

New *Syagrus* Species from Brazil

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Several new *Syagrus* species have been discovered during an effort to update the next edition of *Palmeiras Brasileiras* (Lorenzi et al. 2004). Most are “acaulescent” palms, many of which would have formerly been dismissed as *Syagrus petraea* (Mart.) Becc., but leaflet anatomy and field experience with the plant’s habit reveal distinct species that should be recognized. This is an attempt to make sense of some of these puzzling acaulescent *Syagrus* “*petraea*” species.

How characters are measured: There is a need to clarify the measured characters in *Syagrus*. Not everyone defines nor measures characters in the same way. One of the most misunderstood characters in *Syagrus* has been the petiole. The true petiole always has smooth margins and is measured from the base of the leaf blade (lamina) to the beginning of the fibrous remnants or remnant scars marking the beginning of the leaf sheath. The leaf sheath is measured from those same remnant scars to its attachment on the tree. The pseudopetiole (false petiole) is often simply called the “petiole” in many *Syagrus* descriptions. It includes the true petiole and that portion of the leaf sheath that is arching away from the stem and should only be measured on the older leaves. It will often have teeth and fibrous or membranous sheath remains. The rachis of the inflorescence is herein measured from the lowest branch to the bottom of the apical primary branch. A

spicate inflorescence is defined as a terminal primary branch (Tomlinson 1990) and therefore a spicate inflorescence has no measureable rachis, just an inflorescence axis. The inflorescence axis is measured from the first primary branch or lowest flowers to the tip of the terminal primary branch. The width of the peduncular bract is measured from edge to edge around the outside perimeter of the bract and not simply across it.

Characters common to all of the *Syagrus* species described here: The petiole and pseudopetiole are channeled adaxially (on the upper surface) and rounded abaxially (on the lower surface). Normally there are no rammenta (tufts of scales or wooly tomentum) present along the lower abaxial vein and none where the leaflets are inserted on the rachis (except in *S. lorenzoniorum* and *S. rupicola*). The inflorescence is interfoliar, androgynous (containing both male – staminate – and

female – pistillate – unisexual flowers in the same inflorescence), and on the lower portion of primary branches flowers are arranged in triads (one female flanked by two males) and upper portion with male dyads or singly. Male flowers open first and fall off before female flowers become receptive. The peduncular bract is always woody and sulcate (with longitudinal grooves and furrows). There are normally 3 sepals and 3 petals in both male and female flowers (with the exception of *S. gouveiana* and *S. minor* with as many as 4 of each). Male flowers have 6 stamens and the pistillode is trifid and less than 1 mm long. All male flower petals are valvate and all female petals are imbricate (overlapping) at the base but valvate at the tip. All flowers are some shade of yellow. The nut or endocarp has three visible pores near its base and has only one seed with homogeneous endosperm.

Uses. Many of the species described here have edible sweet tasting mesocarps (in spite of the pulpy fiber and mucilage) and edible endosperm or seeds. Several of the species described below could be used in landscaping and the smaller ones would be particularly valuable in the landscaping of small rock gardens. Many of the higher altitude species are probably frost resistant.

NEW SPECIES WITH CONSPICUOUS ABOVE-GROUND STEMS

***Syagrus deflexa* Noblick & Lorenzi, sp. nov.**, *S. flexuosae* similis sed foliis deflexis, rhachillis inflorescentiae plerumque spiraliter dispositis et dissimilibus anatomiis foliolorum differt. Typus: BRAZIL, Goiás, Alto Paraíso de Goiás, ca. 7 km from the town of Alto Paraíso de Goiás in the direction of Tocantins, entrance for the Hotel Fazenda Agua Clara. 14°04'16.7"S, 047°30'26.1"W, altitude: 1360 m, 19 Jun 2008, *Rodrigo Tsuji, H. Lorenzi, L.A. Ventura, L.R. Noblick* 2691 (holotypus HPL; isotypi R, SP, UB, UFG, FTG, NY, K, AAU, CTES). Fig. 1.

Palm caespitose, rarely solitary, stems generally arched, ringed but often covered with leaf base remains, 2–3 m in height and 6–10 cm diam. **Leaves** 5–7 in the crown, a little more than 1 m long; sheath with fibrous margin 25–38 cm long; pseudopetiole 14–33 cm long, petiole ca. 12–22 × 0.7–0.9 cm; rachis 52–85 cm long; leaflets, coriaceous, 39–50 along each side, irregularly spaced, the majority in clusters of 2–5 (–6) inserted in different planes, all strongly bent or deflexed downward, initially glaucous on the lower surface, later wax

wearing off; basal leaflets (6.5–) 21–34 × 0.1–0.4 cm, middle leaflets 16–37 × 1–2 cm, apical leaflets (7–)14–25 × 0.3–0.5 cm. **Inflorescences** with a slightly flattened peduncle covered with silver lepidote indument, 12–16 × 0.6–0.9 cm, 0.4–0.6 cm thick, prophyll 12–14 × 1.4–1.5 cm; peduncular bract glaucous, 34–48 cm long, expanded portion 22–30 × 4–7 cm; inflorescence axis 22–33 cm long; rachis 12–25 cm; primary branches 8–17, the upper ones especially spiraled around the rachis (in younger plants only with smaller inflorescences branches arranged unilaterally similar to *S. flexuosa*), 7–13 cm long at the apex, 15–29 cm at the base; **staminate flowers** ca. 15 × ca. 3–4 mm (apical ones ca. 8–10 mm long), sepals ca. 2–3 × 1–1.5 mm, glabrous, keeled and connate at the base, petals 6–9 × 2–3 mm with acute to acuminate tips, nerves indistinct to slightly raised, stamens 4.5–5 mm long, anther ca. 4 mm long, filaments ca. 2 mm long, basal; **pistillate flowers** elongate pyramidal, lepidote, 15–19 × 8–10 mm (apical flowers 9–12 × 5–7 mm), sepals imbricate 15–19 × 7–7.5 mm, petals slightly to distinctly nerved, sparsely lepidote, imbricate at the base but slightly valvate at the tips (upper 5–9 mm), 14–17 × 6.0–8.5 mm, pistil with lepidote indument from the base to nearly the base of the stigmas, 12–14 × 6 mm, stigmas 3, 3–4 mm long, staminodial ring ca. 3–3.5 mm high, 6-dentate. **Fruits** lepidote or somewhat tomentose at the tip but otherwise glabrous, ellipsoid with an apical beak, yellowish-green, 3.0–4.0 × 1.5–2.0 cm (still immature, probably a bit larger), with a thick, sweet, fibrous-fleshy mesocarp ca. 2 mm thick, endocarp ca. 3.2 × 1.6–1.7 cm and 3–4 mm thick; seed elliptical ca. 12–15 × 10 mm.

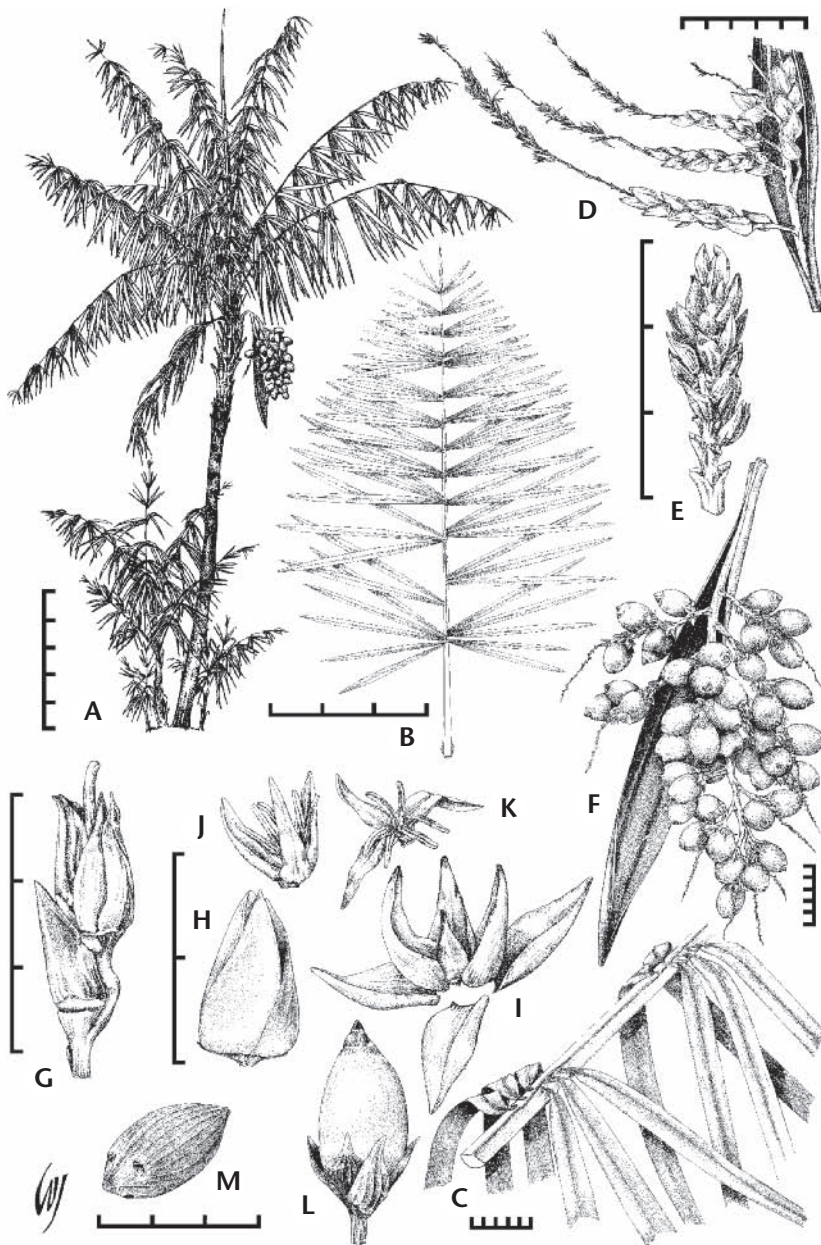
COMMON NAME: *acumã-branco*.

ETYMOLOGY: The name is derived from the fact that all of the leaflets are bent downwards; deflexed.

DISTRIBUTION AND ECOLOGY: This palm is endemic to northern Goiás in the Chapada dos Veadeiros region, in the *campo rupestre* and *cerrado* vegetation in the sandy, rocky soils between Alto Paraíso de Goiás and Teresina de Goiás.

PHENOLOGY: There are flowers and somewhat immature fruit in June.

OTHER SPECIMENS EXAMINED: BRAZIL, Goiás, Chapada dos Veadeiros, Municipio de Alta Paraíso de Goiás, *J. A. Rizzo* 7256 (UFG!); *R. Tsuji & R. Pimenta* 2726 (HPL).



1. *Syagrus deflexa*: A. Habit; B. Leaf; C. Leaflets; D. Inflorescence; E. Portion of a primary branch with staminate flowers; F. Inflorescence; G–I. Pistillate flowers; J–K. Staminate flowers; L. Fruit; M. Endocarp. A–F drawn from images taken by L.R. Noblick, E–L drawn from R. Tsuji *et al.* 2691. All scales are in centimeters except A and B which are in decimeters.

NOTES: Harri Lorenzi first discovered this palm in the Chapada dos Veadeiros region, in the Município of Alto Paraíso de Goiás. In 2005, he brought this new species to Larry's attention; the species has probably been collected and misidentified in most herbaria as *Syagrus flexuosa* (Mart.) Becc. However on a pressed specimen, one would have no appreciation for the deflexed leaflets that so

easily separate this new species from *S. flexuosa*, which may be a close relative. Finding this species has forced us to re-examine the *S. flexuosa* complex. Perhaps *S. campestris* is a good species after all, even though Glassman (1969) synonymized it. Although Glassman examined over 50 dried herbarium specimens, there are important differences in the habit and in the texture of the leaves that cannot be

easily seen on a herbarium sheet. In our experience, *Syagrus campestris* and *S. deflexa* have restricted ranges (eastern Minas Gerais for *S. campestris* and northern Goiás for *S. deflexa*), while *S. flexuosa* has a larger range. *Syagrus campestris* and *S. deflexa* have more coriaceous leaflets that tend to stay rigid and straight on the live plant and even after drying, while *S. flexuosa* has thinner membranaceous leaflets which tend to curl in from the sides when drying and are more pendulous on the plant. In *S. deflexa*, the primary branches of the inflorescence are spirally arranged on the rachis (with the exception of younger plants where they are sometimes unilaterally arranged). In both *S. flexuosa* and *S. campestris* the primary branches are always unilaterally arranged, giving it that distinctive "wind blown" appearance. In short, not only is *S. deflexa* a good species but, there are some reasons to possibly resurrect *S. campestris* as well.

Syagrus kellyana Noblick & Lorenzi, *sp. nov.*, *S. picrophyllae* similis sed caule brevi, fructu omnino lepidoto, rhachillis inflorescentiae marcescentibus vel canescentibus vel fuscentibus (non viridis), flexis vel tortis (non rectis), bracteis rachillae conspicuis differt.

Typus: Brazil, Minas Gerais, Padre Paraíso, 22 km N of the city on BR-116 at Ponte de Dois Valante, 16°55'8.6"S, 41°28'32.2"W, elevation 500–600 m. Garden accession number 97289 and 97290. 23 Jul 1997 L. R. Noblick & L. Cline 5156 (holotypus IPA; isotypus FTG). Fig. 2.

Palm with solitary, columnar stem, 2–5 m tall and 16–18 cm diam. **Leaves** 8–12 in the crown, somewhat plumose, spirally arranged and divergent in the crown, ca. 3 m long; sheath fibrous on the margins 70–138 cm long, pseudopetiole 27–64 cm long, true petiole short, absent to 11 × 3.5–4 cm and 1.5–2 cm thick; rachis 2.4–4 m long; leaflets 104–131 on each side of the rachis, linear with acuminate, nearly symmetrical apex, distributed irregularly in clusters of 2–4 (–5) and inserted in more than one plane, basal leaflets 58 × 0.8 cm, middle leaflets 57–72 × 3.3–4.5 cm and apical leaflets 26 × 0.6 cm. **Inflorescences** branched with peduncle 56–82 cm long, slightly flattened, 3–4 cm wide and 2–2.5 cm thick with the lower portion covered with a lepidote indument; prophyll 40–67 × 6–8 cm, peduncular bract 110–160 cm long and expanded part 62–97 × 15–35 cm; inflorescence axis 53–88 cm long; rachis 42–70 cm long; primary branches 47–69, 8–47 cm long; **staminate flowers** 11–21 × 4–7 mm,

sepals 3–7 × 1–2 mm, glabrous, keeled and connate at the base, petals 12–17 × 5–6 mm with acute tips, nerves indistinct to slightly raised, stamens 7 mm long, anther 6 mm long, filaments 2.5–3.0 mm long; basal **pistillate flowers** pyramidal, glabrous, 16–21 × 9–13 mm (apical flowers 8–15 mm by 7–13 mm), sepals imbricate 10–21 × 7–13 mm, petals glabrous, imbricate at the base (upper 4–5 mm) slightly valvate at the tips, 11–13 × 5–8 mm, pistil with short white indument on the lower half becoming brownish lepidote on more mature ovaries, 7–11 × 4–9 mm, stigmas 3, 2–3 mm long, glabrous, staminodial ring ca. 2–3 mm high, 6-dentate. **Fruits** ovoid, 3.5–4 × 2.6–2.8 cm, with rougher brownish-yellow epicarp splitting a little at the apex when mature, endocarp 3.3–3.5 × 2.4–2.6 cm, 5–6 mm thick.

