

Two new species of *Mimosa* from northeastern Brazil

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ABSTRACT

Two new species of *Mimosa* sect. *Batocaulon* ser. *Leiocarpae* are described from northeastern Brazil. *Mimosa cardosoi* occurs in the seasonally dry woodlands known as *Caatinga* from the upland areas of central Bahia state. It is close to *M. mensicola* from which differs by leaves with smaller and more numerous leaflets and by the shape of the leaflets, calyx, and corolla. *Mimosa simonii* is known only from the Araripe plateau along the Ceará-Pernambuco states border. It is similar to *M. verrucosa* from which it differs by spiculate leaves, larger leaflets, and corolla stellate-pubescent over its entire length.

1 | INTRODUCTION

With more than 500 species, *Mimosa* L. is one of the largest genera of the flowering plants. Most of their species are from the New World, most numerous within the tropics but extending to temperate areas of the United States and Argentina (Barneby 1991). The genus is particularly diverse in seasonally dry and open vegetation as grasslands, savannas and seasonally dry woodlands (Simon et al. 2011). In Brazil, 379 species are recorded mostly from Cerrado (246 species), Mata Atlântica (117), and Caatinga (59) phytogeographical domains (Flora e Funga do Brasil; <https://floradobrasil.jbrj.gov.br/FB23084>).

The current classification system of *Mimosa* was proposed by Barneby (1991), recognizing five sections, 41 series and 37 subseries. Section *Batocaulon* DC. includes species lacking petiolar nectaries, flowers diplostemonous, trichomes simple and perianth never yellow (Barneby 1991). It is the most polymorphic section including 25 series. Series *Leiocarpae* Benth. embraces c. 31 species (Barneby 1991; Silva 2013) and is characterized by the flowers tetramerous and spicate; cauline aculei infrastipular or absent; and fruit a craspedium (Barneby 1991). Both section *Batocaulon* and series *Leiocarpae* are not monophyletic (Simon et al. 2011; Silva 2013) but no alternative taxonomic scheme has yet been proposed.

Several species of series *Leiocarpae* are colonizing fast growing shrubs or treelets as *M. caesalpiniiifolia* Benth., *M. arenosa* (Willd.) Poir., and *M. tenuiflora* (Willd.) Poir. They have been used as multipurpose trees in drylands providing material for living fences, firewood, fodder, nectar and pollen for honey, tannins for painting and for tanning, and fixing nitrogen into the soil (Andrade-

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Lima 1954; Camargo-Ricalde 2000; Rivera-Arce et al. 2007). Besides, they have hallucinogenic (Camargo 2002) and medicinal properties with antispasmodic, anti-inflammatory and healing actions (Tellez and Dupoy de Guitard 1990; Meckes-Lozoya et al. 1990; Souza et al. 2008).

The seasonally dry tropical forests and woodlands (SDTFWs) of northeastern Brazil are the dominant vegetation types in the Caatinga and are particularly rich in legumes, a group that accounts for about one third of all plant species of this phytogeographical domain (Queiroz 2006; Queiroz et al. 2017; Fernandes et al. 2020), in agreement with the general preference of the family for dry tropical areas around the world (Schrire et al. 2005). *Mimosa* is the most diverse genus in the Caatinga, with 59 species of which 38 species are native to the SDTFWs, including 14 species of ser. *Leiocarpae* (Queiroz 2009; Silva 2013). However, phylogenetic studies in the genus *Mimosa* indicates that this series is polyphyletic, with their species scattered in three unrelated clades (Simon et al. 2011).

In the course of a floristic survey of the Caatinga legumes (Queiroz 2009), we encountered specimens that we considered as belonging to two new species according to the morphological species concept (Du Rietz 1930; Bisby & Coddington 1995) as they present morphological discontinuities in relation to all described species of this genus. The conservation assessment was based on the International Union for the Conservation of Nature (IUCN 2017) categories and criteria. The GeoCAT tool (Bachman et al. 2011; <<http://geocat.kew.org/>>) was used to calculate the area of occupancy (AOO) and the extent of occurrence (EOO).

