



A New Endemic *Mimosa* (Leguminosae, Mimosoideae) from Pampa Biome, Brazil

FERNANDA SCHMIDT SILVEIRA¹, SÉRGIO A. L. BORDIGNON² & SILVIA T. SFOGGIA MIOTTO³

¹Programa de Pós-Graduação em Botânica, Universidade Federal do Rio Grande do Sul, Av. Bento Gonçalves, 9500, Porto Alegre, Rio Grande do Sul, 91501-970, Brazil. Author for correspondence: okologie_natur@hotmail.com

²Programa de Mestrado em Avaliação de Impactos Ambientais, Centro Universitário La Salle, Avenida Victor Barreto, 2288, Centro, Canoas, RS.

³Departamento de Botânica, Universidade Federal do Rio Grande do Sul, Av. Bento Gonçalves, 9500, Porto Alegre, Rio Grande do Sul 91501-970, Brazil.

Abstract

Mimosa terribilis (Leguminosae, Mimosoideae), a new subshrub species, endemic from Pampa grasslands of Rio Grande do Sul State in Southern Brazil, is described and illustrated. The new species is morphologically close to *Mimosa ramosissima* with respect to its subshrub habit, recurved aculei, stipules 1-nerved, calyx narrowly campanulate, inflorescence capituliform and globose, besides hispid pods. The new species differs from *M. ramosissima* by not being lobate calyx, nor having nervate calyx; having indumentum that is only puberulent and shorter peduncles (3–6mm long). Furthermore, this species has a narrowly distribution, being known only for south of Rio Grande do Sul State while *M. ramosissima* is distributed along south and southeast of Brazil.

Key words: Endemic species, New species, South Brazil diversity, legume family

Introduction

Species of *Mimosa* Linnaeus (1753:516) grow in a diverse array of habitats, particularly in open vegetation (Simon *et al.* 2011), as on South American savannas and grasslands, which harbor particular floras with a high level of endemism (Iganci *et al.* 2011). Moreover, the genus is rich in narrowly restricted endemic species (Simon *et al.* 2011). According to Simon & Proença (2000), Brazilian *Mimosa* endemism is mainly concentrated in high-altitude locations (>1,000 m) on Cerrado vegetation. Endemism and species richness are highly relevant to the global prioritization of conservation efforts (Myers *et al.* 2000). In Southern Brazil, high species richness and endemism are found, specifically in Pampa Biome. This biome is classified as an area of extreme biological importance (MMA 2000). Furthermore, it has been a site of new species description for species including *Cypella rivularis* Chauveau & L.Eggers (Iridaceae) (Chauveau *et al.* 2014), *Trichocline cisplatina* E.Pasini & M.R.Ritter (Asteraceae) (Pasini & Ritter 2012), *Pavonia exasperata* Grings & Boldrini (Malvaceae) (Grings & Boldrini 2012), *Herbertia zebrina* Deblé (Iridaceae) (Deble 2010), and it is one of the centers of diversity of the *Petunia* group (Lorenz-Lemke *et al.* 2006). According to Boldrini *et al.* (2011), 89 new species in the Pampa Biome were described between 2009 and 2013.

The genus *Mimosa* belongs to the family Leguminosae, which is one of the principal floristic grassland elements in South Brazil (Flores & Miotto 2001). The most southern state of Brazil, Rio Grande do Sul (RS), has hosted the greatest number of Leguminosae taxonomic studies in this region. Approximately 293 species of legumes are cited for this state, and more than half of that diversity (153 species) occurs in grassland vegetation (Miotto, pers. comm.). Although approximately 60 taxa for the genus *Mimosa* are estimated for RS State (Dutra & Morim 2012), this genus has been neglected in taxonomic studies in this state.