COMMON NAME : *coco-de-quarta*.

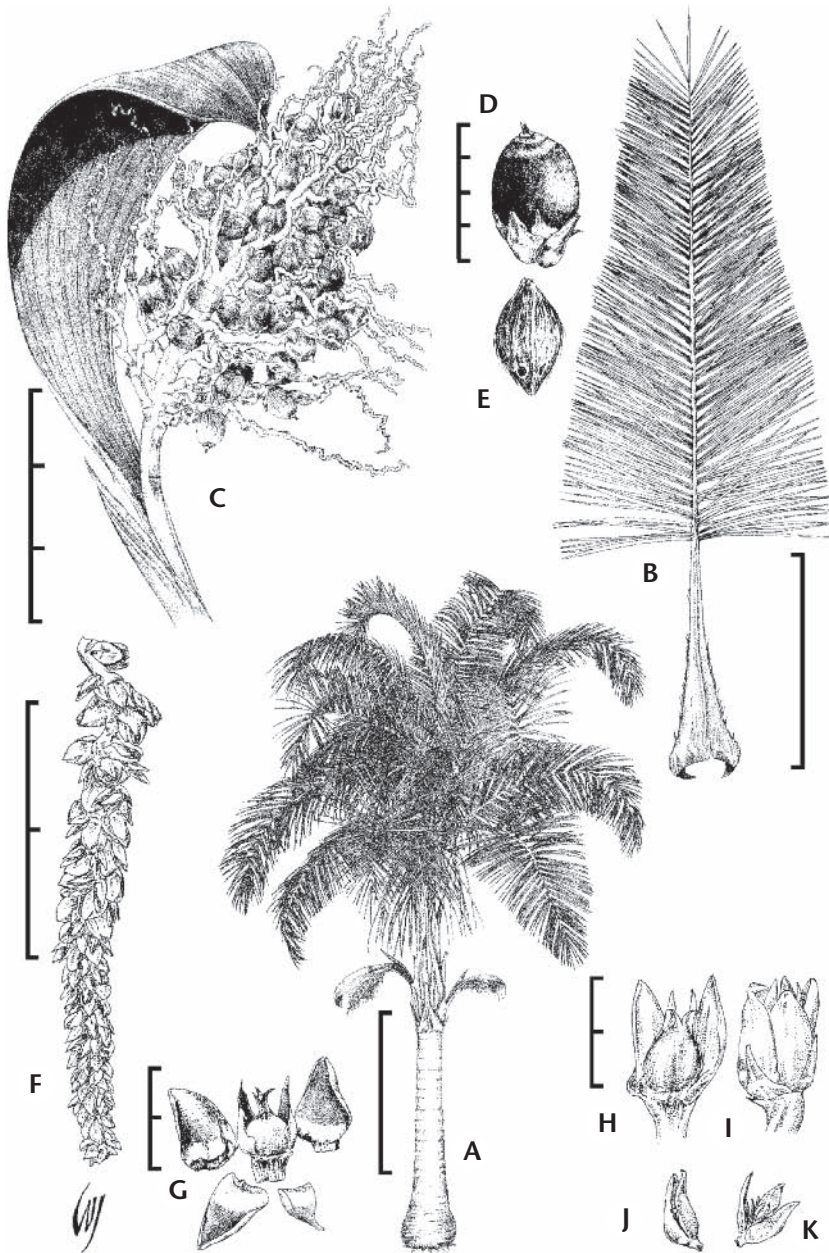
ETYMOLOGY: The specific epithet honors Loyd Kelly and his family who have so generously supported the Montgomery Botanical Center and my research over the years.

DISTRIBUTION AND ECOLOGY: Minas Gerais in the Atlantic forest, old Atlantic Forest vegetation, in well-drained soils, usually growing on granitic rock or in shallow or thin soils on rock outcrops at an elevation of ca. 550 m.

PHENOLOGY: Flowering and fruiting in July.

OTHER SPECIMENS EXAMINED: BRAZIL, Minas Gerais, Municipio de Ponto dos Volantes, 16°54'53,1"S, 41°28'04,4"W, H. Lorenzi, R. Campos & R. Pimenta 6628 (HPL).

NOTES: When we first collected this species, we thought that it was a short *Syagrus oleracea* (Mart.) Becc. Then we noticed the *S. picrophylla*-like petals with their distinctive wide overlapping base abruptly terminating in an acute apiculate tip and so we identified this palm under that name. The *S. picrophylla* complex has caused much confusion among earlier botanists. *Syagrus kellyana*, *S. picrophylla*, *S. lorenzoniorum* and *S. cearensis* all have a seed with a large central cavity like a coconut, which may have led J. Barbosa Rodrigues (1903) to write that the species grew from Ceará to Rio de Janeiro. His 1903 publication had two drawings of this species, neither of which resembles the other, causing more confusion. However we do know his original description was from palms growing in the state of Rio de Janeiro and southern Espírito Santo and so after examining specimens of these, we were able to do more informative comparisons. *Syagrus kellyana* differs from *S.*



2. *Syagrus kellyana*: A. Habit; B. Leaf; C. Infructescence; D. Fruit; E. Endocarp; F. Primary branch with flowers; G. Pistillate flower opened; H-I. Pistillate flowers; J-K. Staminate flowers. Drawn fresh from MBC accession 97290 (Noblick 5157). The scales are as follows: A-B are in meters, C and F are in decimeters and all others are in centimeters.

picrophylla and *S. lorenzoniorum* in being a stouter, thicker stemmed palm with spreading, more arching leaves in healthy plants (rather than straighter more ascending leaves). The fruit are completely covered by a thin scaly lepidote, but *S. picrophylla* and *S. lorenzoniorum* are only covered at the tip or on the upper third. The tips of the inflorescence die, dry up and become twisted and shriveled during fruit

development, but stay alive, nearly straight and turn a dark green in *S. picrophylla*. The primary branch tips also have conspicuous subfloral rachillae bracts that are nearly absent in *S. picrophylla* giving it a more ragged appearance. Anatomically, the abaxial (lower) surface of the leaflet has several distinct nonvascular fiber strands, which are missing in both *S. lorenzoniorum* and *S. picrophylla*.

Syagrus lorenzoniorum Noblick & Lorenzi, **sp. nov.**, *S. picrophyllae* affinis sed lente crescenti, caule brevi, tenui et leviter ventricosus (non tereto), eupetiolus plerumque carens vel usque ad 2 cm longo, endocarpius globosus (non ovoideo vel fusiforme), foliis rigidioribus et valde ascendentibus, ramento praesenti prope foliolorum insertionem differt.

Typus: BRAZIL, Espírito Santo, São Gabriel da Palha, collected in Corrego Comprido, Sitio Pedro Castela. 19°02'01.9"S, 46°29'33.0"W, 200 m altitude. 22 Jun 2008. *R. Tsuji, H. Lorenzi, L. Noblick et al.* 2713 (holotypus HPL; isotypi R, SP, MBML, FTG, NY, K, AAU). Fig. 3.

Palm with stem solitary, short, ringed, 2–4 m in height and 9–16 cm diam., with the apical part of the trunk (area where leaves inserted) swollen or dilated. **Leaves** ascending and slightly arched, 8–17 in the crown, 1.5–2.5 m long; sheath 28–70 cm long, with dark chestnut-brown fibrous margins or a fabric matting of the same fibers; pseudopetiole with fibrous margins also, 15–50 cm long; true petiole nearly always absent or to less than 2 cm long × 2–2.5 cm wide; rachis (90–) 160–270 cm long; leaflets 55–84 along each side of the rachis, distributed irregularly in clusters of 2–4 (–6) and inserted in one plane or forming a V, linear, rigid, concolorous, medium green to slightly paler on the lower surface, with acute apex, ramenta (tufts of scales or wooly tomentum) present along the lower abaxial vein and where leaflets inserted on the rachis, basal leaflets 28–52 × 0.3–0.8 cm, middle leaflets 31–56 × 2.1–3.3 (–4.0) cm, and apical leaflets 10–19 × 0.3–0.6 cm. **Inflorescences** branched with peduncle 60–110 cm long; prophyll 34–57 × 3–4.5 cm; peduncular bract 80–160 cm, expanded part 46–80 × 4–10 cm; inflorescence axis 33–50 cm long; rachis 17–24 cm long, with 25–47 primary branches 11–35 cm long; **staminate flowers** 9–11 × 3–4 mm, sepals 1.0–1.3 × 0.5 mm, glabrous, keeled and connate at the base, petals 8–10 × 3 mm with acute tips, nerves indistinct to slightly raised, stamens 5 mm long, anther 4.0–4.5 mm long, filaments 2 mm long; **basal pistillate flowers** elongate conical, glabrous, ca. 11 × 5 mm (apical flowers ca. 8 × 4 mm), sepals imbricate 10–11 × 3–5 mm, petals glabrous, imbricate at the base but slightly valvate at the tips, 8 × 4 mm, pistil glabrous, 5 × 2 mm diam., stigmas 3, 3 mm long, glabrous, staminodial ring ca. 1 mm high and 6-dentate. **Fruits** globose to oblong, 2.5–3.0 × 2.5–2.8 cm, yellowish-green when mature, endocarp nearly globose 2.4–2.6

cm in diameter and 3–4 mm thick; seed 1.0–1.1 diam. with a large central cavity.

COMMON NAME : *coco-de-quarta-mirim*.

ETYMOLOGY: This palm is named for the Lorenzoni family of the state of Espírito Santo who first brought the differences of this palm to the attention of Harri Lorenzi.

DISTRIBUTION AND ECOLOGY: This species occurs in Espírito Santo, over rocks, especially on the top of rock monoliths in very thin soils.

PHENOLOGY: Flowering and with a few mature fruits in June. Fruiting probably takes place a little later in the year.

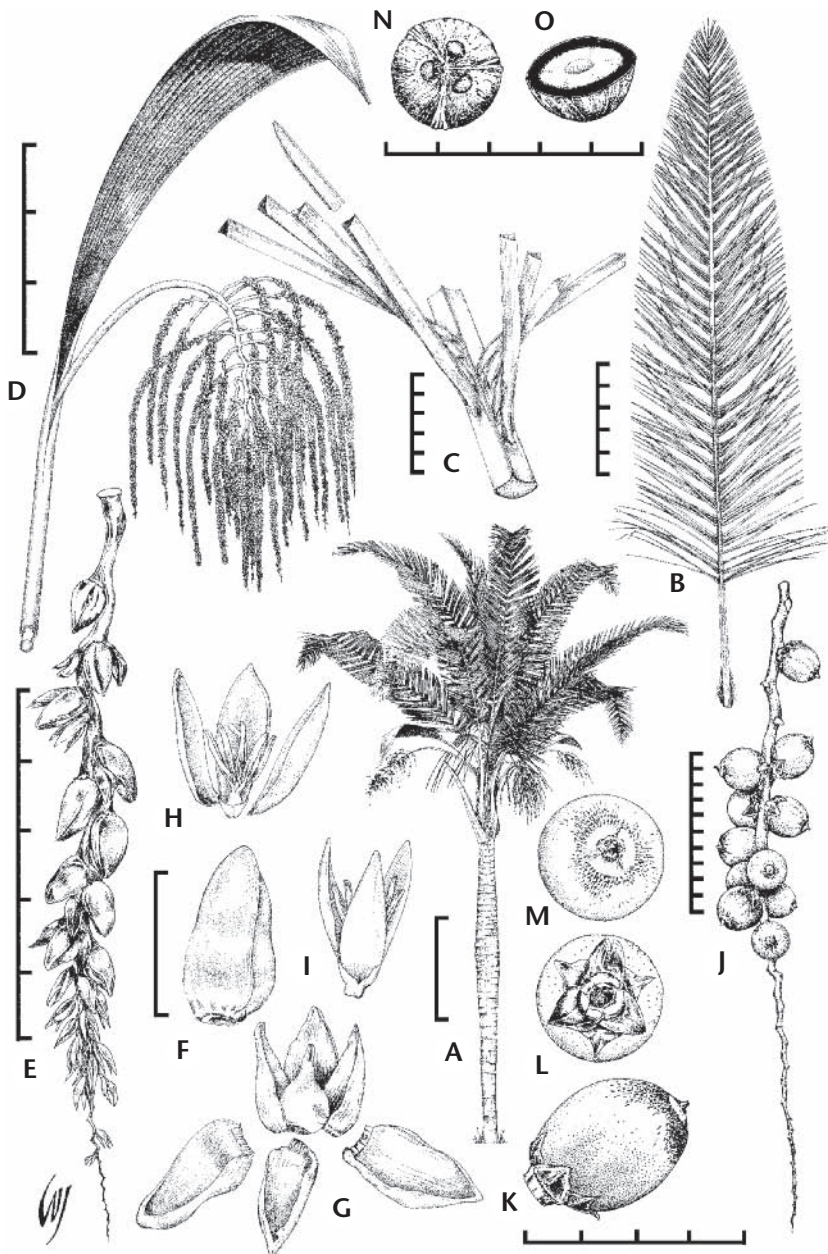
OTHER SPECIMENS EXAMINED: BRAZIL, Espírito Santo, Santa Teresa, *H.B. Fernandes 2088* (MBL); São Gabriel da Palha, *H. Lorenzi et al 5018* (HPL).

NOTES: This palm is referred to as *Syagrus* sp. nov. 2 in the last edition of *Palmeiras Brasileiras* (Lorenzi 2004). Both *S. picrophylla* and *S. lorenzoniorum* are rock loving palms. Some key identifying characters that separate *S. lorenzoniorum* from the closely related *S. picrophylla* with which it has long been confused are: a slower growing tree with a slightly swollen trunk, more strongly ascending leaves, a shorter (0–2 cm vs. 13 cm) true petiole, the presence of ramenta on the base of the abaxial veins (absent in both *S. picrophylla* and *S. kellyana*), a long pendant inflorescence and nearly globose (vs. ovate or elliptical) fruits with roundish endocarps or nuts, rather than ellipsoid or fusiform endocarps.

NEW SUBTERRANEAN TO SHORT-STEMMED SPECIES

Syagrus allagopteroides Noblick & Lorenzi, **sp. nov.**, palma acaulis, usque ad 50 cm alta, foliis *Allagopteram* simulantibus, foliolis effusis 3–4 aggregatis, inflorescentia spicata. *S. petraeae* affinis sed valde anatomia foliolorum dissimili cum fasciculis vascularibus parvis prope adaxialem et abaxialem paginam et uno magno filo fibrarum differt. **Typus:** BRAZIL, Bahia, São Desiderio, on the BA 463 highway that connects the city of São Desiderio to the BR-020 highway, ca. 7 km from the last round about, coordinates: 12°49'55.3"S, 45°53'09.7" W, 840 m. 13 Dec. 2009, *H. Lorenzi, K. Soares & R. Campos 6792* (holotypus HPL; isotypi R, SP, BHCB, CEPEC, UB, NY, FTG, K, AAU). Fig. 4.