2 | TAXONOMY

Mimosa cardosoi P.G. Ribeiro & L.P. Queiroz, *sp. nov.* (Figure 1).

Mimosa cardosoi sectionem *Batocaulonem* seriem *Leiocarpae* pertinens, *Mimosae mensicolae* foliolis glabris coriaceis, pseudoracemis longe exsertis cum spicis brevibus et fructibus sessilibus affinis, a qua foliis cum 2–3 jugis pinnarum (in *M. mensicola* 1–2), foliolis in quoque pinna 14–17 jugis (non 5–7), foliolis 8–10 mm longis, 1.8–3.0 mm latis (non 15–24 mm longis et 5–13 mm latis), linearibus (non oblongis), 2-nervatis (non 4–7-nervatis), margine calycis leviter undulata (non dentata), corolla in anthesi campanulata (non infundibuliformi) et staminibus alternatim longis et brevibus (non aequalibus) differt.

Typus—BRAZIL, Bahia: Seabra, povoado de Lagoa Boa Vista, na saída pela estrada velha para Gado Bravo, 12°16'31"S 41°48'20"W, 1000 m a.s.l., 22 June 1993 (fl, fr), L.P. Queiroz & N.S. Nascimento 3333 (holotype: HUEFS 13764 [HUEFS000142820!]; isotypes: CEPEC 62263!, K 000851126!, K 000091177!).

