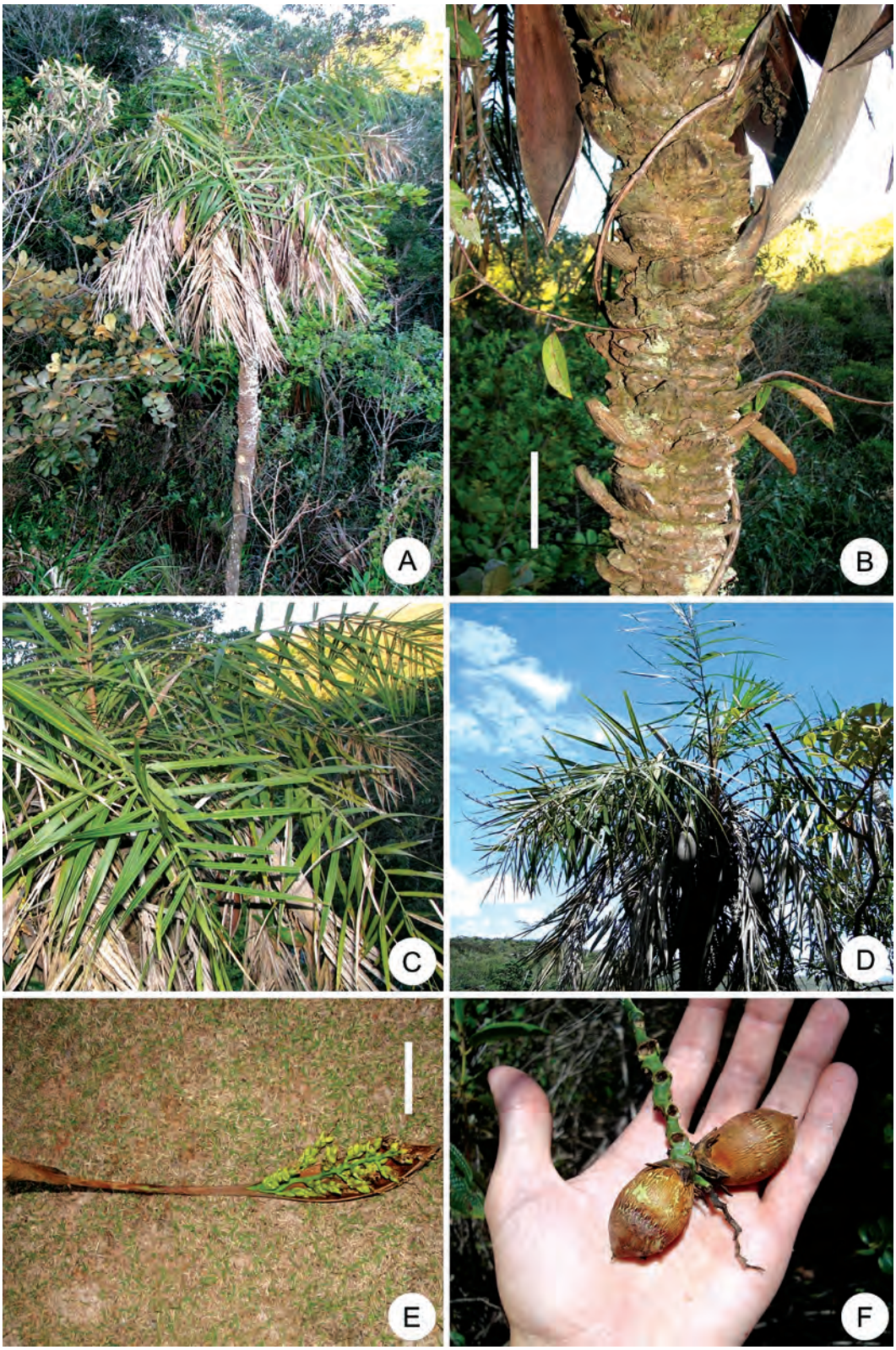
Hybrid between *Syagrus pleioclada* and *Syagrus duartei* with intermediate morphologic characteristics. It differs from *S. pleioclada* by tall scale, by its leaflet arrangement, which are inserted in different planes. It differs from *S. duartei* primarily by having fewer leaflets, which are quite spaced. Type: BRAZIL. Minas Gerais: município de Santana do Riacho, Fazenda Alto do Palácio, near to Cachoeira do Coronel, 19º16'19.55"S 43º33'18.34"W, fl., fr., 16 Jun. 2013, *K. Soares, L. Assis & A. G. Vieira 57* (Holotype HDCF).

Solitary palm, small, 1.70 m tall (Fig. 1A). **Stem** 10 cm diam., ringed, covered with leaf base remains (Fig. 1B). **Leaves** 10, erect, 0.7–0.8 m long (Fig. 1C and 1D); sheath to 37 cm long, deeply split opposite petiole, margins with hair-like fibers; pseudopetiole 15–20 cm long; petiole 4 cm long, 1.2 cm wide, convex abaxially and slightly channeled adaxially, covered with a ferruginous indument; rachis 65–70 cm long, densely covered with ferruginous indument, ± flat adaxially near the base progressively becoming angled, costa sharp distally; leaflets 35–40 per side, irregularly arranged, clustered, inserted in 2 or 4 planes, leaflet groups rather distant from each other by 5–8 cm, proximal leaflets to 25–30 × 0.8 cm, mid-blade leaflets 35–40 × 1.5–2.0 cm, most distal leaflets 20–25 × 0.6–0.7 cm, long-lanceolate, rigid, thin-leathery, green, midrib covered with tomentum on the abaxial side. **Inflorescences** interfoliar, 80–90 cm long, branched to 1 order (Fig. 1E); prophyll 30–35 × 3 cm; peduncular bract woody, sulcate, green, total length 85–100 cm, expanded portion 30–35 × 7.5–9.5 cm, bearing a 1 cm beak; peduncle 54–60 × 0.5–0.6 cm, densely covered with tomentum; rachis 15–20 cm long; rachillae 10–12, proximal 10–13 cm long, mid-rachis 7.5–10.5 cm long, most distal 5.0–6.2 cm long, arranged in a spiral around rachis. **Flowers** cream, yellow-green or yellow, arranged in triads at basal portion, with one pistillate flower flanked on either side by earlier-opening staminate flowers, in distal one-fourth of rachillae staminate flowers only; staminate flower 13 mm long, cupular, sepals and petals 3; sepals connate, less than 1 mm long, glabrous; petals valvate, 12 × 3 mm with acute tips, glabrous, stamens 6, ca. 6 mm long, anther 5–6 mm long. pistillate 12–15 × 5–7 mm, pyramidal or ovoid; sepals and petals 3; sepals 12–15 × 10–12 mm; petals imbricate, 10–13 × 10–12 mm; pistil 12–15 mm, ovoid, stigmas 3. **Fruits** 4.5 × 3 cm, ovoid, maturing cream or yellowish green, covered by ferruginous indument (Fig. 1F); endocarp 3.2 × 2 cm, ovoid.