Palm with stem generally solitary, short or subterranean ca. 4 cm diam., the whole palm



3. *Syagrus lorenzoniorum*: A. Habit; B. Leaf; C. Leaflets; D. Inflorescence; E. Portion of a primary branch with flowers; F-G. Pistillate flowers; H-I. Staminate flowers; J. Primary branch of an infructescence; K-M. Fruit side, basal and apical view; N-O. Endocarp endview showing pores and x-section showing interior cavity. A-D drawn from images taken by L.R. Noblick, E-L drawn from *R. Tsuji et al. 2713*. All scales are in centimeters except A which is in meters and B and D which are in decimeters.

less than 50 cm in height. Leaves 2-8 in the crown; sheath 6-14 cm long; pseudopetiole with nearly smooth to fibrous margins, 6-22 cm long, true petiole 5-16 × 0.5-1.0 cm; rachis 23-52 cm long; leaflets 21-47 along each side of the rachis, linear, stiff, green on both sides of the leaflet to glaucous on the abaxial side, with long acuminate and asymmetrical apex,

often rounded on one half, distributed irregularly in clusters of 2-4 and inserted in various planes, basal leaflets 11 × 0.2 cm, middle leaflets 12-20 × 0.8-2.6 cm, and apical leaflets ca. 10 × 0.3 cm. Inflorescence erect and spicate or branched, with peduncle 8-22 (-46) × 0.4-0.6 cm; prophyll 5.0-14.5 × 1-3 cm; peduncular bract 10-32 cm long,

expanded 7–20 × 1.2–4.5 cm; inflorescence axis 6–17 cm long, rachis 0–5 cm long with 1–6 primary branches 3–19 cm long; **staminate flowers** 9 × 4 mm, sepals 1.5 × 1 mm, glabrous, keeled and briefly connate at the base, petals 7–8 × 3 mm with acute tips, nerves indistinct to slightly raised, stamens 3 mm long, anther 1.5–2.0 mm long, filaments 1.0–1.5 mm long, basal **pistillate flowers** elongate conical, glabrous, 12–13 × 8 mm (apical flowers 11 × 6 mm), sepals imbricate 10–12 × 5–6 mm, petals glabrous, imbricate at the base but slightly valvate at the tips, 10–11 × 4–6 mm, pistil with white pubescence on the lower third, 7.5 × 4.0 mm diam., stigmas 3, 2.5 mm long, staminodial ring ca. 2 mm high, 6-dentate. **Fruits** ovoid, ca. 2.2–3.3 × 1.8–2.2 cm with fibrous-fleshy mesocarp, endocarp 2.4–3.1 × 1.4 cm and 1.5–2.2 mm in thickness. Seed ca. 1 cm diam. with no internal cavity.

COMMON NAME : *huri-falso*.

ETYMOLOGY: The specific epithet "*allagopteroides*" means like or similar to *Allagoptera* and refers to how similar the leaves of this palm are to leaves of palms in the genus *Allagoptera*.

DISTRIBUTION AND ECOLOGY: It is endemic to the state of Bahia (Serra Geral de Goiás), Goiás and Minas Gerais, in low shrubby to sparsely vegetated *cerrado*, generally in fine, light brown to reddish sandy soils sometimes mixed with iron rich rocks usually above 600 m elevation in a very flat or undulating terrain and often associated with *Astrocaryum campestre* and *Attalea barreirensis*. It has been collected from directly west of Barreiras, Bahia to Formoso, Minas Gerais and near Posse, Goiás. Its survival is threatened by the soybean plantations in western Bahia.

PHENOLOGY: Flowering in June.

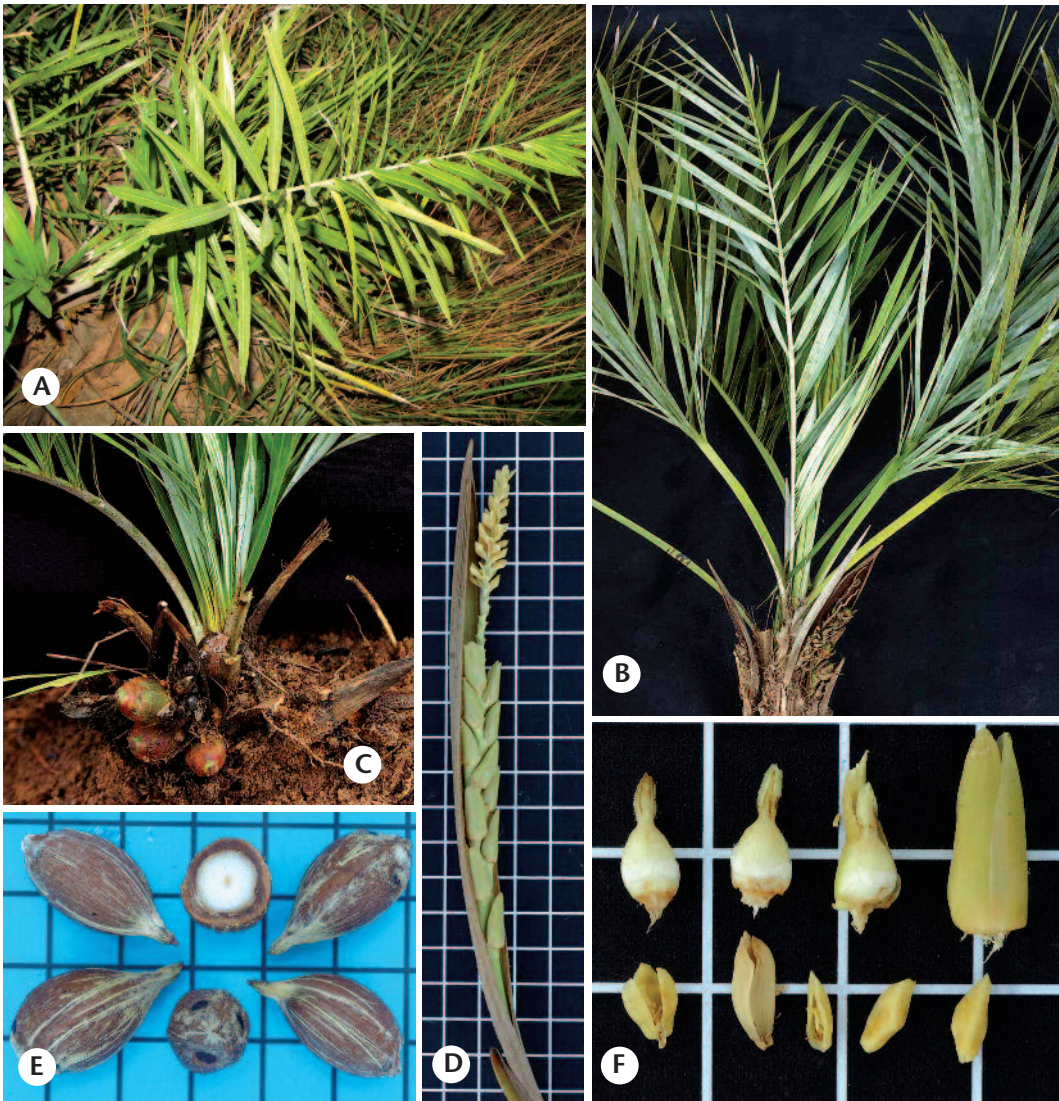
OTHER SPECIMENS EXAMINED: Brazil, Bahia, Municipio of Barreiras, *Noblick & Lima 4665* (BAH, CEPEC, CPATSA, F); *Noblick & Lima 4669* (ALCB, CEPEC, CPATSA, F, K, U); Municipio of Côcos, *Noblick & Lima 4652* (CAS, CEPEC, CPATSA, F); Municipio of Correntina, *Noblick & Lima 4655* (F); locality called Rosário, 13°56'27.1"S 46°11'40.2"W, *H. Lorenzi 6642* (HPL); Municipio of São Desidério, Roda Velha, *Medeiros-Costa et al. 261* (CPATSA); 12°22'S 44°58'W, 24 Oct 1988, *Noblick & Lima 4659, 4660* (CPATSA, F, FTG), *4662* (CEPEC, CPATSA, F, FTG); Minas Gerais, Formoso, 14°56'15.6"S 46°14'28.2"W, *H. Lorenzi 6640* (HPL).

NOTES: A small leaved, acaulescent palm with tightly clustering leaflets that are displayed

somewhat like that of an *Allagoptera* and a spicate inflorescence. We first collected this palm several times throughout western Bahia in the 1980's, but dismissed it as another growth form of *S. petraea*. However, after having the opportunity to examine Bolivian material of *S. petraea*, we found that its leaflet anatomy is significantly different than the true *S. petraea* from Bolivia, having a very large marginal fiber strand (absent in *S. petraea*) and many small vascular bundles along the upper and lower surface of the leaf (vs. only along the lower surface of the leaf in *S. petraea*).

Syagrus angustifolia Noblick & Lorenzi, **sp. nov.**, palma humilis, acaulis, foliolis angustis et plerumque inflorescentiis multiplis; *S. graminifoliae* similis sed caespe maiore et brevior, rachillis et floribus unilateraliter dispositis, rachillis brevioribus et congestioribus, fructibus ellipsoideis angustioribus differt. Typus: BRAZIL, Minas Gerais, João Pinheiro, collected on the road towards Brasilândia de Minas (km 167), 41 km from João Pinheiro, 17°21'17.8"S, 46°04'29.6"W (altitude: 820 m). 4 Mar 2009. *H. Lorenzi, R. Pimenta & R. Campos 6636* (holotypus HPL; isotypi R, SP, BHCB, NY, K). Fig. 5.

Palm less than 50 cm tall, stem clustering and very short or subterranean. **Leaves** 3–7 in the crown; sheath 13–15 cm long, pseudopetiole 17–20 cm long with fibrous and smooth margins; true petiole ca. 13–14 cm long, rachis 29–45 cm long, whitish indument covering the abaxial surface of the pseudopetiole and rachis and even the margins of some of the lower leaflets; leaflets 16–21 along each side of the rachis, distributed irregularly in clusters of 2 and inserted in different planes, lanceolate, medium green, glabrous on both sides, except for the tomentum already mentioned on the lower leaflets, with acuminate and asymmetrical apex, basal leaflets ca. 10–12 × 0.1–0.2 cm, middle leaflets 18–22 × 1.0 cm, and apical leaflets 18–19 × 0.4 cm. **Inflorescence** spicate or unilaterally branched with peduncle, glabrous to covered with a thin white indument, 14–18 cm long; prophyll 8–13 × 1.0–2.5 cm; peduncular bract covered with a white to grayish white indument on its exterior, 20–30 cm long, the expanded part 11–22 × 2.7–6.0 cm; inflorescence axis 7–18 cm long, rachis 2–10 cm long with 1–8 primary branches measuring 3.5–11 cm long; **staminate flowers** 6.0–11.5 × 4 mm, sepals 1.0–2.5 × 1.0–1.3 mm, glabrous, keeled and connate at the base, petals sometimes 4 on the



4. *Syagrus allagopteroides*: A. Leaf showing the *Allagoptera* form leaf; B. Habit with an inflorescence; C. Inflorescence; D. Spicate inflorescence; E. Endocarps; F. Pistil and pistillate flowers above and staminate flowers below. All grids are in centimeters.

basal flowers 10–11 × 2.0–2.5 mm with acute tips (apical flowers 4.5–6.0 mm long), nerves indistinct to slightly raised, stamens 3–4 mm long, anther 2.5–3.0 mm long, filaments 1.5–2 mm long, basal **pistillate flowers** elongate pyramidal, glabrous, 14–15 × 7 mm (apical flowers 11 × 5–6 mm), sepals imbricate 8.5–9.0 × 4–5 mm, petals glabrous, imbricate at the base but slightly valvate at the tips, 9–10 × 2.5–3.0 mm, pistil glabrous, 8 × 4 mm, stigmas 3, 2 mm long, glabrous, staminodial ring ca. 1.0–1.5 mm high, 6-dentate. **Fruits** ellipsoid 3.0–3.5 × 1.5 cm, reddish brown, endocarp hard, 2.2–2.9 × 0.8–1.1 cm and 0.8–1.5 mm thick containing a single seed. Seed 8–9 mm diam. with no internal cavity.

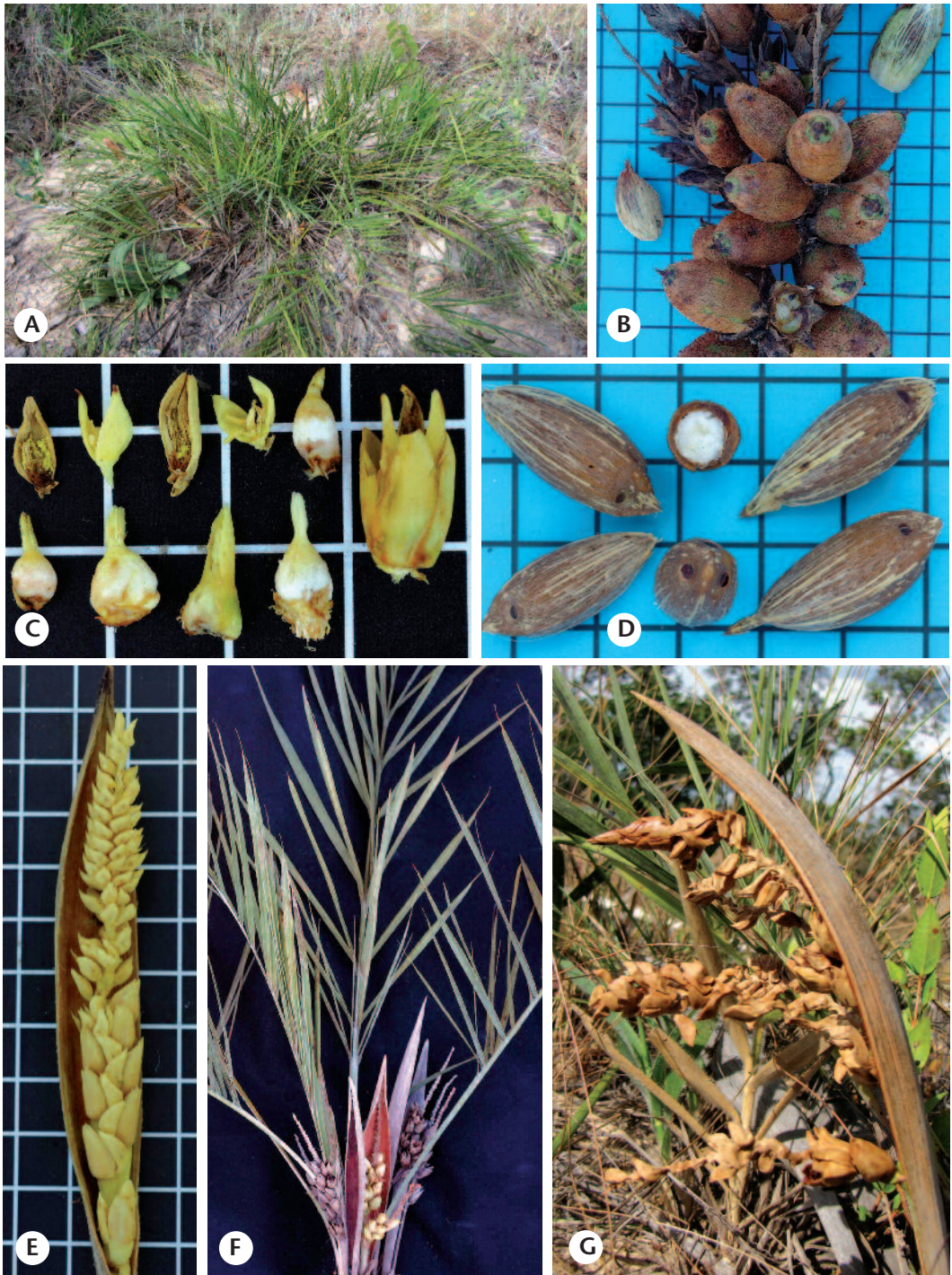
COMMON NAME : *coco-de-vassoura*.