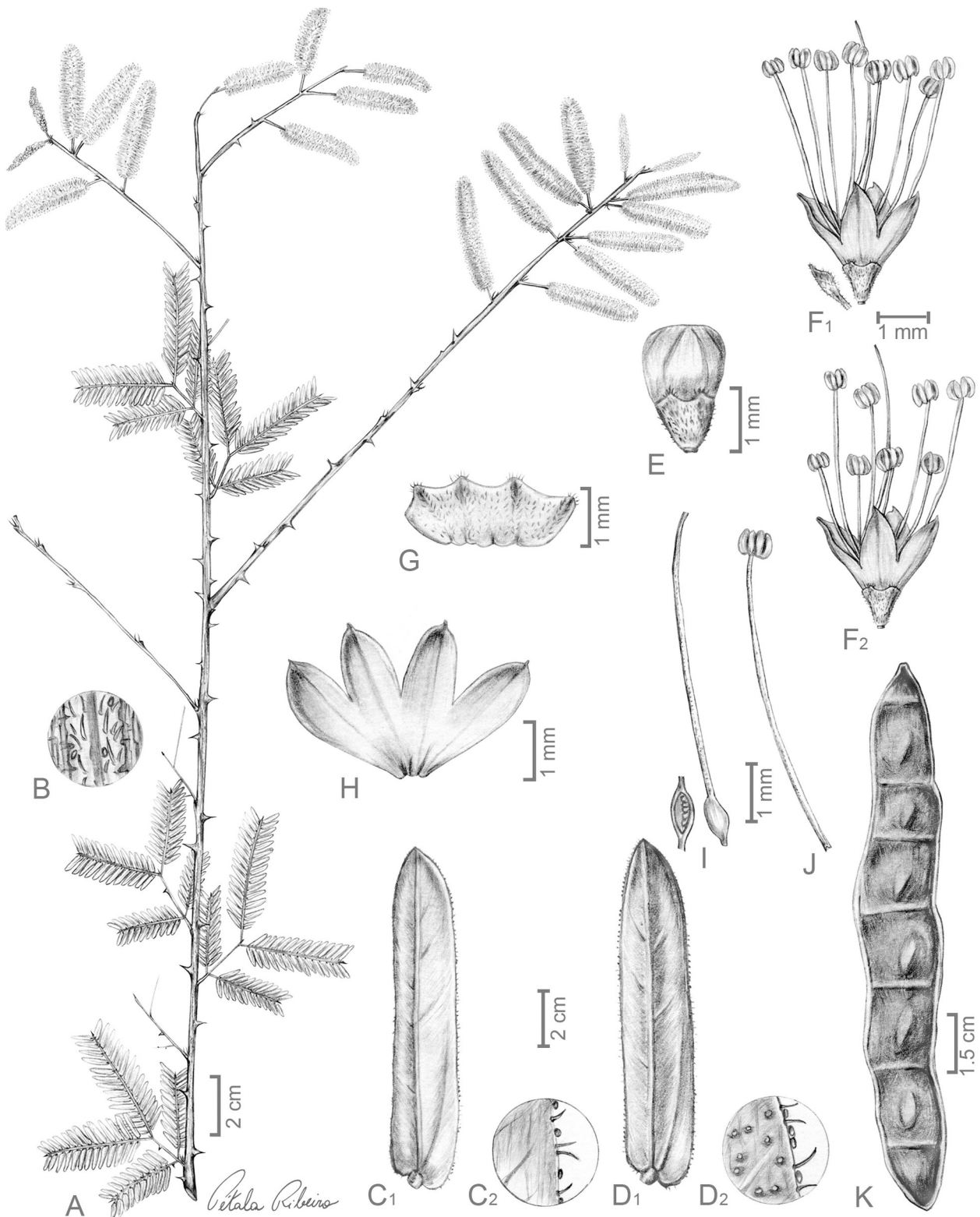


Figure 1. *Mimosa cardosoi*. A. Flowering branch. B. Detail of the stem pubescence. C1–D2. Leaflet in upper (C1) and lower (D1) surfaces and a detail of the respective margins (C2, D2). E. Flower bud. F1. Floral bract and flower with stamens of equal size. F2. Flower with alternately longer and shorter stamens. G. Open calyx (outer surface). H. Open corolla (outer surface). I. Gynoecium showing detail of the ovary. J. Stamen of the larger whorl. K. Craspedium. A–J from D. Cardoso & A.A. Conceição 457; K from L.P. Queiroz & N.S. Nascimento 3333 drawn by P.G. Ribeiro.

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Shrub 2–3.5 m, armed on the branches and dorsal rib of some pinna-rachises with broad-based aculei 4–7 mm long, the cauline ones mostly straight or slightly upcurved, the foliar smaller and recurved, the young branches, leaf stalks, and inflorescence axes minutely puberulent and granular. Stipules 5–7 × c. 1 mm, narrowly triangulate, erect. Leaves 2–3-jugate becoming 1-jugate toward the inflorescence; petiole 5–10 mm long; rachis 7–14 mm long, the segments between the pinnae 6–10 mm long, spicula subulate between each pair of pinnae; pinnae becoming longer toward the apex, the distal ones 30–42 mm long, the median ones 30–40 mm long, the basal ones 15–38 mm long, charged near the base with a pair of deltoid paraphyllidia, interfoliolar segments 1.8–3.0 mm long; leaflets of the longer pinnae 14–17 pairs, coriaceous, 8.0–10.0 × 1.8–3.0 mm, 3–5× longer than wider, linear, apex obtuse, base oblique, a little shorter near each end of the pinnae and commonly broader distally, 2-nerved from pulvinule, the midrib slightly displaced, the second main vein from pulvinule upcurved, the midrib giving rise to 5–9 secondary veins, facially glabrous, the margins shortly puberulous mixed with dense or sparse glandular trichomes. Spikes (1) 2–3 per node, grouped in longly exserted pseudoracemes, 36–40 × c. 4 mm, 5–8 mm belonging to the peduncle; bracts c. 0.6 mm long, puberulent dorsally, narrowly obovate, caducous before anthesis; flower buds obovoid. Flowers 4-merous; calyx c. 1 mm long, tubular, margin shallowly undulate, shortly puberulent, ciliate; corolla 2.5–3.0 mm long, white, at full anthesis campanulate, the tube 1.6–1.8 mm long, the lobes 0.7–1.2 mm long, erect, ovate, apex acute; stamens 8, white, free to the base, alternately longer and shorter, the filaments of the longer ones 5–6 mm long, those of shorter ones 3–4 mm long, anthers ellipsoid; ovary 0.5–1.0 mm long, c. 10-ovulate, sessile, glabrous, style c. 7 mm long. Craspedium 51–59 mm long, sessile, broadly linear, plano-compressed, replum almost straight, minutely puberulent, the papery, glossy, brownish valves almost glabrous except by sparse glandular trichomes; articles 6–10, 5–8 × 4–9 mm, almost square.