The new species described herein was recognized for the first time by the botanists Marcos Sobral and José Newton Marchiori, who named it *Mimosa terribilis*. However, a formal description did not proceed, with this name being known only on herbarium sheets and on the Species Link website (<http://splink.cria.org.br/>). According to Bebbler *et al.* (2010), collecting and publishing descriptions of new species are two distinct components of the discovery process that are largely dissociated. Just a small number of new species are recognized at the time of being collected and subsequently quickly published. Furthermore, accurate taxonomy and nomenclature are vital to reproducibility,

documentation, and prediction; for example, for medicinal plant identification (Bradley & Balick 2014), but also regarding all other related disciplines such as ecology and conservation. Thus, as part of the revision of genus *Mimosa* section *Mimosa* for the Rio Grande do Sul State, this new taxon was confirmed and is here properly described.

Materials and Methods

The following herbaria were consulted: BHCN, BOTU, CORD, CTES, E, ESA, F, FURB, HAS, HDCF, HPBR, HUCC, HUEN, HURG, HVAT, IAC, ICN, K MBM, MNHM, MO, MVFA, MVJB, MVM, NY, PACA, PEL, R, RB, SMDB, SPSF, SJRP and W, acronyms according to Thiers (2015). However, the new species was recognized only from exsiccates of ESA, HURG, ICN, PEL and RB herbaria. Measurements were taken with a caliper and the photos of morphological details under a stereomicroscope. Terminology was adapted from Barneby (1991) and Beentje (2010). Furthermore, field collections were conducted to obtain additional information including growth-form, ecology and geographic distribution. The collected materials were deposited at the ICN Herbarium.

We provide a dichotomous key to identify species belonging to *Mimosa* subser. *Ramosissimae*, including the new species and a comparative table to discriminate *Mimosa terribilis* from *Mimosa ramosissima* Benth (1875:394). Moreover, we provide data about flowering and fruiting; distribution and ecology; taxonomic position; etymology; and conservation status; as well as comments; illustrations and distribution map.

Taxonomic Treatment

Mimosa terribilis Marchiori & Sobral ex Schmidt-Silveira & Miotto *sp. nov.*

Type:—BRAZIL. Rio Grande do Sul: Pelotas, Cascata, BR-392, ca. 32.4 km do trevo com a BR-116, 29 August 1998, *J. A. Jarenkow 3849* (Holotype ICN!; isotypes K! MBM! NY!).

(Fig. 1, 2, 3, 4 & 5)

Mimosa terribilis is a subshrub, which has puberulent indumentum covering branches and peduncles, recurved aculei, 1-jugate leaves, with longer petioles in relation to pinna length, inflorescence capituliform globose, calyx subcoriaceous without defined lobes, corolla puberulent at lobes, fruits craspediform and hispid. The new species resembles *Mimosa ramosissima*, but it differs by its non-hirsute indumentum, calyx that is neither lobate nor nervate, shorter peduncles (3–6 mm long) and its distribution area is limited to south of Rio Grande do Sul state in Brazil (Tab. 1).

Subshrubs virgately branching or humifuse to diffusely ascending, 0.5–2 m tall, leaves sensible to touch. **Branches** alternated, dark gray, with grooves, almost glabrous, except by thin, canescent, diminute trichomes (puberulent indumentum) and armed with recurved aculei. **Aculei** 2–3 mm long, with lateral expanded base, being at internodes with subopposed to alternate distribution. **Leaves** bipinnate, 1-jugate, pinna 3–19 mm long, 6–22 pairs of leaflets. **Spicule** 0.6–0.9 mm long. **Paraphyllidia** lanceolate, small, 0.3–0.6 × 0.11–0.24 mm, puberulent, 1-nervate. **Petioles** developed, 2–6 mm long, puberulent. **Leaflets** narrowly oblong, 2.5–5 × 0.5–1 mm, concolor, asymmetric base and apex obtuse to mucronate, one central vein not visible at dorsal face, but outstanding at ventral face, yellowish punctuations present, margin with short thin and superimposed trichomes. **Stipules** linear-lanceolate, 2.5 × 0.5 mm with 1–2 main veins. **Synflorescence** racemose. **Inflorescence** capituliform, globose, peduncles 3–6 mm long, puberulent. **Bracts** ovate, 0.9 × 2.0 mm, dorsally puberulent, margin glabrous, before anthesis smaller than corolla. **Calyx** narrowly campanulate, subcoriaceous, glabrous, 0.75–1 mm long, reddish-brown, margin with small thin trichomes, lobes neither defined nor nervate, covering fast half of corolla length. **Corolla** tubular, 2.0–2.5 × 0.5 mm, lobes covered with thin antrorse trichomes. **Ovary** oblong with a tuft of trichomes at apex. **Stamens** exerted 3–4.5 mm long; free, lilac-pink. **Fruits** a craspedium, 1–10 per capitulum, oblong-ondulate, 13–15 × 3–5 mm, stipitate, the stipe 0.6–1 mm long, 1–4 articulate, apex cuspidate, valves with stiff setae trichomes and replum glabrous or sometimes with some stiff setae. **Seeds** ovoid, brown, 2.4–2.7 × 1.6–2 mm, pleurogram present.