ETYMOLOGY: The specific epithet "*angustifolia*" means narrow leaf, one of the characters that one first notices about this species.

DISTRIBUTION AND ECOLOGY: Endemic to the state of Minas Gerais, in open or sparsely vegetated *cerrado*, generally in fine grained, sandy soils (talcum powder-sized sand) of high altitude (ca. 800 m).

PHENOLOGY: Flowering with immature developing fruits in June.

NOTES: This is a low clustering acaulescent palm with narrow leaflets, often with multiple



5. *Syagrus angustifolia*: A. Habit in habitat; B. Inflorescence; C. Flowers. The first four flowers in the top row are staminate, followed by a pistil and a pistillate flower. The second row are all pistils, however the third one still has the petals attached; D. Endocarps; E. Spicate inflorescence; F. Crown with inflorescences showing leaf shape; G. Older branched inflorescence. All grids are in centimeters.

inflorescences, but similar to *Syagrus graminifolia*. However this species has larger and shorter caespitose clumps than *S. graminifolia*, with unilaterally arranged

rachillae and flowers, and with shorter and more closely spaced primary branches and with more congested flowers, and with a narrower ellipsoid fruit and endocarp.

Syagrus caerulescens Noblick & Lorenzi, **sp. nov.**, palma foliis *Allagopteram* simulans, desuper saturate viridis, inferne pruina glauca obtecta, inflorescentia spicata brevi, bractea pedunculari concava 4–6 cm lati. Typus: BRAZIL, Goiás, Município of Alto Paraíso de Goiás on the GO-118 highway to Teresina de Goiás on a side road to the right [East side], 5 km from the town of Alto Paraíso, towards the locality of Cachoeira dos Cristais, a little more than 500 m from the GO-118 highway, in a grassy field with sandy soil. 14°05'17.0"S 47°30'59.7"W. Altitude of 1,370 m, in a region called the "Chapada dos Veadeiros". 7 Mar 2009. *H. Lorenzi, R. Pimenta e R. Campos 6649* (holotypus HPL; isotypi R, SP, UB, NY, K). Fig. 6.

Palm with stem generally solitary, short or subterranean. **Leaves** less than 1 m long and 2–4 (–6) in the crown; sheath 12–20 cm long; pseudopetiole with fibrous margins, 9–17 cm long, true petiole 6–14 cm long; rachis with white tomentum along the abaxial side, 53–87 cm long; leaflets 40–56 along each side of the rachis, linear, stiff coriaceous, dark green on the upper surface and bluish green on the lower, with acute and asymmetrical apex, distributed irregularly in clusters of 2–3 and inserted in various planes, basal leaflets measuring 12–22 × 0.1–0.4 cm, middle leaflets 13–24 × 1.0–1.9 cm, apical leaflets 4.5–6 × 0.2–0.5 cm. **Inflorescence** erect and mostly spicate or rarely branched, with peduncle 11–14 cm long × 0.5–0.8 cm in diameter; prophyll 8–12 × 1.8–3 cm long; peduncular bract 17–20 cm long, expanded part 8–15 × 4–6 cm; inflorescence axis 8–10 cm long, rachis absent with 1 terminal primary branch 8–10 cm long; **staminate flowers** 13.6–15.7 × 6.0–8.3 mm, sepals 1.4–2.1 × 1.1 mm, glabrous, keeled and connate at the base, petals 12.0–13.6 × 2.8–4.3 mm with acute tips, nerves indistinct to slightly raised, stamens 6.4–8.0 mm long, anther 4.3–6.4 mm long, filaments ca. 1.5 mm long; basal **pistillate flowers** elongate conical, glabrous, ca. 11 mm long and 10 mm wide, sepals imbricate 10 × 9.3 mm, petals glabrous, imbricate at the base but slightly valvate (to 4 mm) at the tips, 9 × 6.7 mm, pistil slightly lepidote, 8.6 × 5 mm diam., stigmas 3, less than 3 mm long, glabrous, staminodial ring ca. 1 mm high, 6-dentate. **Fruits** ovoid, 2.0–2.5 × 1.5–2.0 cm, epicarp reddish brown lepidote and with fibrous-fleshy mesocarp, endocarps nearly globose to obovate 1.2–1.5 × 1.2–1.3 cm and 0.8–1.3 mm thick.

COMMON NAME : *palmeirinha-azul*

ETYMOLOGY: The specific epithet means bluish which reflects its common Brazilian name "*palmeirinha-azul*" or little blue palm.

DISTRIBUTION AND ECOLOGY: This species is endemic to the state of Goiás in the rocky, sandy soils of the *campo rupestre* vegetation of the Chapada dos Veadeiros.

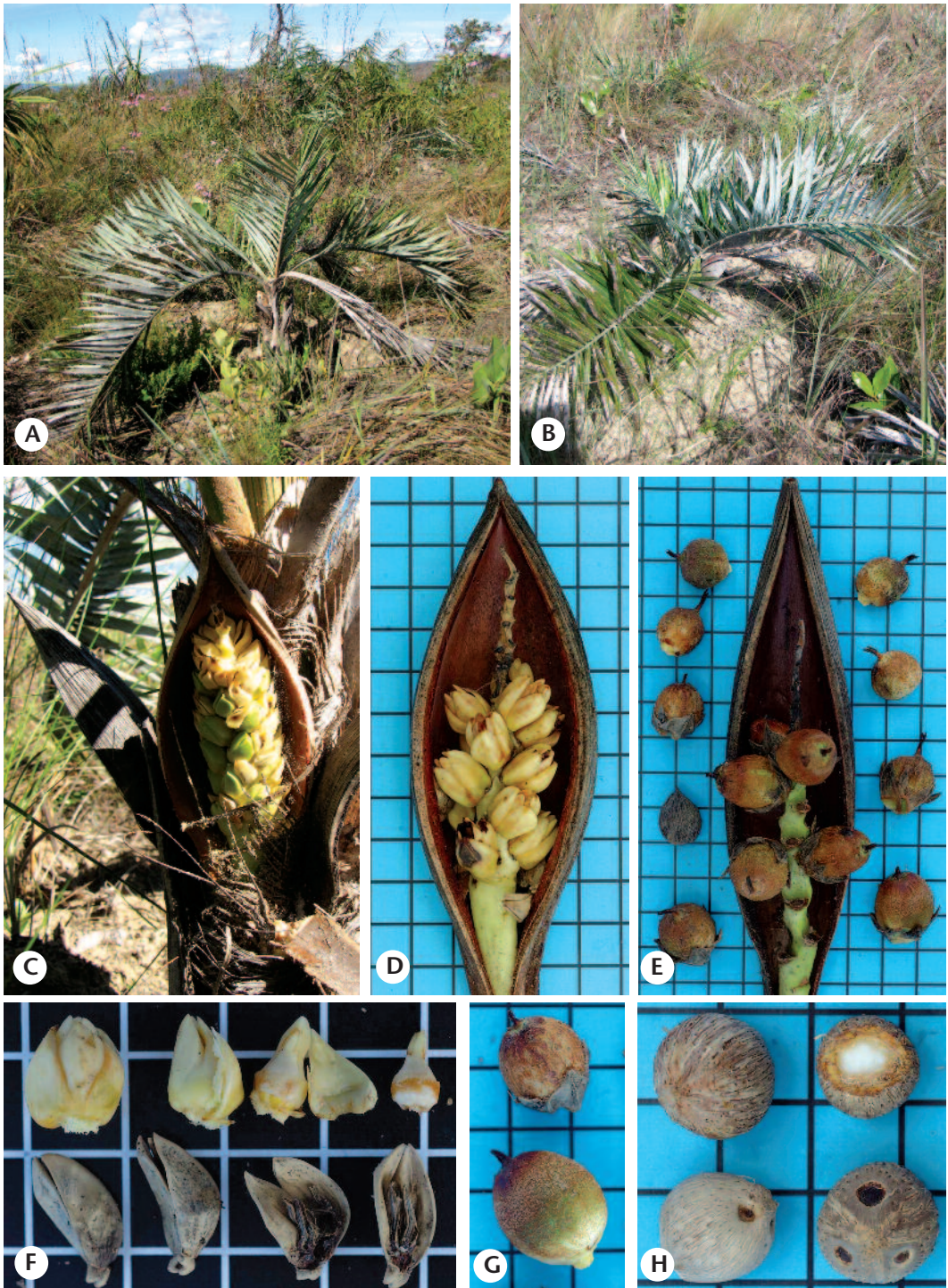
PHENOLOGY: It was flowering in July, but no fruits were present.

OTHER SPECIMENS EXAMINED: Brazil, Goiás, Município de Alto Paraíso de Goiás, *R. Tsuji & E. Franco 2622* (HPL).

NOTES: The attractive bluish color of the palm is due to the thick waxy bluish coating on the lower side of its leaves. It frequently has a low number of leaves, but this may be due to having to recover from the frequent fires that sweep across its habitat. Its leaflet anatomy is most similar to *S. rupicola*, but it has thinner leaflets, a much thinner epidermis and more numerous small vascular fibers along the abaxial surface of its leaflets. It differs further from *S. rupicola* by being smaller in stature with leaves that are blue on the lower surface and green on the upper surface, rather than silvery-blue on both surfaces.

Syagrus cerqueirana Noblick & Lorenzi, **sp. nov.**, Palma solitaria vel caespitosa, acaulis, foliolis angustis, inflorescentia unilateralis; *S. petraeae* similis sed inflorescentia ramosa (non spicata) et et anatomia foliolorum dissimili differt. Typus: BRAZIL, Mato Grosso do Sul, Ponta Porã, collected on the road to Antonio João near the fiscal post Aquibadã, located 21 km from Ponta Porã. 22° 21' 54.7"S; 55° 43' 59.5"W, altitude: 680 m. 8 Sept. 2008. *H. Lorenzi & M. Pinho 6514* (holotypus HPL; isotypi R, SP, CGMS, NY, K). Fig. 7.

Palm solitary or caespitose, less than 1 m tall, with short or subterranean stem. **Leaves** medium-green, 5–9 per stem; sheath 15–30 cm long, pseudopetiole 13–23 cm long, true petiole 7–24 cm long, both with smooth margins; rachis is 43–75 cm long; leaflets 28–62 on each side of the rachis, linear with long acuminate and asymmetric to bifid apex, arranged in clusters of 2–3 along the rachis, basal leaflets measuring 19.0–28.5 × 0.4–0.7 cm, middle leaflets, 20–33 × 0.5–1.2 cm, and apical leaflets 7.5–22.0 × 0.1–0.3 cm. **Inflorescences** erect and branching; peduncle 4–9 cm long; prophyll 8–14 × 2.2–2.5 cm; peduncular bract 18–27 cm long, the expanded portion 13–18 × 2.3–3.0 cm; inflorescence axis 13–24 cm long, rachis 2–9 cm long with 4–12



6. *Syagrus caerulea*: A. Habit; B. Leaf with a greenish upper and bluish lower surface; C. Inflorescence on the plant; D. Spicate inflorescence, showing the pistillate flowers and thickish bract; E. Inflorescence; F. Pistillate flowers and pistil above and older staminate flowers below; G. Fruits; H. Endocarps. All grids are in centimeters.

primary branches 6–15 cm long; **staminate flowers** 7–8 × 3–5 mm, sepals 2.5 × 1.0–1.5 mm, glabrous, keeled and very briefly connate

at the base, petals 4 × 1.0–1.3 mm with acute tips, nerves indistinct to slightly raised, stamens 3 mm long, anther 1.5–2.0 mm long,

filaments 1.5 mm long, basal **pistillate flowers** elongate conical, glabrous, 12.0–12.5 × 7.5 mm (apical flowers 10.0 × 6.5 mm), sepals imbricate 10–12 × 5 mm, petals glabrous, imbricate at the base but (upper 4–5 mm) slightly valvate at the tips, 11 × 4–5 mm, pistil glabrous, 9 × 4 mm in diameter, stigmas 3 in number, and 4 mm long, glabrous, staminodial ring ca. 1 mm high and 6-dentate. **Fruits** ovoid, brownish-yellow, 2.3–3.5 × 1.2–2.2 cm, containing a fibrous-fleshy mesocarp, endocarp 1.8–2.2 × 0.8–1.1 cm and 0.8–1.5 mm thick, seed and endosperm with no central cavity.

COMMON NAME : *acumã-mirim*.

ETYMOLOGY: This palm is named in honor our mutual friend and palm enthusiast, Luiz Sergio Coelho de Cerqueira of Pará, who aided both of us while doing palm research in the Amazon region and due to his untimely death will be sorely missed.

DISTRIBUTION AND ECOLOGY: Paraguay and in the Brazilian states of Mato Grosso do Sul and maybe São Paulo, in *cerrado*, generally in sandy to rocky clay soils. At this writing, it is one of two acaulescent *Syagrus* in Paraguay, the other being *S. lilliputiana*. All other closely related acaulescent palms are in the genus *Butia*.

PHENOLOGY: Flowering specimens seen in June.