ETYMOLOGY: The specific epithet *altopalacioensis* refers to the Alto do Palácio Private Reserve, RPPN (Reserva Particular do Patrimônio Natural), located in Santana do Riacho in the state of Minas Gerais (Brazil), where this hybrid was found.

DISTRIBUTION AND HABITAT: This hybrid is not common; to date only two plants were found, both at RPPN Alto Palacio private reserve, one of them being a young plant.

NOTE: This hybrid is easily recognized among the individuals of the "pure" species. It shows characters intermediate between *Syagrus pleioclada* and *Syagrus duartei*. It differs from *S. pleioclada* by tall stems (vs. low stature, seldom reaching 1.5 m), by its leaflet arrangement, the leaflets being inserted in different planes (vs. deflexed leaflets). It differs from *S. duartei* primarily by having fewer leaflets, which are



1. A. *Syagrus* × *altopalacioensis* (*S. pleioclada* × *S. duartei*) habit; B. Stem detail, scale 10 cm; C. Leaf detail; D. Crown of palm; E. Inflorescence, scale 10 cm; F. Fruits.

Table 1. Comparison between *Syagrus* × *altopalacioensis* and its parental characterstics.

Characters	*S. pleioclada*	*S.* × *altopalacioensis*	*S. duartei*
Height (m)	up to 1.5	1.7	up to 2
Leaflet arrangement	deflected in one plane; spaced	irregular in 3 or 4 planes; spaced	irregular in 3 or 4 planes; dense
Leaflet number	18–25	35–40	44–64
Rachillae number	8–20	10–12	5–8

quite distant (vs. more densely and evenly distributed along the rachis) (Table 1).

OBSERVATIONS: During the collection of data to describe this new hybrid, including observations of their parents, i.e. the pure species, the authors found some difficulty in clarifying the identity of the taxa in the *Syagrus glaucescens*/*S. duartei* complex. Populations from many locations were analyzed in the Espinhaço (Santana do Riacho, Morro do Pilar, Diamantina, Serro and other municipalities); in all localities the taxa showed great morphological variability, especially in relation to fruit/endocarp size, number of leaflets and rachillae (characteristics that separate *S. glaucescens* and *S. duartei*). Therefore, we have not reached any conclusions about the validity of the species *S. duartei*.

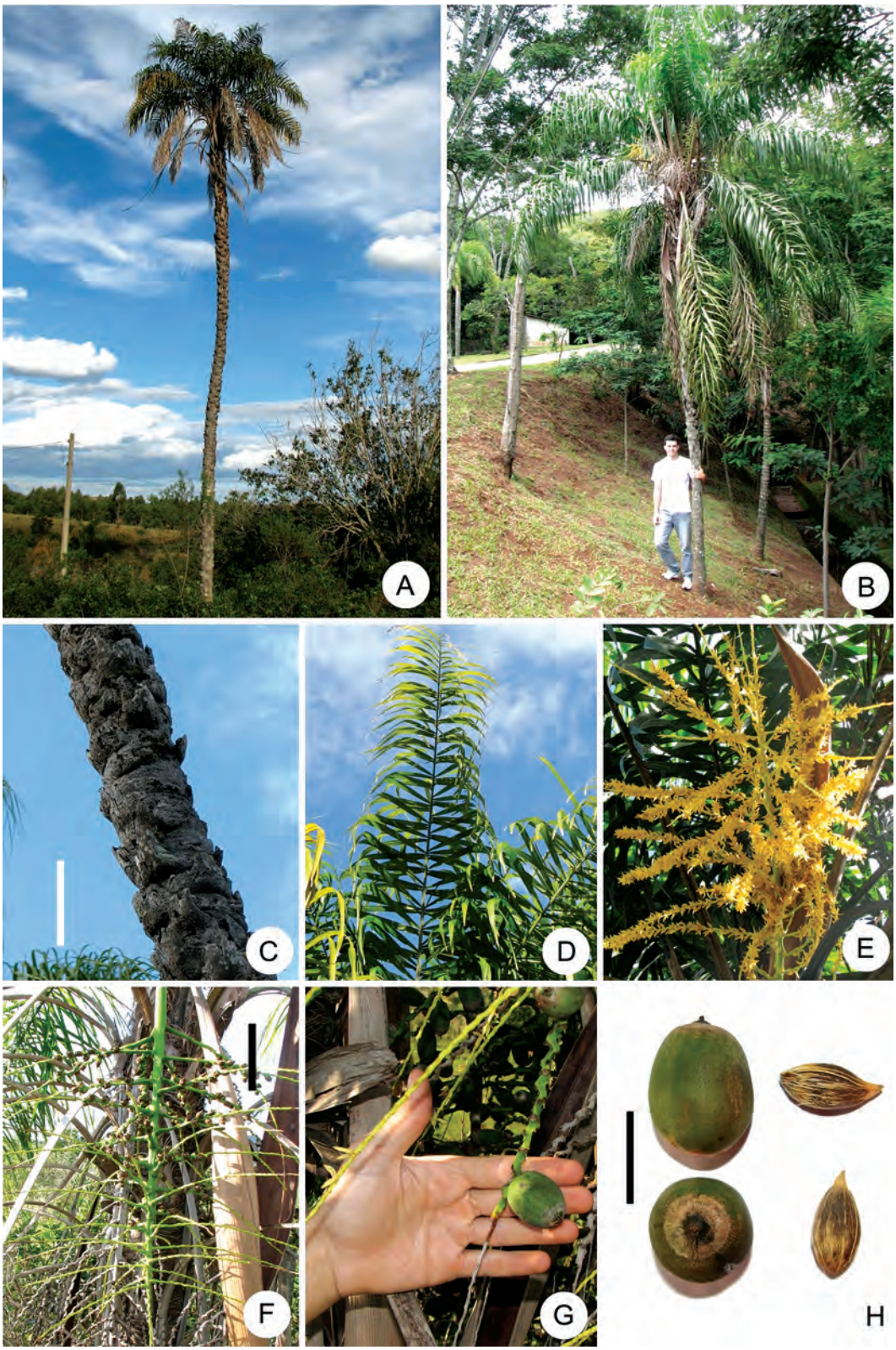
Syagrus × andrequiceana K. Soares & L.C. Assis **nothosp. nov**. (*S. romanzoffiana* × *S. flexuosa*).