Flowering and fruiting:—Flowers of this species have been collected from July to September. However, flowering time can be extended to October according to field observations. Fruits have been collected during November, but probably began to undergo fructification early, during September and October.

Distribution and ecology:—*Mimosa terribilis* is known only from seven different localities of Rio Grande do Sul State in Pampa Biome: Aceguá, Canguçu, Chувиска, Dom Feliciano, Pelotas, Piratini and Rio Grande (Fig. 5), where it was found growing on grasslands outcrops (rock grasslands), in grass fields and shrublands (vassoural), and at forest edge and roadsides, at approximately 100–300 m elevation. Almost all of these localities belong to Serra do Sudeste, in which we observed a mosaic of rock grasslands with a seasonal forest vegetation. This region has undulate relief and altitude between 150 and 500 m, being the oldest geological area of this state (Boldrini 1997). Furthermore, the Serra do Sudeste region is distinguished as a high-level priority area for conservation (CNCFlora 2014). At a higher scale, this region belongs to Pampa Biome, which is considered one of the main hotspots of the global biodiversity; it is one of the Priority Areas for the Flora and Fauna Conservation (MMA 2000, 2007).

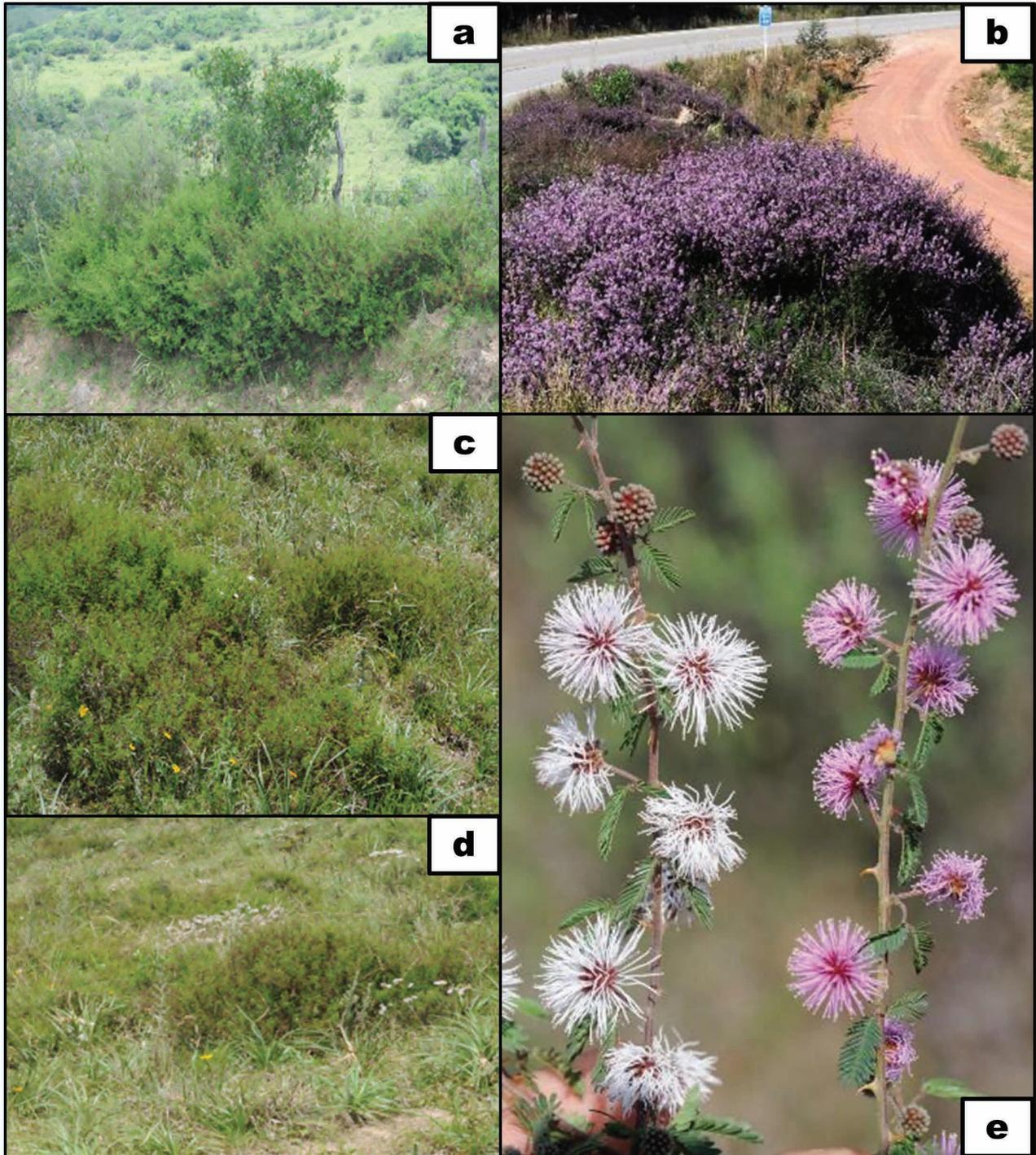


FIGURE 1. *Mimosa terribilis* as virgate subshrubs of Pampa Biome, Southern Brazil. Species growing: (a, b) along roadsides, (c, d) in grasslands. Details of *Mimosa terribilis* inflorescences (e).

This species shares the same habitat with other *Mimosa* species from section *Mimosa* occurring on RS State as *M. ramulosa* Benth (1841:385) and *M. dutrae* Malme (1931:10). On open grassland and shrubland, it is easy to find *M. terribilis* occurring together with *M. ramulosa*. On forest edges near roadsides, this plant creates a wall of up to 2 m height, densely stiff and consequently harmful, which is trimmed near roadsides.