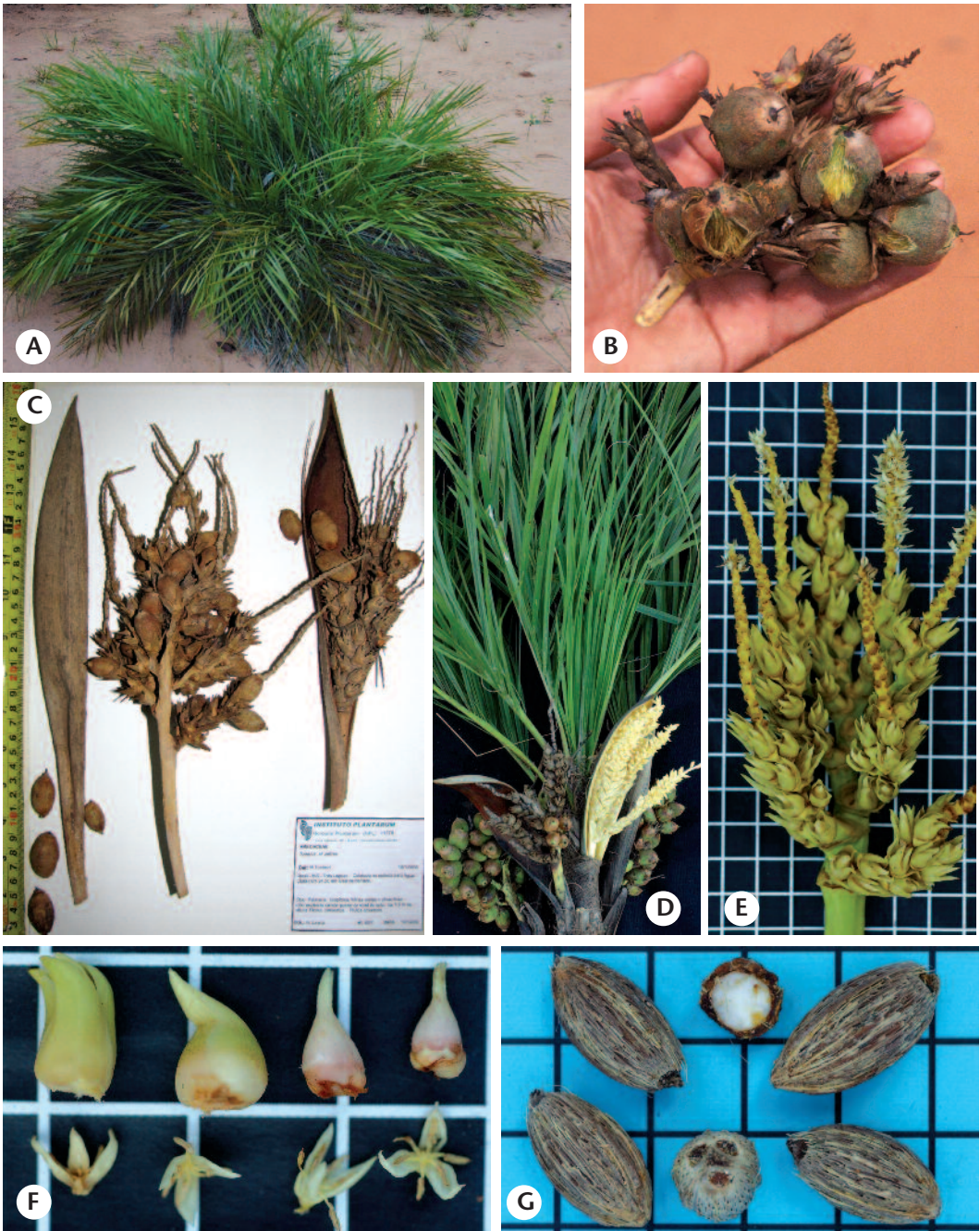
OTHER SPECIMENS EXAMINED: BRAZIL, Mato Grosso do Sul, Ponta Porã, R. Tsuji & E.R. Salviani 1029 (HPL); H. Lorenzi 6512 (HPL); Três Lagoas, H. Lorenzi et al 6577 (HPL); H. Lorenzi et al 6578 (HPL); PARAGUAY, Amambay, Cerro Cora National Park, 22°39'35.1"S 56°1'37.7"W, Noblick et al. 5126 (FTG, PY).

NOTES: In Paraguay, Larry collected this plant and identified it as *S. petraea*, because it was identified as such in all of the local herbaria; however, it did not look like the plants of *S. petraea* that he had collected elsewhere in Brazil, so he suspected that it may not be identified correctly. Suspicions were confirmed when he had the opportunity to compare the leaflet anatomy of this plant to Bolivian material collected from the type locality and discovered that it was different. *Syagrus cerqueirana* has small vascular bundles on both the upper and lower surface of the leaf and very few nonvascular fibers on either surface, while *S. petraea* from Bolivia has small vascular fibers only along the lower surface and an abundance of nonvascular fibers along the upper surface. *Syagrus cerqueirana* has leaflet

anatomy similar to *S. allagopteroides* which grows above 600 m in Bahia, Goiás and Minas Gerais, but it is a larger plant with a leaf rachis measuring 43–75 vs. 23–52 cm and middle leaflets measuring 20–33 vs. 12–20 cm. Also *S. allagopteroides* tends to be solitary, but *S. cerqueirana* tends to be caespitose.

***Syagrus gouveiana* Noblick & Lorenzi sp. nov.**, *S. evansianae* affinis sed foliis pallidioribus viridibus et concoloribus, floribus plerumque ut in quadratis dispositis, partibus floris tetrameris differt. *Typus*: BRAZIL, Minas Gerais, Municipio de Gouveia, collected on the Gouveia/Curvelo road 20 km from Gouveia [km 479 on BR-259], S18°35'12.6", W43°53'44.8", 1269 m [ca. 1200–1270 m] altitude. 14 Nov 2008, H. Lorenzi 6537 (holotypus HPL; isotypi R, SP, BHCB, NY, K). Fig. 8.

Palm solitary, less than 1 m in height, with a very short or subterranean stem. **Leaves** arching, with 3–4 in the crown, less than 1 m long and the general coloration medium to light green; sheath 12–26 cm with fibrous margins, pseudopetiole 16–31 cm long; petiole smooth 2–8 cm long; rachis 42–75 cm long; leaflets 30–60 along each side, linear, rigid-coriaceous with apex acute or rounded and asymmetric, concolorous, distributed irregularly in clusters of 2–3 and inserted at different angles along the rachis, basal leaflets measuring 9–26 × 0.2–0.6 cm, middle leaflets 18–25 × 1.2–2.0 cm, apical leaflets 6–14 × 0.3–0.7 cm. **Inflorescences** erect and spicate to branched; peduncle 17–28 cm long; prophyll 9–17 × 1.5–3.5 cm long; peduncular bract 28–47 cm long, expanded part 14–24 × 4–6 cm; inflorescence axis 8–15 cm long, rachis 0–5 cm, with 1–6 primary branches 5–11 cm long; flowers usually arranged in triads, but frequently arranged in groups of four with two central pistillate flowers each of which is flanked on one side by one staminate flower, both staminate and pistillate flowers frequently have 4 sepals and petals instead of the normal 3, **staminate flowers** 12–14 × 5–7 mm, sepals 2–3 × less than 1 mm, glabrous, keeled and connate at the base, petals 10 × 3–4 mm with acute tips, nerves indistinct to slightly raised, stamens 4.5–5.0 mm long, anther 4 mm long, filaments 1.5 mm long; basal **pistillate flowers** elongate conical, glabrous, 13–15 × 5–6 mm (apical flowers ca. 10 × 4 mm), sepals imbricate 14–15 × 5–6 mm, petals glabrous, imbricate at the base but slightly valvate (upper 3–5 mm) at the tips, 11–13 × 4–5 mm, pistil glabrescent, 8–9 × 4–5



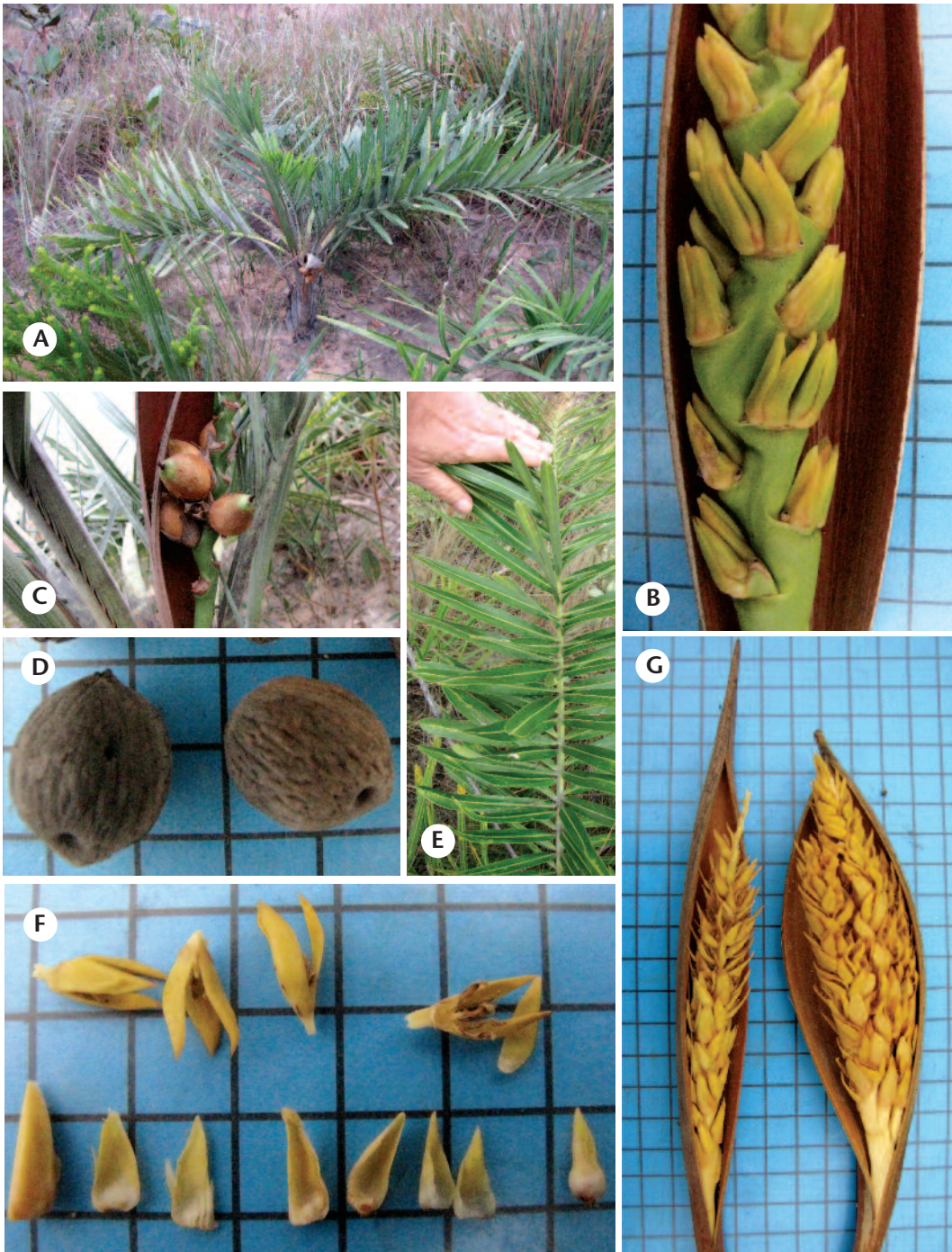
7. *Syagrus cerqueirana*: A. Habit; B. Infructescence, Noblick *et al.* 5126; C. Herbarium sheet showing unilateral infructescence, H. Lorenzi 6577; D. Close up of inflorescence and infructescence on the plant; E. Inflorescence with pistillate flowers; F. Pistillate flowers and pistils above and staminate flowers below; G. Endocarps. All grids are in centimeters.

mm diam., stigmas 3, 3–4 mm long, staminodial ring ca. 2 mm high and 6-dentate. **Fruits** globose, yellowish brown, 1.7–2.1 cm diam., with a fibrous-fleshy (pulpy) mesocarp. Endocarp 1.9–2.2 × 1.5–1.7 cm.

COMMON NAME : *coquinho-da-pedra*.

ETYMOLOGY: Named for the closest town to the place of its discovery, Gouveia, Minas Gerais.

DISTRIBUTION AND ECOLOGY: Occurs in the state of Minas Gerais in the Cadeia do Espinhaço region, in high altitude *campo rupestre* or *cerrado*, generally in well-drained rocky terrain.

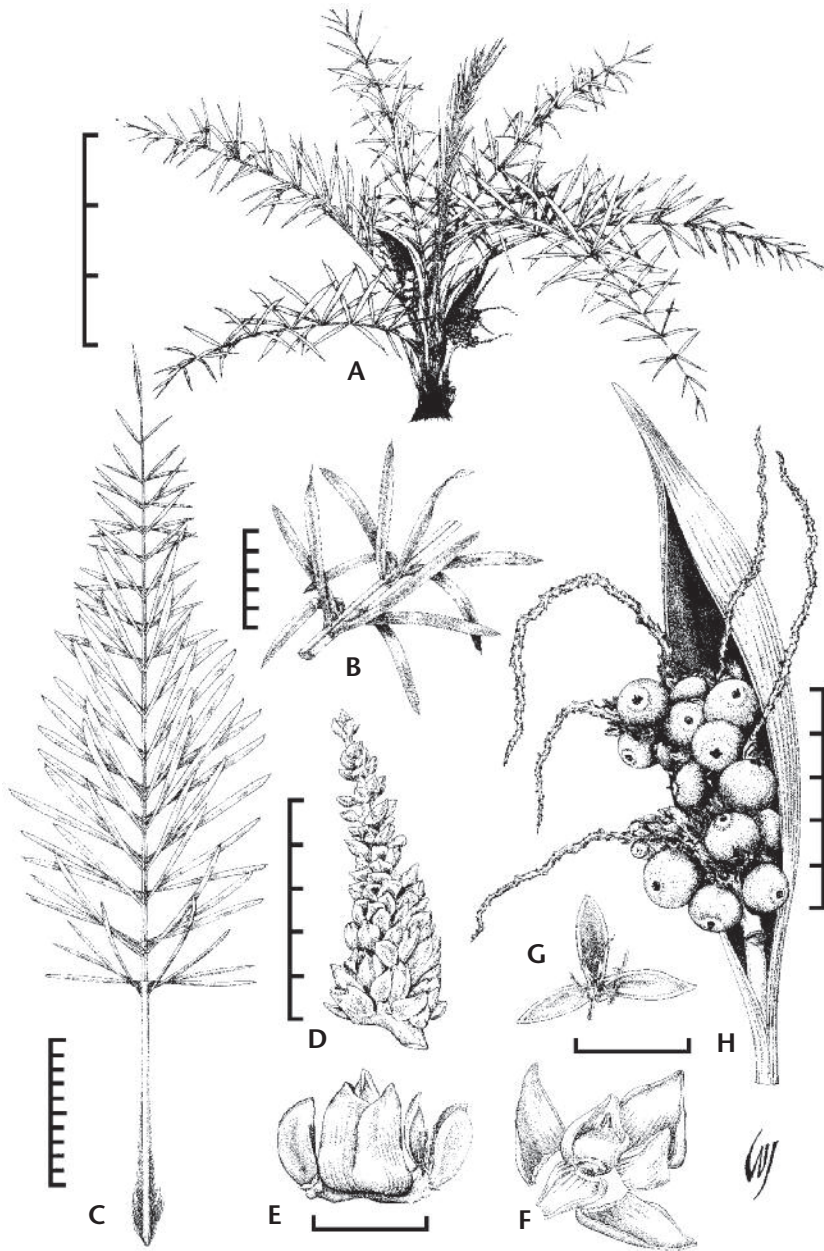


8. *Syagrus gouveiana*: A. Habit; B. Inflorescence with two sets of pistillate flowers part of a quadrad; C. Infructescence on the plant; D. Endocarps; E. Close-up of leaf showing concolorous leaflets; F. Staminate flowers above and dissected 4 parted pistillate flower below including the pistil with its fourth petal still attached; G. Spicate and branched inflorescence. All grids are in centimeters.