Additional specimens examined (paratypes)—BRAZIL: Bahia, Mucugê, Serra do Esbarrancado, trilha na subida do Beco, 12°43'S, 41°30'W, 1150 m a.s.l., 17.Apr.2005 (fl.), *D. Cardoso & A.A. Conceição* 457 (HUEFS 94693); estrada de Guiné para Palmeiras, 12°45'S 41°30'W, 1000 m a.s.l., 20 Jun 2005 (fr.), *D. Cardoso & A.A. Conceição* 591 (HUEFS 96980); Bahia, Iraquara, ca. 4 km S de Água de Rega na estrada para Lagoa da Boa Vista, 12°12'16"S 41°46'54"W, 960 m a.s.l., 22.Jul.1993 (fl, fr), *L.P. Queiroz & N.S. Nascimento* 3389 (HUEFS 13820); Iraquara, ca. 3 km N de Água de Rega na estrada para Souto Soares, 12°08'58"S 41°46'17"W, 1000 m a.s.l., 23.Jul.1993 (fr.), *L.P. Queiroz & N.S. Nascimento* 3396 (HUEFS 13827); Bahia, Seabra, ca. 10 km W de Seabra na BR-242, 12°24'25"S 41°51'37"W, 1000 m a.s.l., 22.Jun.1993 (fr.), *L.P. Queiroz & N.S. Nascimento* 3329 (HUEFS 13760).

Etymology—This species is named after Domingos Cardoso, who recorded the species in the field and brought our attention to it.

Distribution and habitat—*Mimosa cardosoi* occurs in the Chapada Diamantina mountain range in Central Bahia. It is known only from a small area near Iraquara, Mucugê and Seabra, in seasonally

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dry woodlands and shrublands on rocky soil. It was collected in flower in April to July, and in fruit in June and July.

Conservation assessment—Spatial analysis found an Extent of Occurrence of 354 km² and an Area of Occupancy of 24 km². Then, this species should be considered as endangered according to criteria B1-2a,b of IUCN (2017), since it has a restricted range in very fragmented habitats.

Taxonomic comments—*Mimosa cardosoi* is morphologically related to *M. mensicola* Barneby, both sharing the glabrous, coriaceous leaflets, the widely exerted pseudoracemes with rather shorter spikes, and the sessile fruit. Both species occur in the Chapada Diamantina in similar habitats but in distinct mountain tops. They can be distinguished by leaves with 2–3 pinnae pairs in *M. cardosoi* (vs. 1–2 in *M. mensicola*); 14–17 (vs. 5–7) leaflets per pinna; leaflets 8–10 × 1.8–3.0 mm (vs. 15–24 × 5–13 mm), linear (vs. oblong), 2-nerved (vs. 4–7-nerved), with sessile glandular trichomes at the abaxial face (vs. leaflets lacking glandular trichomes); calyx rim shallowly undulate (vs. dentate); and corolla at full anthesis campanulate (vs. funnelform).