Taxonomic position:—*Mimosa terribilis* seems to belong to subser. *Ramosissimae* of Barneby (1991), owing to its similarity to *M. ramosissima*. According to Barneby's description (1991) subser. *Ramosissimae* has many plastic characters as following: capitula format (globose or ellipsoid), stipule number of veins (1 or 4–6), calyx length (minute or bigger) and petioles length (sessile or developed). Nevertheless, it subseries can be recognized by the habit, aculei format and geographical distribution. Thus, subser. *Ramosissimae* are usually shrubs or subshrubs armed with recurve or subrecurved aculei from South Brazil. This subseries has been represented by four species restricted to the south and southeast of Brazil. These are *M. ramosissima*; *M. oblonga* var. *oblonga* (1841:365), *M. oblonga* var. *pinetorum* Barneby (1991:600–601) and *M. orthacantha* Benth (1841:365–366). In recent phylogenetic studies, species of subser. *Ramosissimae* are part of a large unresolved clade, which is called clade X, with members of many other subseries such as *Sparsae*, *Dryandroideae* and *Obstrigosae*, besides members of *Calothamnos* Barneby section, suggesting that this subseries as many others are not monophyletic (Simon *et al.* 2011).

Etymology:—The specific epithet refers to the number of aculei throughout the plant that make it untouchable.

Conservation Status:—Although we observed large populations during field work, most of these were near roadsides, where they are removed due to the expansion of highways or by road maintenance. This fact probably increases the vulnerability of *M. terribilis*; however, for assignment of its conservation status, sufficient data are still lacking. At the present time, we do not know if these populations around roadsides can survive into the future. The ecology, dispersal and reproductive system of this species are not known. Therefore, we have chosen to assess the species in the category data deficient (DD), according to the IUCN red list criteria (IUCN 2001).