PHENOLOGY: Flowering with some immature fruit in June.

NOTES: A small acaulescent palm with coriaceous, concolorous leaves, usually spicate and sometimes branched inflorescences, often

with flowers in groups of 4 instead of the normal triad or with 4 sepals and 4 petals instead of the normal 3, these are characters that set this species apart from anything else in the region.



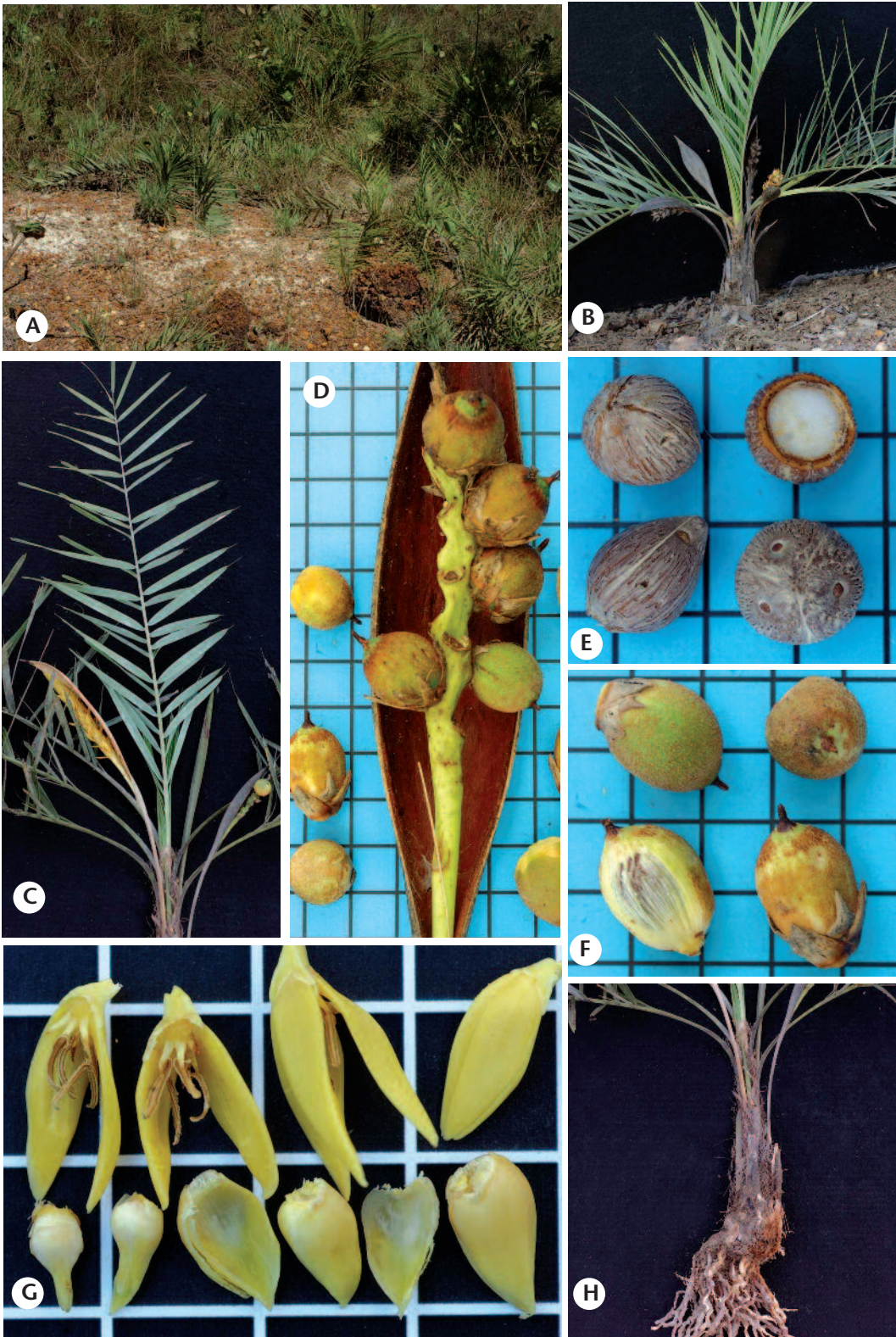
9. *Syagrus itacambirana*: A. Habit; B. Leaflets; C. Leaf; D. A primary branch with flowers; E. Triad with central pistillate flower flanked by two staminate flowers; F. Pistillate flower; G. Staminate flower; H. Infructescence. A–F drawn from images taken by L.R. Noblick and H. Lorenzi, E–L drawn from R. Tsuji *et al.* 2691. All scales are in centimeters except A which is in decimeters.

Syagrus itacambirana Noblick & Lorenzi, *sp. nov.*, Palma acaulis, foliis 5–9 saturate viridibus, concoloribus, foliolis 25–38, rhachide 24–46 cm longa et fructibus globosis.

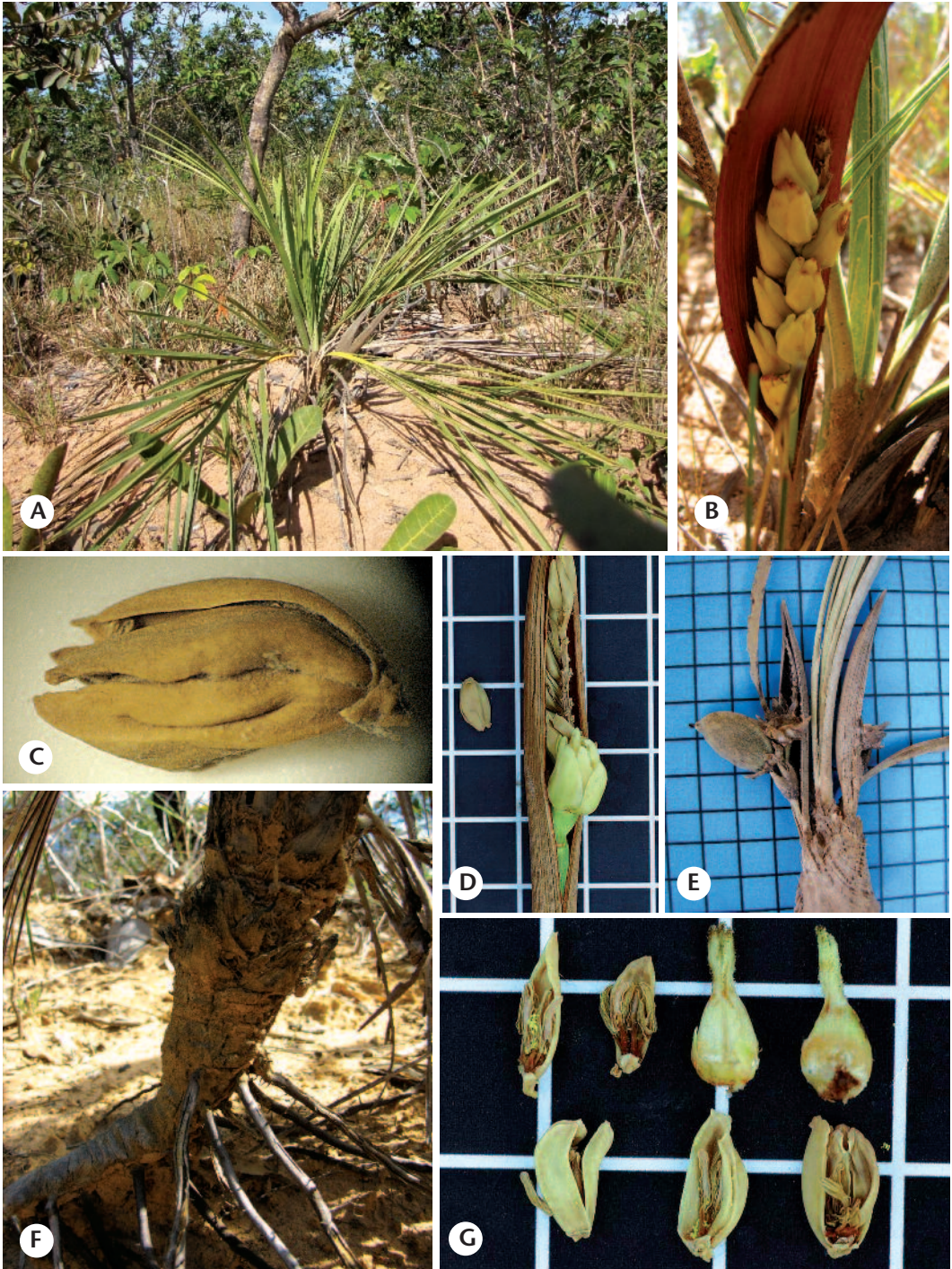
Typus: BRAZIL, Minas Geras, Municipio of Juramento, collected on the Juramento/Itacambira road between Juramento and Itacambira on the right [southside], in the interior of an *Eucalyptus* planting, 27 km east

of Juramento, 16°57'20.9"S, 043°28'11.4"W, altitude 1220 m, 20 JUN 2008, R. Tsuji, H. Lorenzi, L. Noblick *et al.* 2706 (holotypus HPL; isotypi R, SP, BHCN, NY, K). Fig. 9.

Palm less than 50 cm tall, stem caespitose or solitary, very short or subterranean. Leaves 5–9 in the crown; sheath ca. 10–15 cm long; pseudopetiole 9–19 cm long with fibrous and smooth margins; true petiole 7–15 × 0.7–1.0



10. *Syagrus longipedunculata*: A. Palms in habitat; B. Habit with inflorescences; C. Discolorous leaf with inflorescence and inflorescence; D. Inflorescence; E. Endocarps; F. Close-up of fruits; G. Staminate flowers above and dissected pistillate flower below; H. Underground stem. All grids are in centimeters.



11. *Syagrus minor*: A. Habit; B. Inflorescence with pistillate flowers; C. 4 parted staminate flower; D. Inflorescence; E. Infructescence; F. Underground stem; G. Two staminate flowers and two pistils above and staminate flowers below. All grids are in centimeters.

cm by 0.3–0.4 cm thick, rachis 24–46 cm long; leaflets, 25–38 along each side of the rachis, distributed irregularly in clusters of 2–5 and inserted in different planes, lanceolate, dark-green, glabrous on both sides, with acute and

asymmetrical apex; basal leaflets measuring 10–14 × 0.5–0.7 cm, middle leaflets 10–19 × ca. 0.5–1.8 cm, apical leaflets 3–6 × 0.1–0.3 cm. **Inflorescences** with peduncle glabrous, 6–14 cm long, somewhat flattened in cross-section,

0.5–1.0 × 0.3–0.7 cm diam.; prophyll ca. 8 × 1.5 cm; peduncular bract 20–30 cm long, the expanded part 12–22 × 2.7–6 cm; inflorescence axis 7–18 cm long, rachis 2–10 cm long with (1–) 3–8 primary branches measuring 3.5–11 cm long; **staminate flowers** 8–9.5 × 4–4.5 mm, sepals 1–1.5 × 1–1.5 mm, glabrous, keeled and connate at the base, petals 7.5 × 3.5 mm with acute tips, nerves indistinct to slightly raised, stamens 2.4–3.5 mm long, anther 1.7–2.5 mm long, filaments ca. 1.4–1.5 mm long, basal **pistillate flowers** elongate pyramidal, glabrous, 9–10 mm × 6–7 mm, sepals imbricate 8–9 mm × 4–5 mm, petals glabrous, imbricate at the base but slightly valvate at the tips, 9.5 mm × 5 mm, pistil glabrous, 7 mm × 3.5–4.0 mm, stigmas 3, 2.5–3.0 mm long, staminodial ring ca. 3 mm high, 6-dentate. **Fruits** globose, green when mature, 1.8–2.5 × 2.1–2.7 cm, with a fleshy-fibrous (pulpy) yellowish mesocarp ca. 3 mm thick, endocarp ca. 2.5 mm thick, ca. 1.5–1.7 × 1.1–1.4 cm with suture lines visible at the base but obscured at the apex. Seed nearly globose ca. 7 mm diam. with no internal cavity.

COMMON NAME : *palmeira-de-vassora*.

ETYMOLOGY: This palm is named for the município close to where it was collected, Itacambira, Minas Gerais.

DISTRIBUTION AND ECOLOGY: This palm is endemic to the state of Minas Gerais, in the Cadeia do Espinhaço, generally in rocky, sandy soils of high altitude *cerrado* or *campo rupestre*. One of the few known surviving populations was discovered in a *Eucalyptus* plantation along the road between Juramento and Itacambira. Another population was discovered in a *cerrado* region just south of Montes Claros, but with spicate inflorescences.

PHENOLOGY: Immature fruits can be found in June. In cultivation mature fruits were present in September.

NOTES: This is a small, acaulescent palm with branched inflorescences, globose fruit and tightly clustered, dark green, coriaceous, concolorous leaflets that are occasionally slightly twisted.

Syagrus longipedunculata Noblick & Lorenzi, **sp. nov.**, palma caule subterraneo, foliis plerumque patentibus rachide usque ad 65 cm longa, foliolis medianis brevibus usque ad 19 cm longis, inflorescentia spicata plerumque longipedunculata usque ad 31 cm longa.

Typus: BRAZIL, Goiás, Niquelândia, collected on the road to Alto Paraíso, ca. 20 km from the

town of Niquelândia, coordinates: 14°28'1.7"S, 48°18'8.1"W; 530 m altitude, common, 12 Dec 2009, H. Lorenzi, K. Soares & R. Campos 6790 (holotypus HPL; isotypi R, SP, BHCB, NY, K). Fig. 10.

Palm erect, 40–60 cm tall, stem solitary, very short to 20–30 cm in height with a rhizome 6–14 × 5–6 cm. **Leaves** 3–6 in the crown; sheath ca. 12–14 cm long; pseudopetiole 8–14 cm long with fibrous and smooth margins; true petiole 7–11 × 0.6–0.9 cm by 0.5–0.7 cm thick, rachis 46–65 (–73) cm long; leaflets, 28–42 along each side of the rachis, distributed irregularly in clusters of 2–4 and inserted in different planes, lanceolate, grayish blue, glabrous on both sides, with acute and asymmetrical apex; basal leaflets measuring 9–16 × 0.7–1.1 cm, middle leaflets 10–19 × 0.7–1.2 cm, apical leaflets 8–15 × 0.5–0.9 cm. **Inflorescence** a spike with glabrous peduncle, 17–31 cm long, somewhat flattened in cross-section, 0.3–0.4 cm diam.; prophyll ca. 6–10 cm × 1.2–2.0; peduncular bract 25–41 cm long, expanded part 8–19 × 2.2–3.3 cm; inflorescence axis 8.0–15.5 cm long, rachis not measureable with 1 primary branch measuring 8–19 cm long; **staminate flowers** 14–18 × 4.5–7.0 mm, sepals 3.0–4.7 × 1.0–1.2 mm, glabrous, keeled and connate at the base, petals 12.4–16.0 × 2.9–3.5 mm with acute tips, nerves indistinct to slightly raised, stamens 5.3–6.0 mm long, anther 3.5–4.1 mm long, filaments ca. 1.2–1.8 mm long; basal **pistillate flowers** elongate conical, glabrous, ca. 11–12 × 5–6 mm, sepals imbricate 7–10 mm × 4.9–5.5 mm, petals glabrous, imbricate at the base but (upper 2–3 mm) slightly valvate at the tips, 7.5–8.2 mm × 3.5–4.7 mm, pistil glabrous, 6.5–7.1 mm × 3.5 mm, stigmas 3, 2.4–2.5 mm long, staminodial ring ca. 0.7–1.2 mm high, 6-dentate. **Fruits** globose or somewhat ellipsoid, green when mature with a little bit of indument on the epicarp, 2.0–2.3 × 1.3–1.7 cm, green, with a fleshy-fibrous (pulpy) mesocarp ca. 2–3 mm thick, endocarp ca. 1.5–1.7 × 1.0–1.3 cm, with suture lines visible at the base but obscured at the apex, ca. 0.8–1.0 mm thick. Seed nearly globose ca. 0.9–1.0 cm diam. with no internal cavity.