This new species is morphologically intermediate between *M. mensicola* and *M. ophthalmocentra* Mart. ex Benth. since it presents the number of pinnae and leaflets per pinna similar to the found in *M. ophthalmocentra*. However, they present quite distinctive shape of the corolla, this being narrowly cylindrical with almost square section and apically incurved lobes in *M. ophthalmocentra* (Barneby 1991; Queiroz 2009; Silva 2013) and widely campanulate with expanded lobes in *M. cardosoi*. Besides, the leaflets of *M. ophthalmocentra* are glabrous and lack glandular trichomes, that are present on the leaflets of *M. cardosoi*. *Mimosa ophthalmocentra* grouped in the 'clade D', together with some other species of *Mimosa* ser. *Leiocarpae* from Caatinga, as *M. acutistipula* (Mart.) Benth., *M. arenosa*, and *M. caesalpiniifolia* (Simon et al. 2011), all sharing the eglandular leaflets. *Mimosa cardosoi* is morphologically related to these species and could belong to the same clade.

Mimosa simonii P.G. Ribeiro & L.P. Queiroz, *sp. nov.* (Figures 2-3).

Mimosa sectionem Batocaulonem seriem Leiocarpae pertinens. Mimosae verrucosae ramis inermis setulis verruciformibus et trichomatibus stellatis affinis, ab qua foliis sine spiculis (in M. verrucosa foliis cum spiculis conico-subulatis), pinna basali 3.0–8.5 cm longa (nec 0.8–1.3 cm), foliolis 4–8 mm latis (nec 1.5–4.5 mm), 1.6–2.5-plo longioribus quam latioribus (nec 2.2–3.3) ex pulvinulo 5–6-nervatis (nec 3-nervatis), ambobus nervis fortioribus apicem in areola sine venis convergentibus, calyce et corola trichomata stellata omni extensione dense vestitus differt (nec trichomata stellata apicem loborum calycis et corolae restrictibus).

Typus—BRAZIL, Ceará: Crato, divisa da FLONA, 27 Jun. 2003 (fl), F.S. Cavalcanti & E. Silveira s.n. (holotype: HUEFS 80802 [HUEFS000159549!]; isotypes: EAC 32532!, HUEFS [HUEFS000159513!]).