Comments:—The specimen identified as *Mimosa terribilis* for Soledade City by Matias Morales deposited on MBM herbarium at the number 115724 (Sobral *et al.* 5250 collector) is not the reported species; however, it is *Mimosa sparsa* Benth (1841:385–386) another endemic species of Rio Grande do Sul State. Furthermore, the three other collections identified as *Mimosa terribilis* on MBM Herbarium include this new species.

Additional Specimen Examined (paratypes)—BRAZIL, Rio Grande do Sul: Aceguá, Projeto de Assentamento Estância do Fundo, August 2006 (fl), *M. Grings 1383* (ICN!); Chuvisca, 7 November 2014 (fr), *Schmidt-Silveira & S. Bordignon 824* (ICN!, HUCS!, MBM!, NY!, PACA!); Canguçu, September 1998 (fl), *M. Sobral & J.A. Jarenkow 8763* (ICN!, NY!, MBM!, RB!); Dom Feliciano, 7 November 2014 (fr), *Schmidt-Silveira & S. Bordignon 825* (ICN!, HUCS!, MBM!, NY!, PACA!); Pelotas, Cascata, BR-392, 29 August 1998 (fl), *J.A., Jarenkow, 3847* (ICN!, MBM!, PEL!, NY!); Pelotas, na divisa com Canguçu, 20 November 1986 (fr), *J. Mattos 29965* (HAS!); Piratini, 11 November 1976 (fr), *T.M. Pedersen 11459* (MBM!); Rio Grande, Ilha Leonídeo, 17 August 1982 (fl) *I.V. Gonçalves w.n* (HURG 000365!).

Key to the species of *Mimosa* subseries *Ramosissimae* from Brazil

1. Stipules ovate, 3–6-nervate; branches with scabrous indumentum..... *M. chaetosphaera*
- 1'. Stipules linear-lanceolate, 1–2-nervate; branches with other type of indumentum..... 3
2. Inflorescence capituliform..... 3
- 2'. Inflorescence elliptic 5
3. Branches with trichomes stiff like aculei; calyx membranaceous; corolla glabrous;..... *M. orthacantha*
- 3'. Branches without trichomes stiff like aculei; calyx subcoriaceous; corolla pubescent..... 4
4. Branches with hirsute and puberulent indumentum; calyx with defined lobes and each one 1-nervate; peduncles 7–13 mm length *M. ramosissima*
- 4'. Branches only with puberulent indumentum; calyx not lobate neither nervate; peduncles 3–6 mm length..... *M. terribilis*
5. Delicate plants, little branched; hispid indumentum of branches; leaflets 1-nervate; corolla tubular or infundibuliform; calyx membranous-subtruncate, margin glabrous..... *M. oblonga* var. *oblonga*
- 5'. Stiff plants, highly branched; hirsute indumentum of branches; leaflets 2-nervate; corolla campanulate or subtubular; calyx membranous-truncate, margin ciliolate *M. oblonga* var. *pinetorum*



FIGURE 2. Holotype image of *Mimosa terribilis*, which has only flowers, from Pelotas City, deposited in the ICN Herbarium. Isotypes are deposited in ICN, K, MBM and NY Herbaria.



FIGURE 3. *Mimosa terribilis* details: (a) capitulum inflorescence; (b) fruits with stiff setae on valves; (c) flowers on prefloration; (d) fruits with a short stipe; (e) corolla pubescent and calyx campanulate subcoriaceous with margin ciliate.