Hybrid between *Syagrus romanzoffiana* and *Syagrus flexuosa*. It differs from its parents mostly by the rachillae arrangement on the rachis, in the first quarter of the rachis length, inflorescence branches are arranged unilaterally, in the remainder of the rachis the rachillae are inserted spirally. Type: BRAZIL. Minas Gerais: município de Datas, near Córrego Andrequicé, 18°33'21.44"S 43°38' 25.23"W, fl., fr., 17 Oct. 2012, *K. Soares, L. Assis & A.G. Vieira 46* (Holotype, paratype HDCF).

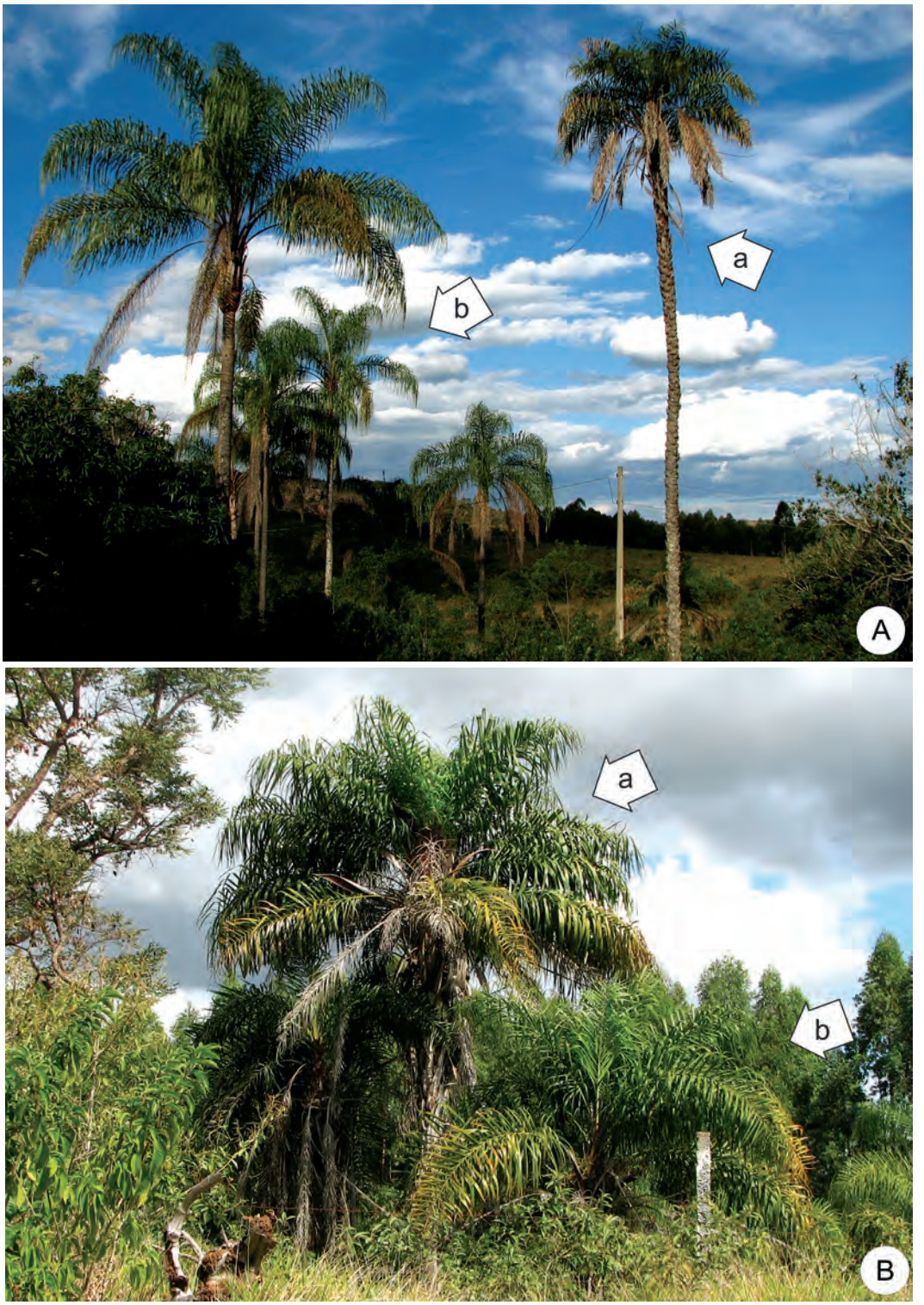
Solitary palm, size moderate or high, 5–13 m tall (Fig. 2A and 2B). **Stem** 14–21 cm diam., covered with leaf base remains, at least in the younger part (Fig. 2C). **Leaves** 15–26, spirally arranged, arched, 2–3 m long, bright green (Fig. 2D); sheath 57–93 cm, deeply split opposite petiole, margins with hair-like fibers; pseudopetiole 46–67 cm long; petiole 6–10 × 1.8–2 cm; convex abaxially and slightly channeled adaxially, with whitish or grayish, scurfy, mealy, ± deciduous tomentum abaxially; rachis 164–190 cm long, convex with tomentum, ± flat adaxially near the base progressively becoming an angled, sharp costa distally; leaflets 100–120 per side, irregularly arranged, clustered, inserted in 3 or 4 planes, leaflets groups fairly separate from each other, long-lanceolate, ± coiled, thin-leathery, dark green, with conspicuous transverse nerves on the adaxial side, abaxially the midrib with scarce ramenta, proximal leaflets to 50–55 × 0.9–1.1 cm, mid-blade leaflets 52–58 × 1.8–2.2 cm, most distal leaflets 26–39 × 0.7–0.9 cm. **Inflorescences** androgynous, interfoliar (Fig. 2E), 100–150 cm long, arching in flower,

Table 2. Comparison between *Syagrus* × *andrequiceana* and its parental characterstics.