COMMON NAME : *ariri-mirim*.

ETYMOLOGY: The specific epithet "*longipedunculata*" means long peduncle and refers to the longer than normal peduncle seen in this acaulescent palm.

DISTRIBUTION AND ECOLOGY: This palm is endemic to the state of Goiás, in rocky,

gravelly, sandy clay soils of high altitude sparsely vegetated *cerrado* or *campo rupestre*. PHENOLOGY: Flowering and older fruits seen in December.

NOTES: This is a medium-sized acaulescent palm, normally with spicate inflorescences, globose fruit and a long pedunculate inflorescence and infructescence.

Syagrus minor Noblick & Lorenzi, **sp. nov.**, palma minutissima, acaulis, foliis parvis, rachide 14–31 cm longa, 5–15 foliolis utroque, inflorescentiis spicatis 4.5–9.5 cm longis.

Typus: BRAZIL, Minas Gerais, Grande Sertão Veredas, collected on the road of the Parque [Nacional] do Grande Sertão Veredas, 15°25'26"S, 45°52'12.9"W, altitude 890 m. 4 Mar 2009. *H. Lorenzi, R. Pimenta & R. Campos 6639* (holotypus HPL; isotypi R, SP, BHC, NY, K). Fig. 11.

Palm less than 40 cm tall, stem solitary, very short or subterranean, 3.0–3.5 cm diam. **Leaves** arched, 3–5 in the crown, sheath 3.0–9.5 cm long, pseudopetiole with fibrous and smooth margins 8–18 cm long, petiole 3.5–9.0 cm long; rachis 14–31 cm long; leaflets 5–15 along each side of the rachis, distributed regularly or at times irregularly towards the base in clusters of 2 or rarely 3 and inserted along the rachis in nearly the same plane, lanceolate, dark-green, glabrous on both sides, with acute and rounded asymmetrical apex, basal leaflets 7–20 × 0.2–0.5 cm, middle leaflets 14.5–30.0 × 0.6–0.8 cm, and apical leaflets 10–19 × 0.3–0.5 cm. **Inflorescences** spicate, peduncle 5–16 cm long; prophyll 2.7–9.0 × 0.7–1.2 cm; peduncular bract 10–28 cm long, the expanded part 5.6–13.0 × 0.8–2.5 cm; inflorescence axis 4.5–9.5 cm long, rachis absent and one terminal primary branch 4.5–9.5 cm long; **staminate flowers** 7–8 × 3.5–4.0 mm, sepals 1.5 × 1.0 mm, glabrous, keeled and connate at the base, petals 6–7 × 2.0–2.5 mm with acute tips, nerves slightly raised, stamens 4–5 mm long, anther 3–4 mm long, filaments 1.5–2.0 mm long; basal **pistillate flowers** elongate pyramidal, glabrous, 14–18 × 8–11 mm (apical flowers 13–14 mm and 8–11 mm), sepals imbricate 9–11 × 7.5–9.0 mm, petals glabrous, imbricate at the base but slightly valvate at the tips, 9–13 × 5 mm, pistil glabrous, 9–10 × 3.5–4.0 mm diam., stigmas 3, ca. 4 mm long, glabrous, staminodial ring ca. 1 mm high, 6-dentate. **Fruits** ellipsoid to ovoid 2.5 × 1.5 cm, with a sweet, fibrous-fleshy mesocarp and hard endocarp ca. 1.7–2.5 × 1.1–1.3 cm containing

a single seed. Seed ca. 0.8 cm diam. with no interior cavity.

COMMON NAME : *palmeirinha-mirim*.

ETYMOLOGY : The specific epithet "*minor*" refers to the small stature of this species.

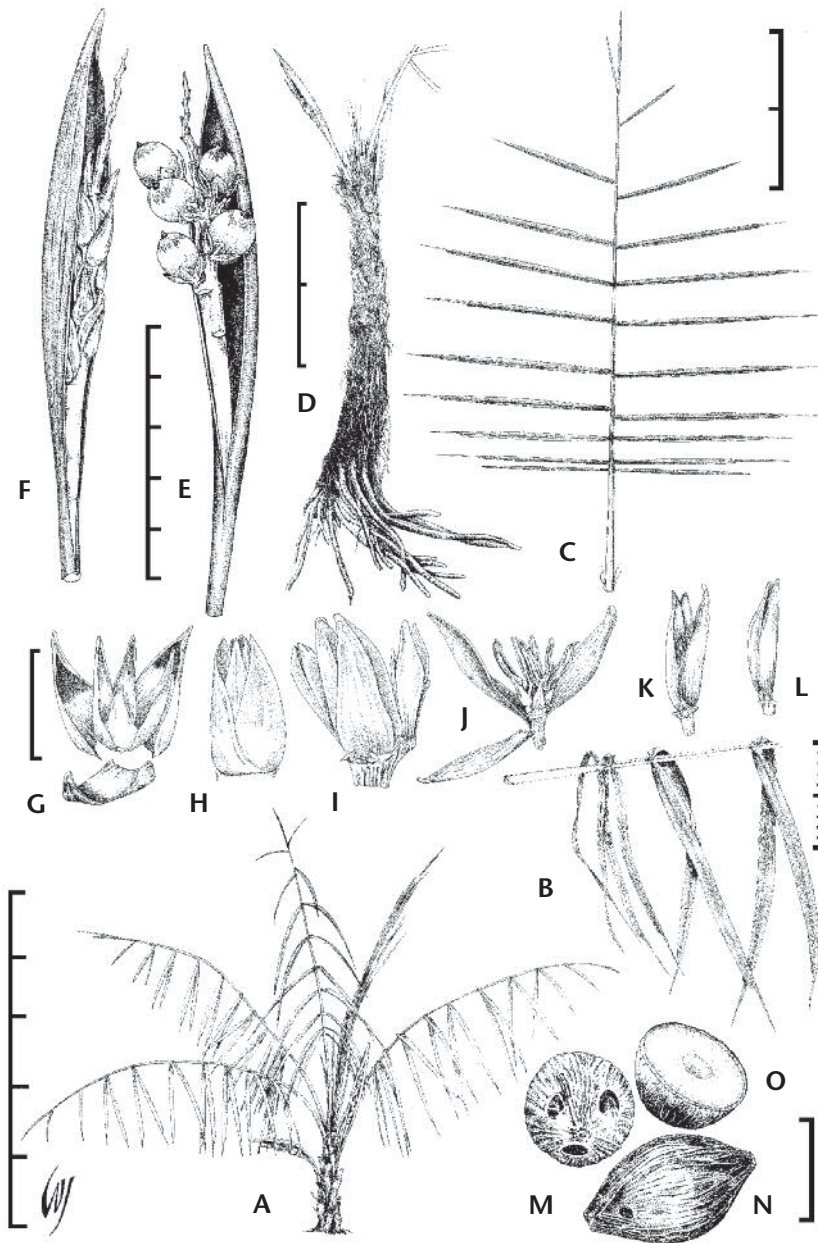
DISTRIBUTION AND ECOLOGY: Northwestern Minas Gerais in the Grande Sertão Veredas National Park in open *cerrado* vegetation. It is known only from the park. Since the park borders on Bahia, it is possible that this species occurs in the extreme southwestern part of Bahia as well.

PHENOLOGY: A few flowering specimens were seen in June.

NOTES: This is possibly one of the smallest *Syagrus* species yet discovered. Although there are two species that have small versions that are also contenders for the smallest *Syagrus* (*S. lilliputiana* and *S. procumbens*), this is certainly an impressively small palm.

Syagrus pleiocladoides Noblick & Lorenzi, **sp. nov.**, *S. pleiocladae* similis sed inflorescentia spicata, regulariter dispositis foliolis praeter ad basem et anatomia foliolorum dissimili differt. Typus: BRAZIL, Mato Grosso, General Carneiro, on the road to Cuiabá – BR 070 at Km 126.5, coordinates: 15°35'05.9"S, 053°10'25.5"W, altitude 493 m, 21 Jan 2009, *H. Lorenzi, R. Pimenta & R. Campos 6583* (holotypus HPL; isotypi R, SP, UB, UFMT, NY, FTG, K, AAU, CTES). Fig. 12.

Palm with an overall height of 50–70 cm, stem generally solitary, short (ca. 20 cm) or subterranean. **Leaves** nearly 1 m long and 4–9 in the crown; sheath 2.5–5.0 cm long; pseudopetiole with fibrous margins, 14–26 cm long, true petiole nearly absent to 15 × 0.4–1.0 cm by 0.2–0.5 cm thick; rachis 43–81 cm long; leaflets 11–25 along each side of the rachis, linear, pendulous, bright green, with long acuminate and asymmetrical apex, distributed mostly regularly except at the base where irregular in clusters of 2 and inserted in one plane, leaflets strongly deflexed or pendulous forming what appears to be an upside down "V" under the rachis; basal leaflets 7–22 × 0.1–0.5 cm, middle leaflets 21–35 × 1.0–1.5 cm, apical leaflets 7–13 × 0.1–0.6 cm. **Inflorescence** erect, spicate or rarely branched, with peduncle ca. 10–20 cm long; prophyll 8–13 × 0.8–1.8 cm; peduncular bract (6–) 14–37 cm long, expanded part 6.5–12.0 × 0.8–4.2 cm and 1–2 mm thickness; spike or inflorescence axis 3–14 cm long, rachis usually not measureable, usually with 1 primary branch



12. *Syagrus pleiocladoides*: A. Habit; B. Leaflets; C. Leaf; D. Underground stem; E. Inflorescence; F. Inflorescence; G-H. Pistillate flowers; I. Triad with one pistillate flower flanked by two staminate flowers; J-L. Staminate flowers; M-O. Endocarp basal end showing pores, side view, and x-section showing the interior cavity. A-D drawn from images taken by L.R. Noblick and H. Lorenzi, E-O drawn from H. Lorenzi 6583. All scales are in centimeters except A, C, and D which are in decimeters.

3–14 cm long, pistillate portion ca. 2.5–4.0 cm long with 3–5 pistillate flowers or fruits, staminate portion ca. 3.5–4.0 cm long; **staminate flowers** 8.5–12.0 × 4 mm, sepals fleshy 1 mm long or less and connate at the base, petals 7–11 × 3–4 mm (7–8 mm long at apex) with acute tips, nerves indistinct, stamens 5–6 mm long, anther 4.5–5.0 mm

long, filaments 1.5–2.0 mm long; **pistillate flowers** pyramidal, glabrous, 12–13 × 6 mm at the base of the inflorescence and 6 × 2.5–3.0 mm at the apex, sepals imbricate 10–12 × 4–5 mm, petals unnerved, imbricate at the base but (upper 1.5–2.0 mm) valvate at the tip, 7.5–9.0 × 3.5–4.0 mm, pistil glabrous, 6 × 2.5–3.0 mm diam., stigmas 3, 3 mm long,

glabrous, staminodial ring about 1 mm high and 6-dentate. **Fruits** ovoid with a short apical beak, 2.0–2.3 × 1.3–1.5 cm, with a fibrous-fleshy mesocarp, endocarp 1.9–2.2 × 1.2–1.3 cm; seed 1.1 cm diam. with a small central cavity.

COMMON NAME : *coqueirinho-mirim*.

ETYMOLOGY: The specific epithet "*pleiocladoides*" alludes to its close resemblance to *S. pleioclada*, with similar strongly pendant leaflets, which grows in eastern Minas Gerais in the Serra do Cipo and Cadeira do Espinhaço region.

DISTRIBUTION AND ECOLOGY: Mato Grosso and Goiás in open *cerrado* vegetation in rocky areas with sandy and median textured, well drained soil, between 350–500 m elevation.

PHENOLOGY: Fruiting in November.

OTHER SPECIMENS EXAMINED:: BRAZIL, Mato Grosso, Barra do Garças, 15°51'15"S 52°16'10"W, *H. Lorenzi* 4752 (HPL); General Carneiro, 15°43'02.1"S 52°39'44.7"W. *R. Tsuji et al.* 974 (HPL). 15°35'33"S 53°13'22.6"W, , *H. Lorenzi, K. Soares & R. Campos* 6787 (HPL).

NOTES: Harri Lorenzi discovered *S. pleiocladoides* in Mato Grosso and successfully introduced it into his garden collections. This acaulescent palm with its deflexed leaflets resembles *S. pleioclada*, but differs from it in having a straight, spicate inflorescence instead of one with several gnarly branches. It also has regularly spaced leaflets (basal ones excepted) instead of clustered leaflets and a distinctively different leaflet anatomy. The *S. pleiocladoides* has thinner leaflets with distantly spaced large vascular bundles (veins) that are attached only to the upper surface of the leaflet along with numerous smaller nonvascular fibers that are found along both the upper and lower surface of the leaflet. *Syagrus pleioclada* has a thicker leaflet that has larger, more closely spaced vascular bundles that touch both the upper and lower surface of the leaflet along with a few large nonvascular fibers. The two species are separated by hundreds of kilometers with *S. pleiocladoides* growing in Mato Grosso and possibly western Goiás and *S. pleioclada* in eastern Minas Gerais.