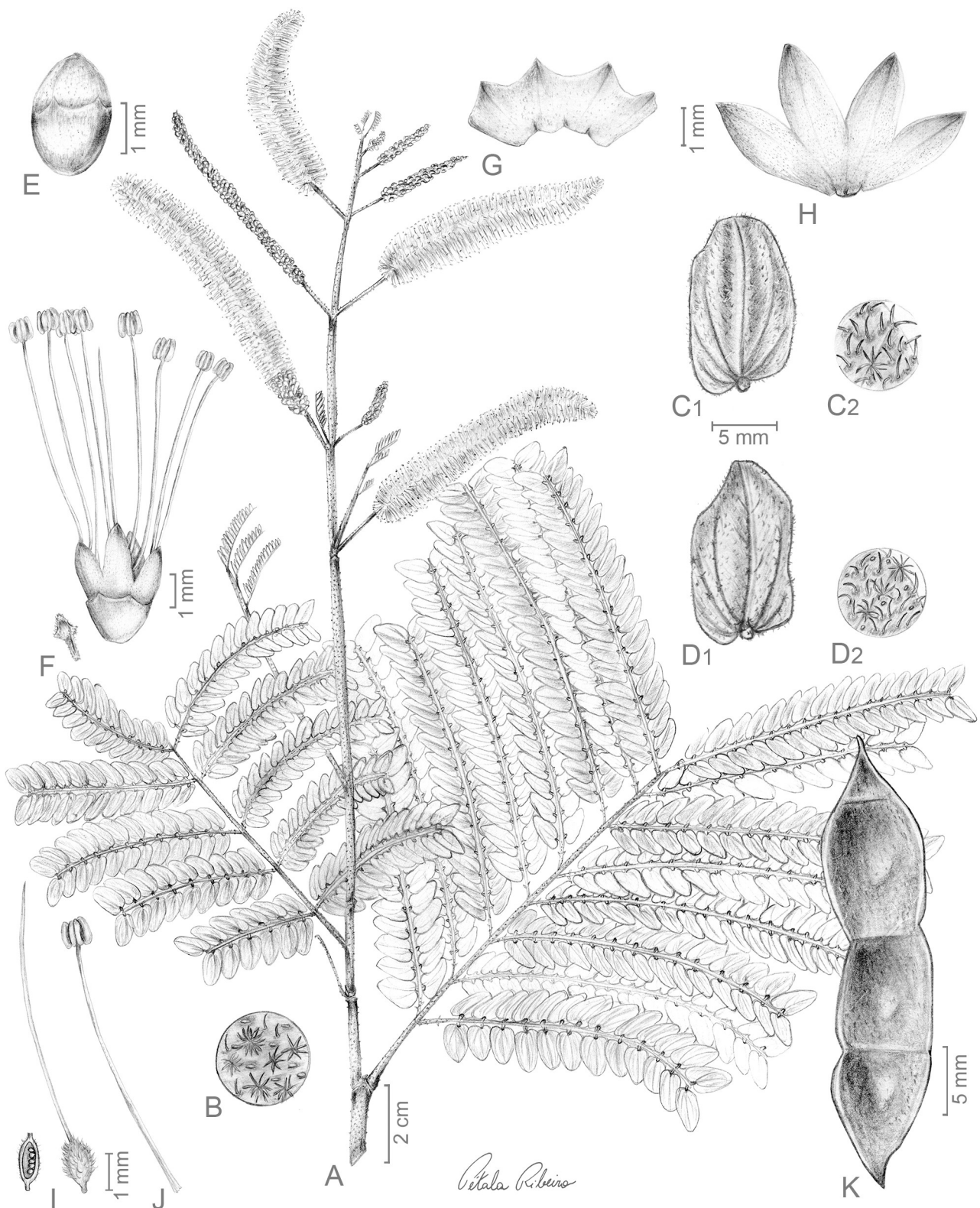


Figure 2. *Mimosa simonii*. A. Flowering branch. B. Detail of the stem pubescence. C1–D2. Leaflet in the upper (C1) and lower (D1) surfaces and detail of the respective pubescences (C2, D2). E. Flower bud. F. Floral bract and flower. G. Open calyx (outer surface). H. Open corolla (outer surface). I. Gynoecium showing detail of the ovary. J. Stamen. K. Craspedium. A–K from the type (F.S. Cavalcanti & E. Silveira s.n. EAC 32532) drawn by P.G. Ribeiro.