Characters	*S. romanzoffiana*	*S.* × *andrequinceana*	*S. flexuosa*
Stem diam. (cm)	20–55	14–21	6–15
Leaf sheath retained	no	yes	yes
Rachillae arrangement	spiral	unilateral basally spiral distally	unilateral
♀ flower length (mm)	5–6	8–10	16–20
Fruit size (cm)	1.8–3.5 × 1.4–2.8	4–5 × 2.0–2.5	3.0–5.5 × 3.5–3.2
Endosperm	partially intruded by endocarp	homogeneous	homogeneous



2. A. *Syagrus* × *andrequiceana* (*S. romanzoffiana* × *S. flexuosa*) habit; B. Habit in Mangabeiras Park, Belo Horizonte; C. Stem detail, scale 20 cm; D. Leaves; E. Inflorescence; F. Infructescence showing rachillae, proximal unilateral and mid-rachillae/distal in spiral, scale 20 cm; G. Fuit; H. Fruits and endocarp, scale 2 cm.



3. A, B. *Syagrus* × *andrequiceana* (*S. romanzoffiana* × *S. flexuosa*) (a) growing close to *S. romanzoffiana* (b).

pendulous in fruit, branched to 1 order; prophyll 35 × 6 cm; peduncular bract woody, sulcate, green, total length 103–145 cm, expanded portion 38–100 × 7.5–17 cm, bearing a 5–6 cm beak; peduncle 38–70 × 1.5–2 cm, densely covered with tomentum; rachis 27–60 cm long; rachillae 42–61, proximal 25–40 cm long, mid-rachis 16–35 cm long, most distal

Table 3. Comparison between *Syagrus* × *lacerdamourae* and its parental characterstics.

Characters	*S. coronata*	*S.* × *lacerdamourae*	*S. botryophora*
Stem surface	sheaths retained, or deeply ringed	smooth, ringed	smooth, ringed
Leaflet arragement	irregular, in 3 or 4 planes	irregular, in 3 or 4 planes	regular, in "V"
Peduncular bract	shallow grooves	shallow grooves	deep grooves
Rachillae	unbranched	branched	unbranched
Epicarp	covered with indumentum	covered with indumentum	smooth

8–24 cm long, proximal rachillae arranged unilateral around rachis (like *S. flexuosa*), distal and mid-rachillae arranged in spiral (like *S. romanzoffiana*) (Fig. 2F). **Flowers**, cream, yellow-green or yellow, arranged in triads at basal portion of rachillae, with one pistillate flower flanked on each of two sides by earlier-opening staminate flowers, in distal one-fourth of rachillae only staminate flowers; staminate 7–9 mm, sepals connate and cream-colored in proximal 1 mm; petals 6–8 × 3 mm, long-ovate, valvate; stamens 6, ca. 4 mm long, anthers 4 mm long, dorsifixed below middle, pistillode short, 1 mm tall; pistillate 8–10 × 7 mm, ovoid, sepals 8–10 6–9 mm, petals 6–7 × 6–7 mm, imbricate nearly to apex, pistil 8–9.5 × 5 mm, ovoid, stigmas 3. **Fruits** 4–5 × 2–2.5 cm, ovoid, maturing yellow-orange or green-yellow; endocarp ovoid, 2.2–3.2 × 1.2–1.6 cm with homogeneous endosperm (Fig. 2G & 2H).

ETYMOLOGY: The specific epithet *andrequiceana* refers to the Andrequicé stream which the first individuals of these hybrids were found living near.

DISTRIBUTION AND HABITAT: this hybrid is relatively common in areas where the species *S. flexuosa* (Mart.) Becc. and *Syagrus romanzoffiana* (Cham.) Glassman grow together (Fig. 3A & 3B), a group of several hybrids was observed in the Datas – MG municipality, including some backcrossing (*S. romanzoffiana* × *S.* × *andrequiceana*). Other specimens were also seen in the Datas municipality (18º34'8.01"S 43º37'39.02"W), growing in Belo Horizonte in the Santa Rosa Avenue (19º51'10.13"S 43º57'49.85"W) and in Parque das Mangabeiras (19º57'4.19º57'4.20"S 43°54'18.43"W), Vale Verde farm in Betim–MG municipality (19º56'55.79"S 44º16'44.41"W), and Rio Manso–MG municipality, close to the road MG 831 (20º15'46.35"S 44º18'41.46"W).