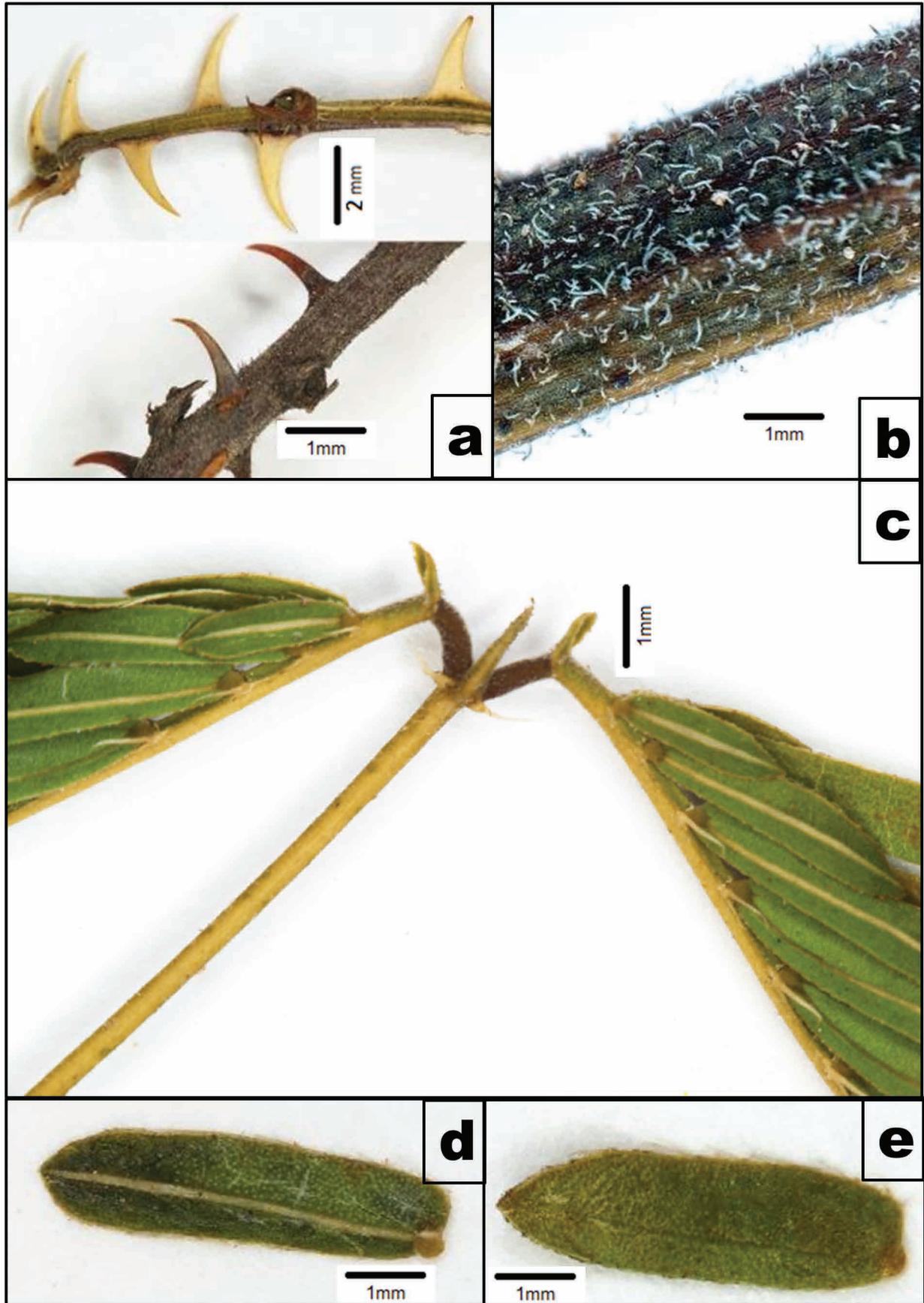


FIGURE 4. *Mimosa terribilis* details: (a) aculeate branches; (b) detail of puberulent indumentum; (c) spicule and paraphyllidia; (d) leaflet, ventral face; and (e) leaflet, dorsal face.

TABLE 1. Comparative morphology and geographic distribution of *Mimosa terribilis* with *Mimosa ramosissima*.