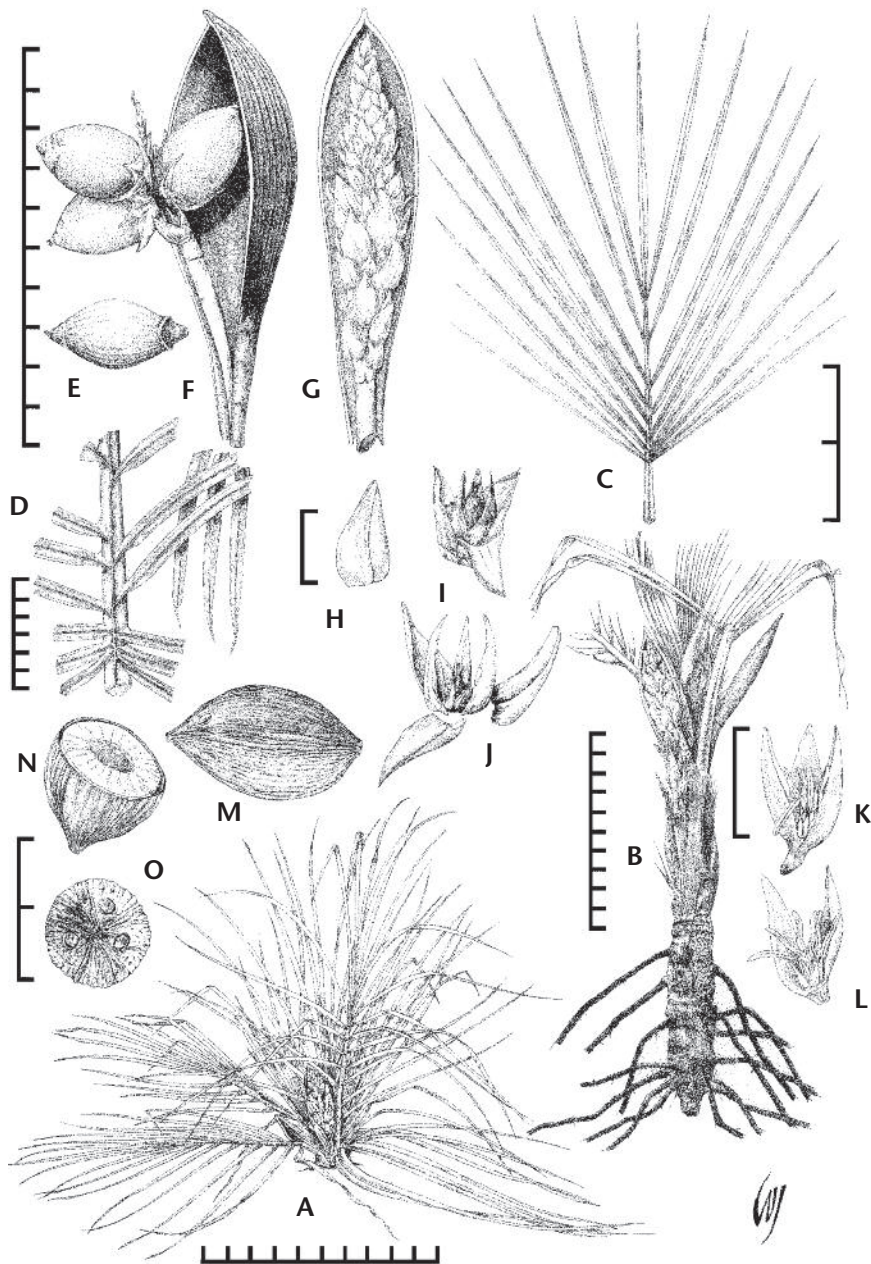
Syagrus procumbens Noblick & Lorenzi, *sp. nov.*, palma tronco solitario subterraneo, inflorescentia spicata, foliis veterioribus valde procumbentibus, foliolis angustis plerumque regulariter dispositis ad basem aggregatis, apicibus foliorum asymmetricalibus acuminatis. Typus: BRAZIL, Mato Grosso do

Sul, Municipio de Agua Clara, collected near km 107, at an entrance to a side road that gives access to a *cerrado*, 33 km from Agua Clara, 20°33.579'S, 52°35.130'W. 16 Jun 2008. *R. Tsuji, H. Lorenzi, L. Noblick and R. Ventura* 2677 (holotypus HPL; isotypi R, SP, CGMS, UB, CTES, NY, FTG, K, AAU). Fig. 13.

Acaulescent palm with solitary short subterranean stem, the whole plant usually less than 50 cm in height. **Leaves** less than 1 m long and 2–4 in the crown and the older ones lying procumbent on the ground, only the newest leaf erect; sheath 9–16 cm long; pseudopetiole with fibrous margins, 2–9 cm long, true petiole 0–6 × 0.5 cm by 0.4 cm thick, rachis 2.5–13.0 cm long; leaflets medium to dark green, (3–) 5–8 (–11) along each side of the rachis, linear, with long acute to acuminate and asymmetrical apex, distributed mostly regularly along the rachis and arranged in one plane with the two sides forming a slight V over the rachis; basal leaflets 18–50 × 0.1–0.8 cm, middle leaflets 31–78 × 0.4–1.5 cm, apical leaflets 13–59 × 0.1–1.5 cm. **Inflorescence** erect, spicate or rarely branched, peduncle 7.0–9.5 cm long; prophyll 4.0–8.5 × 1.0–1.5 cm; peduncular bract 6.5–20.0 cm long, expanded part 4.5–10.0 × 3.0–4.8 cm including a beak, nearly absent to 2 mm long; spike inflorescence 3.3–10.0 cm long, 1 primary branche 3.3–10.0 cm long, pistillate portion ca. 4 cm long or less with 3–6 pistillate flowers or fruits, staminate portion ca. 2–6 cm long; **staminate flowers** 4–13 × 4–6 mm, sepals 1–2 × 1.5–2.0 mm, usually keeled and connate at the base, petals 6–8 × 2.5–5.0 mm with acute tips, nerves indistinct, stamens 3.5–5.0 mm long, anther 3–4 mm long, filaments 0.5–1.0 mm long; **pistillate flowers** elongate pyramidal, glabrous, 8–19 × 4–9 mm, sepals imbricate 8–13 × 4–9 mm, petals nerved, imbricate at the base but (upper 6–7 mm) valvate at the tips, 9–13 × 5–8 mm, pistil nearly glabrous, 4 × 2.0–2.5 mm diam., stigmas 3, 2–3 mm long, glabrous, staminodial ring about 1.5–2.0 mm high, short dentate to nearly truncate. **Fruits** ellipsoid, yellowish tinged when mature, 2.5–3.3 × 1.8–2.2 cm with fibrous-fleshy (pulpy) mesocarp ca. 3 mm thick, epicarp fine reddish brown lepidote; endocarp 1.5–2.6 × 1.3–1.6 cm, ca. 0.5–2.0 mm thick. Seed ca. 1.1 cm diam. with an internal cavity.

COMMON NAME : *ariri-rasteiro*.

ETYMOLOGY: The Latin word "*procumbens*" means procumbent and refers to the manner



13. *Syagrus procumbens*: A. Habit; B. Underground stem; C. Leaf; D. Leaflets; E. Fruit; F. Infructescence; G. Inflorescence; H–J. Pistillate flowers; K–L. Staminate flowers; M–O. Endocarp sideview, x-section showing the interior cavity, side view, and basal end view showing the pores. A–D drawn from images taken by L.R. Noblick and H. Lorenzi, E–O drawn from R. Tsuji *et al.* 2277. All scales are in centimeters except A, and C which are in decimeters.

in which the lower leaves tend to lay nearly flat against the ground.

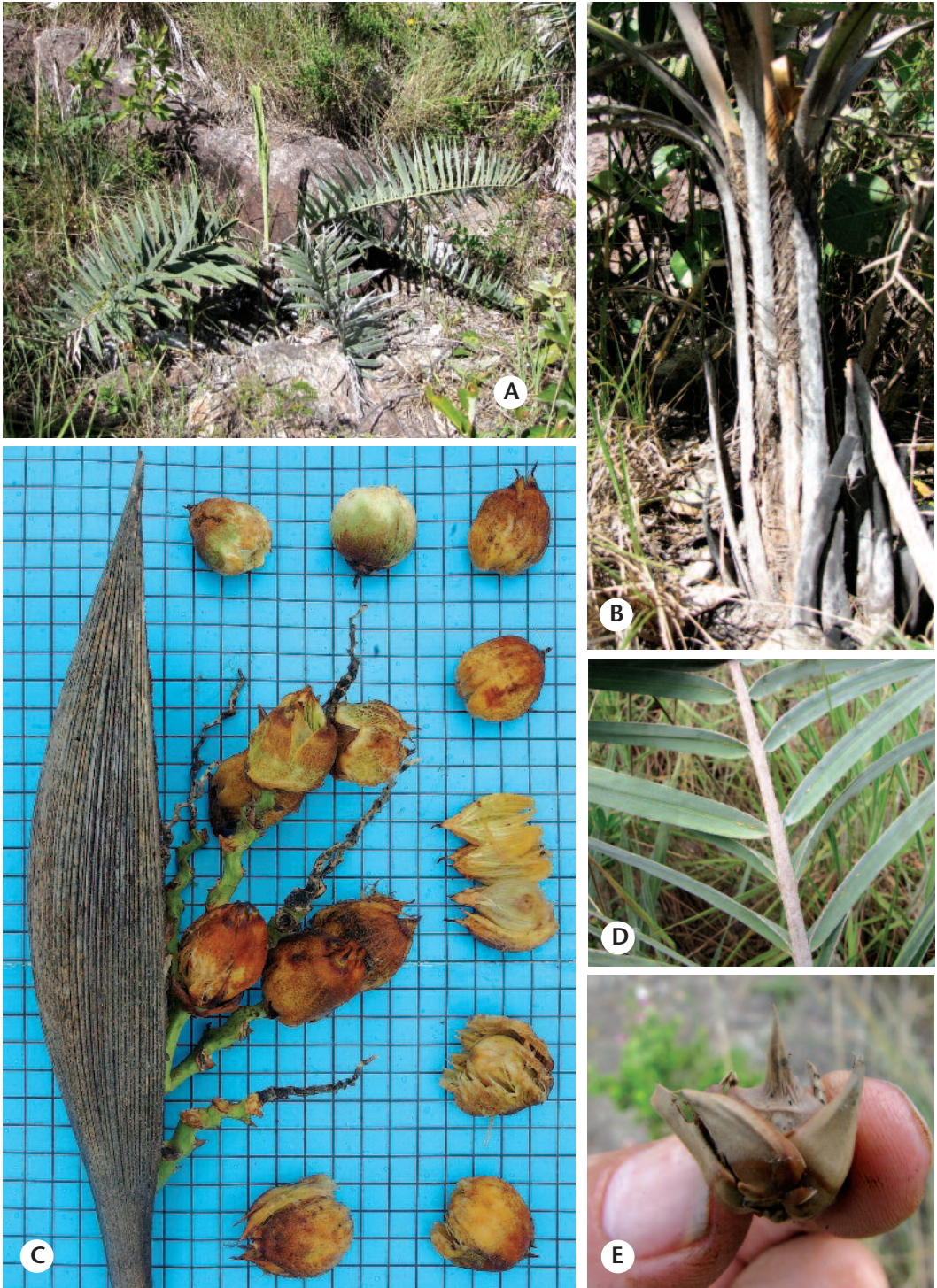
DISTRIBUTION AND ECOLOGY: Goiás and Mato Grosso do Sul in *cerrado*, generally in sandy soils.

PHENOLOGY: Fruiting in December.

OTHER SPECIMENS EXAMINED: BRAZIL, Goiás,

Município de Mineiros, Parque Nacional das Emas, 18°05'S 53°05'W, L. Noblick and H. Ferreira 4868 (FTG, UFG).

NOTES: This is an acaulescent palm with its lower leaves lying flat or procumbent on the ground; long narrow leaflets with a relatively short rachis help to identify this palm along with its leaflet anatomy.



14. *Syagrus rupicola*: A. Habit; B. Above ground portion of the stem; C. Inflorescence showing the tendency of the fruit to split at their apices; D. Underside of leaflets showing the ramenta and tomentum along the rachis; E. Large old pistillate flower. Grid is in centimeters.

Syagrus rupicola Noblick & Lorenzi, *sp. nov.*, Palma rupicola, caule breve subterraneo 10–20 cm longo, foliis coriaceis usque ad 1.2m longis viride-argenteis vel caerulescentibus, floribus

femineis grandibus usque ad 2 cm longis. *Typus*: BRAZIL, Goiás, Teresina de Goiás, on the GO-118 highway towards Alto Paraiso de Goiás – km 215 (ca. 35 km from the town of

Alto Paraíso), 13°52'28.8"S, 47°20'08.4"W, at an altitude of 1140 m, in the region of the Chapada dos Veadeiros. 7 Mar 2009, H. Lorenzi, R. Pimenta & R. Campos 6647 (holotypus HPL; isotypi R, SP, UB, NY, K). Fig. 14.

A robust solitary palm, slightly over 1 m in height, with a very short or subterranean stem, 10–20 cm long. **Leaves** arched, 3–6 in the crown, ca. 1 m long; sheath 17–35 cm with fibrous margins, pseudopetiole 36–55 cm long; true petiole 16–30 cm long; rachis 0.7–1.2 m long, the underside of the sheath and rachis covered by a thick white tomentum; leaflets 45–66 along each side, linear, rigid-coriaceous with apex acuminate and asymmetric, silver or bluish-green and slightly lighter on the lower surface, distributed irregularly in clusters of 2–5 and inserted at different angles along the rachis, ramenta scales or tomentum often present near the base along the abaxial vein and especially at the insertion of the leaflets on the rachis, basal leaflets 6–22 × 0.1–0.4 cm, middle leaflets 24–34 × 2–3 cm, and apical leaflets 4.0–8.5 × 0.2–0.6 cm. Inflorescences erect and spicate to branched; peduncle 30–40 cm long; prophyll 16–21 × 4.5–6.0 cm; peduncular bract covered on the exterior with a grayish indument, 56–64 cm long, expanded part 20–29 × 4–7 cm; inflorescence axis ca. 24 cm long, rachis ca. 8 cm, with 1–6 primary branches ca. 9–15 cm long; **staminate flowers**, not yet seen; basal **pistillate flowers** pyramidal, glabrous, 18–20 × 13–16 mm, sepals imbricate 17–18 × 10–11 mm, petals glabrous, imbricate at the base but strongly valvate (upper half 8–9 mm) at the tips, 18–19 mm × 14–15 mm, pistil glabrous to finely lepidote, stigmas 3, glabrous, staminodial ring ca. 2.5 mm high, 6-dentate. **Fruits** nearly globose, pale yellowish to reddish brown, 3.5–3.9 × 2.5–3.4 cm, with a fibrous-fleshy (pulpy) mesocarp and visibly splitting at the apices when mature; epicarp covered with a fine reddish-brown lepidote indument.

COMMON NAME : *palmeria-da-pedra*.

ETYMOLOGY: The specific epithet means rock dweller and alludes to the preferred rocky habitat of this species.

DISTRIBUTION AND ECOLOGY: Occurs in the northern part of the state of Goiás in the

Chapada dos Veadeiros region, in high altitude (above 1000 m) *campo rupestre* or *cerrado*, generally in very rocky, well-drained soils.

PHENOLOGY: Fruiting in December.

NOTES: A medium-sized acaulescent palm; the rigid-coriaceous silvery-bluish leaves, fruit that splits at the apex with the mesocarp easily separating from the endocarp, and large pistillate flowers are some of this palm's distinguishing characters.

Acknowledgments

Sincere thanks to Fairchild Tropical Botanic Garden, where Larry is a research associate, and especially to their volunteer, Wes Jurgens, who furnished the drawings for the diagnostic plates. We would also like to thank Eduardo Gonçalves from Inhotim for helping us with the Latin diagnoses and to both Monica Moraes and Luiz Moreno for sending Larry material of the Bolivian *S. petraea* for study. Final thanks to Jill Menzel and Ricardo Campos for their support in helping Larry study many of these palms in the field. Part of the impetus for publishing some of these species was provided by the National Science Foundation Grant #0212779.

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