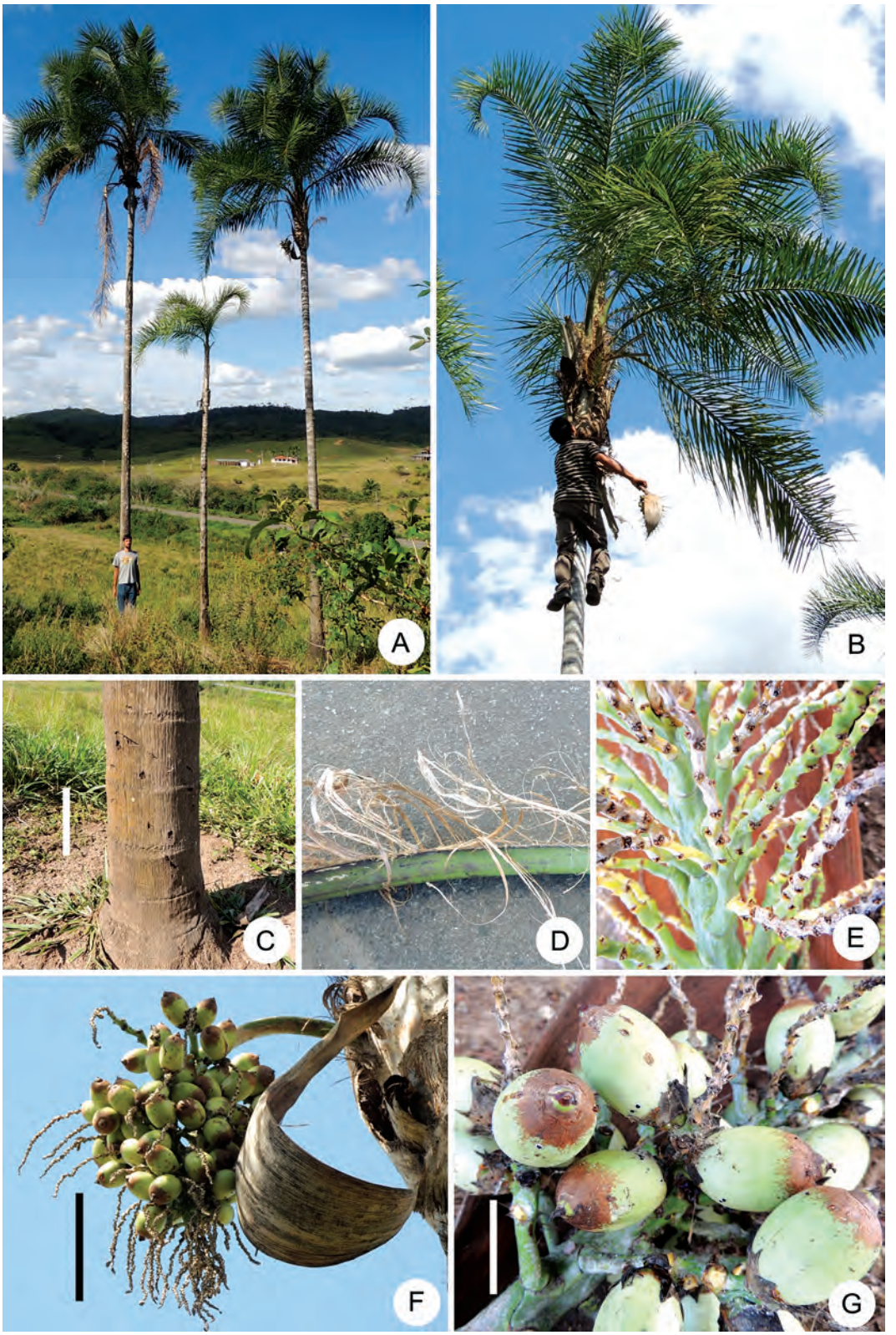
NOTE: It has characteristics intermediate between *S. romanzoffiana* and *S. flexuosa*, easily distinguished from the first by a thinner stem, with leaf sheaths adhering for a long time, leaving deep scars on its surface when they fall, by the larger pistillate flowers, by the arrangement of the rachillae on the rachis – in the first quarter of the rachis length, inflorescence branches are arranged unilaterally similar to *S. flexuosa*, and in the remainder of the rachis the rachillae are inserted spirally and by the fruit and endocarp, which are larger than in *S. romanzoffiana* with homogeneous endosperm (vs. irregularly penetrated by the endocarp). It differs from *S. flexuosa* by having larger stems, leaves and inflorescences, with stems always single, and also by the spiral arrangement of the rachillae along most of the rachis length (Table 2).

The palm has a rapid development and is a fertile hybrid. Although it produces fewer seeds per inflorescence, its fresh seeds germinate easily.

Syagrus × lacerdamourae K. Soares & C.A. Guim **nothosp. nov.** (*S. coronata* × *S. botryophora).*

Hybrid between *Syagrus coronata* and *Syagrus botryophora*. Morphologically similar to *Syagrus botryophora*, it differs from its parents mostly in displaying some branched rachillae (2–4 branches), an uncommon characteristic in *Syagrus* species. Type: BRAZIL. Bahia: Itapetinga, Fazenda Atalaia, 15º10'18.56"S 40º5'4.76"W, fl. fr., 22 Oct. 2013, *K. Soares, J. Santos, L. Assis, C. Guimarães 54* (Holotype HDCF).

Solitary palm, moderate to large, 5–16 m tall (Fig. 4A & 4B). **Stem** 4–14 m in height and 18–26 cm diam., tall, ringed with dilated base (Fig. 4C). **Leaves** 10–15, spirally arranged, arched, 3 m long; sheath 120 × 20 cm, deeply



4. A. *Syagrus* × *lacerdamourae* (*S. coronata* × *S. botryophora*) habit; B. Crown of palm; C. Dilated base of stem, scale 20 cm; D. Hair-like fibers of pseudopetiole; E. Branched rachillae; F. Infructescence, scale 20 cm; G. Fruits, scale 3 cm.