Characters	<i>M. terribilis</i>	<i>M. ramosissima</i>
Growth-form	Subshrubs virgate or humifuse ascending (0.5–2 m tall)	Subshrubs diffusely ascending (2.5–5 m tall)
Branches Indumentum	Puberulent	Hirsute and puberulent
Paraphyllidia	Lanceolate, puberulent	Lanceolate, puberulent
Spicule	0.6–0.9 mm long	1.7–1.9 mm long
Petiole	2–6 mm, puberulent	1–7 mm, puberulent
Leaves	1–jugate, 3–19 mm long, 6–22 pairs of leaflets	1–jugate, 9–21 mm long, 7–16 pairs of leaflets
Stipules	Linear-lanceolate, 2.5 × 0.5 mm, 1–2 main vein, no trichomes at margin.	Linear-lanceolate, 3 × 0.5 mm, 1 main vein, trichomes at margin.
Inflorescence	Capituliform, globose.	Capituliform, globose.
Peduncles	3–6 mm long, puberulent.	7–13 mm long, hispid
Bracts	Ovate, 0.9 × 0.2 mm.	Ovate, 2.0 × 0.5 mm.
Calyx	Subcoriaceous, glabrous, 0.7–1 mm long, reddish-brown, lobes not defined, margin with smaller thin trichomes, cover fast half of corolla length.	Subcoriaceous, glabrous 1–1.4 mm long, reddish-brown, lobes defined and with one central vein in each, cover more than half of corolla length.
Corolla	Tubular, 2 × 0.5 mm, lobes covered with thin antrorse and canescent trichomes.	Tubular, 3 × 0.8 mm, lobes covered with thin antrorse and canescent trichomes.
Stamens	3–4.5 mm long, lilac pink.	3–5 mm long, pink.
Fruits	Shorter stipitate, oblong-ondulate, 13–15 × 3–5 mm, cuspidate apex, valves with stiff setae trichomes and glabrous replum, or sometimes with some stiff setae.	Shorter stipitate, oblong-ondulate, 9–14 × 3–6 mm cuspidate apex, valves and replum hirsute-setose.
Distribution	Brazil: South of RS (Pampa Biome)	Brazil: RS (Mata Atlantica Biome, Campos de Cima da Serra), SC, PR*
Habitat	Rock grassland, shrubland, forest edge, at 150–500 m high.	Wet grasslands and forest edge with Araucaria at 800–1600 m high.

*RS, SC, PR are states from Southern Brazil.

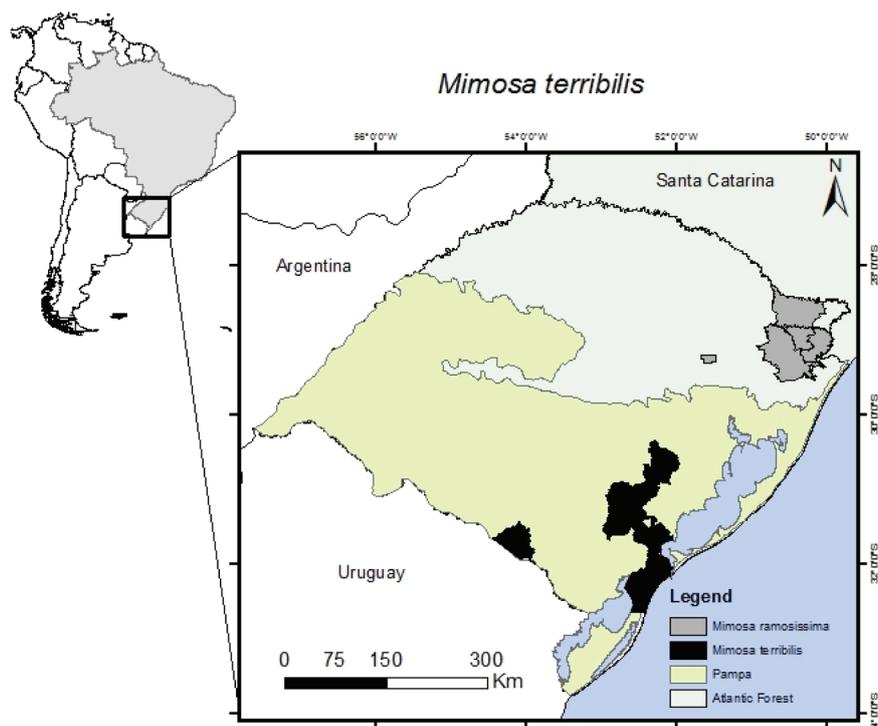


FIGURE 5. Distribution of *Mimosa terribilis* (black) and *Mimosa ramosissima* (grey) in State of Rio Grande do Sul, South Brazil.

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