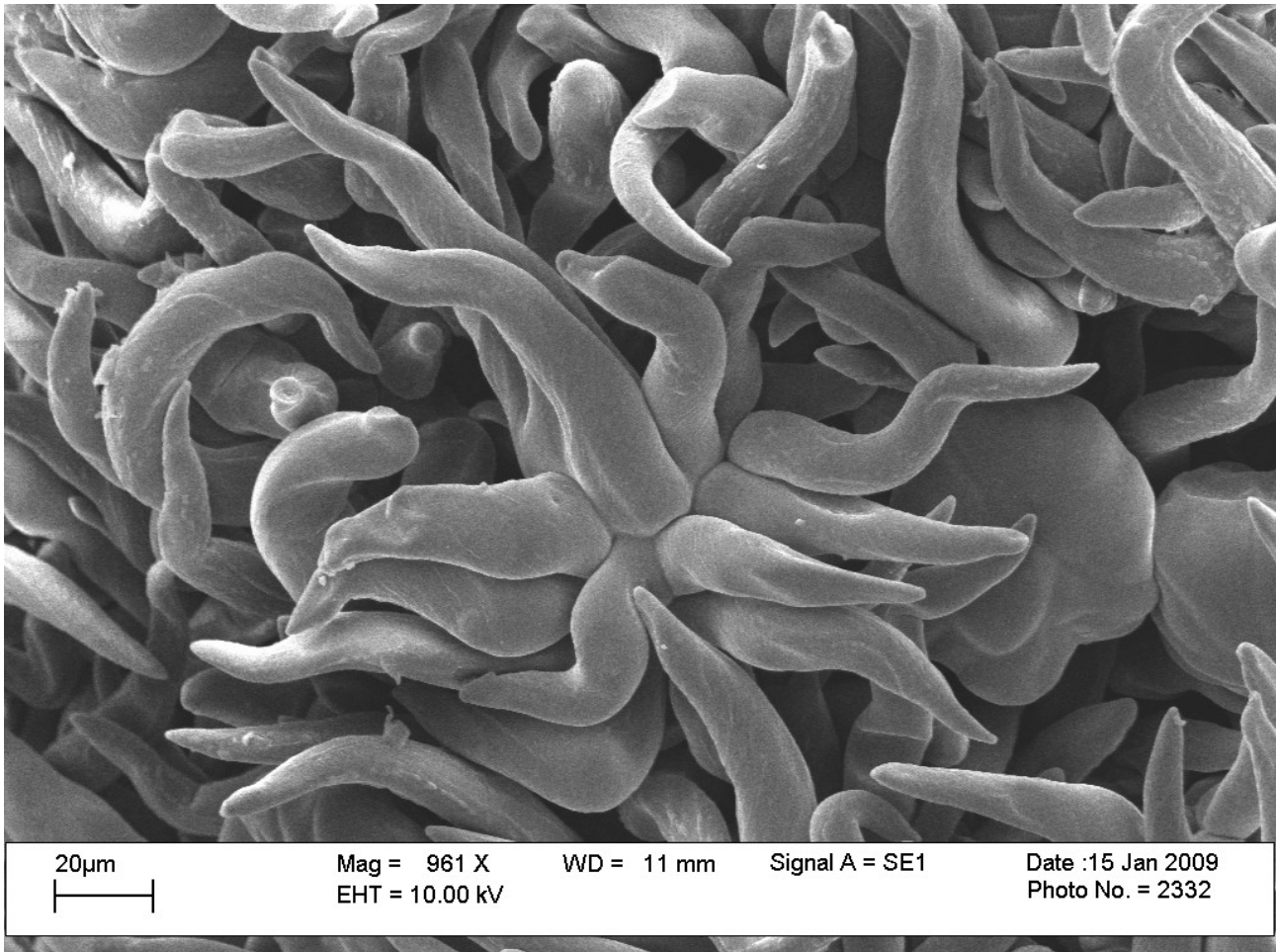


Figure 3. Scanning electron photomicroscopy of the corolla of *M. simonii* (A) showing detail of the stellate indumentum.

Unarmed shrub, the young branches, leaf stalks, and inflorescence axes pubescent with short trichomes and charged with dense verruciform plumose setulae. Stipules 2.5–3.8 × 0.5–0.8 mm, narrowly triangulate, erect. Leaves 5–8-jugate; petiole 14–25 mm long; rachis 50–59 mm long, the segments between pinnae 12–16 mm long, spicula absent; pinnae becoming longer toward the apex, the distal ones 6.2–10.0 cm long, the median ones 5.5–8.5 cm long, the basal ones 3.8–5.0 cm long, charged near the base with a pair of conical paraphyllidia; interfoliolar segments 4–8 mm long, leaflets of longer pinnae 12–18 pairs, 9–13 × 4–8 mm, 1.6–2.5× longer than wider, elliptical, apex rounded, rarely mucronate, base obliquely cordate, 5–6-nerved from pulvinule, the slightly displaced midrib and the other stronger vein converging toward the apex defining a veinless central areole, secondary veins inconspicuous, upper surface pilose or velutinous with broad-based, white, soft, erect trichomes, lower surface with erect, soft trichomes sparse, verruciform plumose setulae denser on the main veins, and facially charged with yellowish sessile glands. Spikes 2 per node, 60–84 × c. 6 mm, 11–13 mm belonging to the peduncle, grouped in exserted pseudoracemes; bracts 1.2–1.5 mm long, sagittate with a long slender base, caducous before anthesis, densely puberulent dorsally; flower buds cylindrical. Flowers 4-merous, calyx and corolla densely covered by stellate hairs