split opposite petiole margins with many hair-like fibers (Fig. 4D); petiole 13–15 × 2.5 cm, convex abaxially and slightly channeled adaxially, with whitish or grayish, scurfy, mealy, ± deciduous tomentum abaxially; rachis 280–300 cm long, convex, ± flat adaxially near the base progressively becoming angled, costa sharp distally; leaflets 190–200 per side, irregularly arranged, clustered, inserted in 3 or 4 planes, rigid, dark green, proximal leaflets to 77–86 × 1.4–2.0 cm, mid-blade leaflets 63–84 × 2.5–3.0 cm, most distal leaflets 20–25 × 1.0–1.3 cm, long-lanceolate. **Inflorescences** androgynous, interfoliar, 45–70 cm long, arching pendulous, always branched to 2 orders, the primary rachillae divided up to 4 branches (Fig. 4E); prophyll 37–44 × 6–7 cm; peduncular bract woody, grooved, but not deeply grooved as in *S. botryophora*, total length 85–97 cm, expanded portion 48–56 × 14–20 cm, bearing a 2–6 cm beak; peduncle 38–41 × 2.5–3 cm, densely covered with tomentum; rachis 38–43 cm long; rachillae 59–71, proximal 20–25 cm long, mid-rachis 13–16 cm long, most distal 8–10 cm long. **Flowers** cream or yellow, arranged in triads at the basal portion of rachillae, with one pistillate flower flanked on each of the two sides by earlier-opening staminate flowers, in distal part of rachillae only staminate flowers; staminate 14–17 mm; sepals 1 × 1.5 mm, connate; petals 12–13 × 5 mm, long-ovate, valvate; stamens 6, ca. 5 mm long, anthers 5 mm long, dorsifixed below middle, pistillode short, 1 mm tall; pistillate 17–18 × 10–11 mm, ovoid, sepals 13–14 × 8–10 mm, petals 12–14 × 8–9 mm, imbricate, pistil 12 × 5 mm, ovoid, stigmas 3. **Fruits** 4.5–4.7 × 2.7–2.8 cm, ovoid, 2–5 per rachillae, ice-white or yellowish-green while maturing, with brownish-yellow tomentum at the apex when mature (like a halo) (Fig. 4F & 4G); mesocarp rich in oil; endocarp ovoid, 4.2–5.0 × 2.4–2.6 cm with homogeneous endosperm.

ETYMOLOGY: The specific epithet *lacerdamourae* honors the forestry engineer José Inácio Lacerda Moura, expert on pests and diseases of palms.

DISTRIBUTION AND HABITAT: To date only eight hybrids were found growing together in the type locality.

NOTE: This palm has similar characteristics to *S. botryophora,* such as the tall and slender stem with smooth surface, only slightly ringed and with dilated base, and by short and wide peduncular bract. However, this hybrid has leaflets irregularly distributed in clusters and in divergent planes along rachis, peduncular bract is not deeply grooved (but similar to its other parent *S. coronata*) and the epicarp of the fruit is covered with indumentum (*S. botryophora* has a glabrous epicarp, orange when ripe). Interestingly, this hybrid always displays some branched rachillae (2–4 branches), usually those that are inserted in the middle part of the rachis; this characteristic is not present in any *Syagrus* species (Table 3). It is a fertile hybrid.

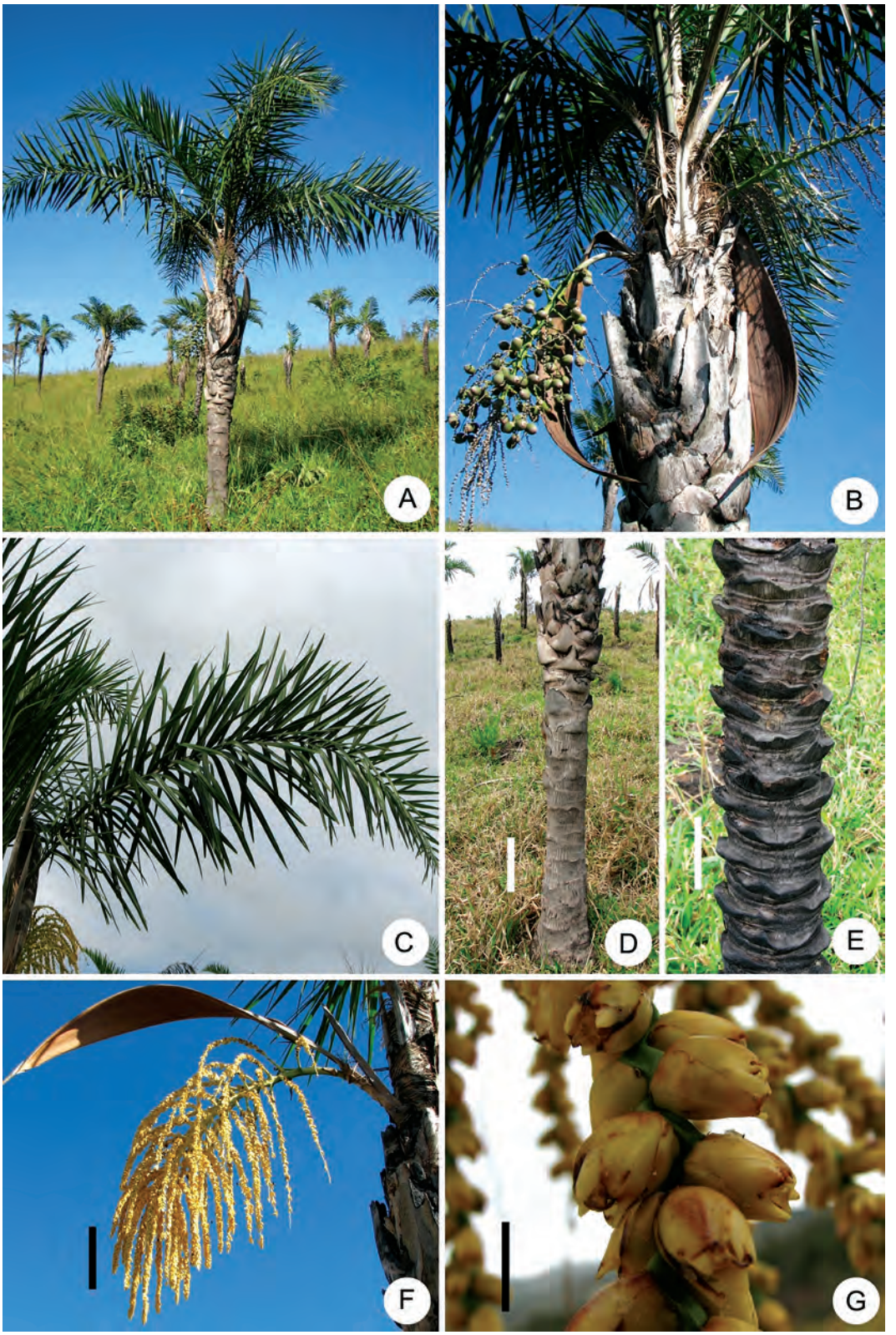
Syagrus × serroana K. Soares & L.C. Assis **nothosp. nov**. (*S. glaucescens* × *S. romanzoffiana*).

Hybrid between *Syagrus glaucescens* and *Syagrus romanzoffiana* with intermediate morphological characteristcs mainly in the consistency of the leaflets, in the surface of the stem and overall size of the leaves, inflorescence rachis and stem. Typus: BRAZIL. Minas Gerais: Serro, próximo ao Rio do Peixe, 8º38'16.73"S 43º24'33.82"W, fl., fr., 26 Apr. 2012, *K. Soares, L. Assis & A.G. Vieira 48* (Holotypus, HDCF).

Solitary palm, size moderate, 4–7 m tall (Fig. 5A). **Stem** 17–22 cm diam., covered with leaf base remains in the younger part, vertically spiraling rows (Fig. 5B), when the sheaths fall, the scars that remain on the stem less marked than in *S. glaucescens* (Fig. 5D & 5E). **Leaves**

Table 4. Comparison between *Syagrus* × *serroana* and its parental characterstics.

Characters	*S. glaucescens*	*S.* × *serroana*	*S. romanzoffiana*
Stem diam. (cm)	8–12	17–22	20–55
Persistent leaf sheaths	present	present on younger part	absent
Leaf rachis (cm)	55–118	220–250	170–440
Leaflet consistency	rigid	rigid	soft
Inflorescence rachis (cm)	5–16	45–55	30–110
Rachillae number	5–17	60–70	40–330



5. A. *Syagrus* × *serroana* (*S. glaucescens* × *S. romanzoffiana*) habit; B. Stem with spiraling rows of leaf bases; C. leaf detail; D. Stem detail, scale 20 cm; E. *Syagrus glaucescens* stem detail, scale 10 cm; F. *Syagrus* × *serrana* inflorescence, scale 20 cm; G. pistillate flowers, scale 10 mm.

6. A. *Syagrus* × serroana (*S. glaucecens* × *S. romanzoffiana*) (a) among *Syagrus glaucescens* (b); B. *S. romanzoffiana* (a) and *S. glaucescens* (a) growing together (parental species).

9–12, possibly more, little arched, 2.5–3 m long, dark green, bright, (Fig. 5C); sheath 47–53 cm, deeply split opposite petiole, margins with hair-like fibers; pseudopetiole 30 cm long; petiole 7–8 × 2.2–2.5 cm, convex abaxially and slightly channeled adaxially,

7. Syagrus glaucescens.

8. A. *Syagrus* × *camposportoana* (*S. coronata* × *S. romanzoffiana*) habit; B. leaves with spiral insertion on stem; C. stem detail, scale 20 cm.

with dense brownish, mealy, ± deciduous tomentum; rachis 220–250 cm long, convex, abundantly tomentose, ± flat adaxially near the base progressively becoming an angled, sharp costa distally; leaflets 115–120 per side, rigid, irregularly arranged, inserted in 3 or 4 planes, clustered 3–4 leaflets, proximal leaflets to 50–55 × 1.7–1.8 cm, mid-blade leaflets 55–65 × 2.8–3 cm, most distal leaflets 19–25 × 1.1–2 cm, long-lanceolate, straight, thin-leathery, dark green, abaxially the midrib with scarce ramenta. **Inflorescences** androgynous, interfoliar, 80–100 cm long, pendulous, 1–branched; prophyll 59 × 6 cm; peduncular bract woody, sulcate, green, total length 120–130 cm, expanded portion 76–81 × 11.5–15 cm, bearing a 3 cm beak; peduncle 45–500 × 2.0–2.3 cm, densely covered with tomentum (Fig. 5F); rachis 45–55 cm long; rachillae 60–70, proximal 39–55 cm long, mid-rachis 35–50 cm long, most distal 20–30 cm long, arranged in spiral. **Flowers**, cream or yellow, arranged spirally in triads (1 pistillate and 2 staminate) on the lower portion and in dyads or singly (only staminate) on upper portion of the rachillae; staminate, 9–10 mm long, cupular, sepals and petals 3, sepals connate, less than 1 mm long, glabrous, petals valvate, 8–9 × 3 mm with acute tips, glabrous, stamens 6, ca. 4–5 mm long, anther 3–4 mm long, filaments 1–2 mm long pistillode 1.0–1.5 mm and trifid; pistillate flower 10–12 × 5–6 mm, ovoid; sepals and petals 3; sepals 10–12 × 6–10 mm, petals imbricate, 8–10 × 6–9 mm, pistil 10–11 mm, ovoid, stigmas 3 (Fig. 5G). **Fruits** 4.2–4.5 × 2.5–3.2 cm, ovoid, maturing yellowish green; endocarp fusiform, 2.8–3.5 × 1–1.3 cm, homogeneous endosperm.

ETYMOLOGY: The epithet *serroana* refers to the Serro municipality in Minas Gerais (Brazil), the first locality where this hybrid was found.

DISTRIBUTION AND HABITAT: Natural hybrids between *S. glaucescens* and *S. romanzoffiana* seem to be infrequent, only two individuals were found, of the type locality (Fig. 6A) and another on the road from Diamantina to Milho Verde (18º17'23.93"S 43º33'9.00"W).

NOTE: This hybrid has intermediate characteristics between the species *S. glaucescens* (Fig. 7) and *S. romanzoffiana* (Fig. 6B) mainly in the consistency of the leaflets, in the surface of the stem and overall size (size of the leaves, inflorescence rachis and stem), it is easily recognized among pure specimens (Table 4).

Syagrus × camposportoana (Bondar) Glassman, Fieldiana (Bot.) 31: 392. 1968. (*S. coronata* × *S. romanzoffiana*).

This natural hybrid was described in 1942 (Bondar 1942) as *Cocos camposportoana* Bondar, from a plant in the Poções municipality grown from a seedling brought from the Itabuna municipality, in the state of Bahia. In his review of the genus *Syagrus*, Glassman (1987) questioned the hypothesis of this hybrid being natural ("...It is uncertain if two parents actually hybridize under natural condition"), because since having been described, there has never been any other botanical material collected or other record pointing to the natural occurrence of this hybrid, even during expeditions that Glassman made to the natural habitat where the species *S. coronata* and *S. romanzoffiana* grow together. Noblick (1991) reported not having seen a confirmed specimen of this hybrid in cultivation or in its natural habitat.