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throughout their entire length; calyx 1.8–2.1 mm long, campanulate, lacinia shorter than tube, obtuse; corolla c. 3 mm long, at full anthesis cylindrical, the tube 1.8–2.0 mm long, the lobes 1.0–1.2 mm long, erect, linear, apex acuminate; stamens 8, pink, free to the base, the filaments 7–11 mm long, anthers ellipsoid; ovary c.1 mm long, c. 10-ovulate, sessile, densely pubescent, style 7–9 mm long. Craspedium 2.5–4.0 cm long, sessile, linear, plano-compressed, replum almost straight, densely puberulent, the valves densely covered with stellate hairs, verruciform setulae, and yellowish glands; articles (1) 2–5, 5–9 × 7–10 mm, almost square.

Additional specimens examined (paratypes)—BRAZIL: Ceará, Santana do Cariri, Chapada do Araripe, próximo a Exu, 3 Sept. 1996 (fl., fr.), *E. Nunes & A. Fernandes s.n.* (EAC 24319), Chapada do Araripe, estrada para Exu, 15 Sept 1992 (bd., fl.), *E. Nunes & B.S. Cavada s.n.* (EAC 18744), Chapada do Araripe, estrada divisa CE-PE Exu, 6 May 1998 (bd., fl.), *M.A. Figueiredo, L.W. Lima-Verde & V.M. Albuquerque s.n.* (EAC 26774), Crato, estrada Velha da Minguriba, 7°17'34"S 39°32'30"W, 919 m a.s.l., 22 May.2011 (bd., fl.), *E.M. Marreira et. al 138* (HUEFS 80402), Serra do Araripe, depois da divisa PE e CE, 9 Mar 1963 (bd., fl.), *F. Paiva 1022* (HST 01319); Divisa PE e CE, Chapada do Araripe, 18 Apr 1965 (bd., fl.), *J. Sobrinho 42* (HST 01556).

Etymology—The epithet is given in honor of Marcelo Simon for his work on systematics of the mimosoid legumes.

Vernacular names—giquiri, jiquiri-liso, jurema-preta.

Distribution and habitat—It is known from a restricted area at the Araripe mountain range, at the border between Ceará and Pernambuco states. It occurs in Caatinga vegetation, and was collected in flower and fruit in June.

Conservation assessment—This species is known only from a small area near the Ceará and Pernambuco border, at the Chapada do Araripe range, with an EOO of 522.7 km² and an AOO of 16 km². It seems to be locally rare and occurs in severely fragmented habitat, thus matching the IUCN (2017) criteria B1-2a for assessing it as an endangered species.

Taxonomic comments— *Mimosa simonii* is morphologically similar to *M. verrucosa* Benth., a species found in the 'clade N' (Simon et al. 2011) together with other species of *Mimosa* ser. *Leiocarpae* from Caatinga with dot glandular leaflets, as *M. tenuiflora* and *M. lewisii* Barneby. Besides the glandular leaflets, *M. simonii* shares with *M. verrucosa* the unarmed stem, the presence of densely pubescent verruciform setulae and stellate hairs, and the pink filaments. They can be distinguished by the leaves without spicules in *M. simonii* (vs. conic subulate spicules in *M. verrucosa*), basal pinna 35–50 mm long (vs. 8–13 mm), leaflets 4–8 mm wide (vs. 1.5–4.5 mm), 1.6–2.5× as long as wide (vs. 2.2–3.3×), 5–6-nerved from pulvinule (vs. 3-nerved), the two stronger nerves converging toward the

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apex defining a veinless areole, calyx and corolla densely covered by stellate hairs throughout their entire length (Fig. 3) (vs. stellate hairs restrict to the tips of the lobes of both the calyx and corolla).

3 | ACKNOWLEDGEMENTS

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