In this paper we are confirming the natural presence of *S.* × *camposportoana* because a specimen was found in a remote place, "alto do Rio Gongogi," in the Iguaí municipality of Bahia, where also the aforementioned species grow together. Botanical material has been collected and photos have been taken (Fig. 8 A–C).

Given its morphological characteristics (2-m long inflorescences with up to 45–60 kg of oily fruits), Bondar (1939) reported its great potential for the oil industry.

SELECTED MATERIAL: BRAZIL. Bahia: Iguaí municipaly, alto do Rio Gongogí, 14º49' 37.78"S 40º6'5.89"W, fl. fr., 22 Oct. 2013, *K. Soares, C.A. Guimarães, L. Assis, J. Santos 55* (UDESC).

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Announcing the Arrival of *Nypa fruticans* Fruit in St. Lucia

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1. *Nypa fruticans* fruit arrived on St. Lucia's Atlantic coast already sprouted.

***Nypa fruticans* fruit has recently been discovered in St. Lucia.**

On September 22, 2013, a group from the National Trust staff, Craig Henry, Lance Peterson and Saphira Hunt, were conducting a biosecurity visit to a small islet, Praslin Island, off the eastern coast of St. Lucia in order to protect native lizards and ensure rats have not returned. They discovered an unusual looking, already sprouted fruit along the beach. An image of the fruit was sent to Roger, who then emailed it to Larry (Fig. 1). To our knowledge, it is the first recorded sighting of *Nypa fruticans* in St. Lucia. Laurent Jean Pierre informed Roger that he has seen the fruit on Atlantic beaches before, and so it is definitely floating around. Mark de Silva also informed Roger that it is commonly seen on beaches in St. Vincent and the Grenadines.

According to Genera Palmarum (Dransfield et al. 2008), *Nypa fruticans* occurs naturally from Sri Lanka and the Ganges Delta to Australia, the Solomon Island and the Ryukyu Islands. It was introduced to the Niger Delta of West Africa in the late 19th century and has spread to western Cameroon. A naturalized population of *Nypa fruticans* was reported from Panama (Duke 1991), and germinated fruits were reported from Manzanilla beach in Trinidad (Bacon 2001). Bacon (2001) speculated that the Trinidad specimens arrived from West Africa by ocean currents and because of the prevailing currents it was unlikely that they came from Panama. Inspired by the Bacon article, Dennis Johnson (2001) of Cincinnati, Ohio wrote to the editors of *PALMS* about seeing naturalized colonies of *Nypa fruticans* in western Guyana in 1994, on the Barima River, downstream from Drum Hill, at a place called Blackwater. His boatman had lived in the area all of this life and reported that *Nypa* first appeared around Mabaruma about 20–30 years earlier. Johnson remembered seeing about 20 colonies. He speculated that *Nypa* propagules from Africa probably became established near the mouth of the river and fruits from those colonies were borne farther upstream by the tidal currents. Johnson (2001) wrote that it would not be surprising to find other colonies elsewhere in the Guianas, Venezuela and Colombia.

Nypa fruticans now appears to be arriving in St. Lucia on similar ocean currents. This is all very exciting; however, there is some concern among local people that it is going to get into St. Lucia's mangroves, because it thrives in the soft mud of estuarine situations at the mouth of rivers (Dransfield et al. 2008). Bacon (2001) calculated that *Nypa fruticans* propagules have been available for dispersal across the Atlantic for nearly 90 years. He stated that less than 10 percent are viable on arrival and that it may take a much longer time period before this species becomes established, trapped in unsuitable strand lines as they are along the Atlantic beaches. However, Saint Lucia is unusual in that it has most of its mangrove on the Atlantic coast. There is mangrove on the main island within 400 m from where the sprouting fruit was observed.

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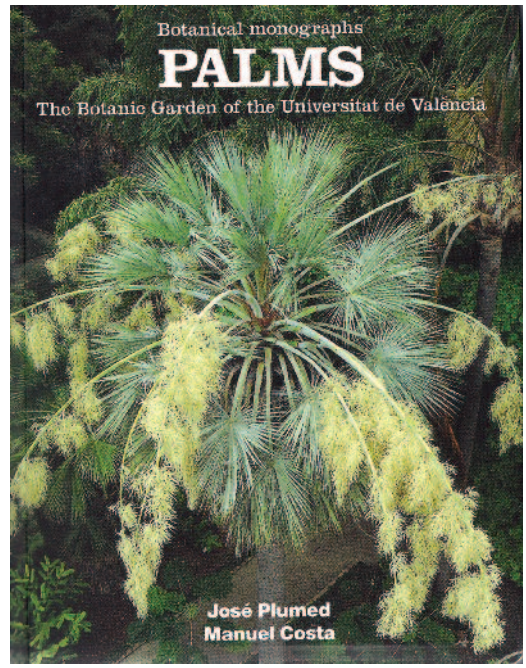
LAS PALMERAS – José Plumed and Manuel Costa. Monografías botánicas, Jardín Botánico de la Universitat de València. Metode, Universitat de València, Jardí Botánic. 2013. ISBN 978-84-370-9130-3.

and

PALMS – José Plumed and Manuel Costa. Botanical monographs, The Botanic Garden of the Universitat de València. Metode, Universitat de València, Jardí Botánic. 2013. ISBN 978-84-370-9132-7. Price €7.00. Softcover. 133 pages, numerous color photographs.



This excellent book, published in two editions (Spanish and English), has been written as a guide to the palms of the València University Botanic Garden. However, it is much more than that – it represents one of the nicest and most accessible introductions to the palm family. Although based on the living collections in Valencia in Spain, the account covers all palm morphology, a basic systematic framework for the whole family and aspects of natural history, uses and palms and climate. In the latter part of the book, 39 different palm genera cultivated in the garden are described and illustrated with truly excellent photographs. The format, 21 × 16 cm, means that the book can easily be slipped into a pocket, made easier still by the rounded corners of the pages. What a great little book! IPS members will surely wish to purchase copies. The cost is a mere €7.00 plus postage (not specified) and can be obtained via the garden's website http://www.jardibotanic.org.

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