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Two new species of *Pavonia* section *Lebretonia* subsection *Hastifoliae* (Malvaceae: Malvoideae) from southern Brazil

MARTIN GRINGS[1] & ILSI IOB BOLDRINI[2]

[1]*Programa 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. E-mail: martin_grings@yahoo.com.br*
[2]*Departamento de Botânica, Universidade Federal do Rio Grande do Sul, Av. Bento Gonçalves, 9500, Porto Alegre, Rio Grande do Sul 91501-970, Brazil. E-mail: ilsi.boldrini@ufrgs.br*

Abstract

Two new species of *Pavonia* section *Lebretonia* from the Brazilian states of Rio Grande do Sul and Santa Catarina are described, *Pavonia salmonea* and *Pavonia exasperata*. The first inhabits highland grasslands and scrub, and edges of *Araucaria* forest in the Brazilian Atlantic Rainforest biome, being distinguished from similar species by its salmon pink corollas, leaves with large stellate trichomes and features of its mericarps. The second species inhabits dry and rocky grasslands and forest edges in the Pampa biome, being distinguished from similar species by its larger apiculate mericarps with lateral acute tubercles, and by the presence of lobate basal leaves. Descriptions, illustrations, images and a distribution map for the two new species, as well as a diagnostic key, are presented.

Resumo

Duas novas espécies de *Pavonia* seção *Lebretonia* do Rio Grande do Sul e Santa Catarina, Brasil, são aqui descritas, *Pavonia salmonea* e *Pavonia exasperata*. A primeira habita campos de altitude e nas bordas destes com florestas de Araucária, bioma Mata Atlântica, sendo claramente diferenciada das espécies próximas devido as suas flores de coloração salmão, grandes tricomas nas folhas e por características dos mericarpos. A segunda espécie habita campos e no contato destes com florestas, no bioma Pampa, sendo claramente diferenciada das espécies próximas devido aos seus mericarpos maiores e apiculados, os quais apresentam tubérculos laterais agudos e pela presença de algumas folhas basais lobadas. Descrições, ilustrações, imagens e um mapa de distribuição das duas espécies novas, além de uma chave dicotômica para diferenciá-las das espécies próximas, são apresentados.

Keywords. Atlantic Rainforest biome, grasslands Pampa biome, taxonomy

Introduction

Pavonia Cav. belongs to the tribe Malvavisceae, due to the presence of twice as many styles and stigmas as carpels. Distinctive characteristics of *Pavonia* (in comparison with other genera in the tribe) include: absence of leaf nectaries, flowers subtended by an epicalyx with nonpeltate bracteoles, petals without basal auricles and schizocarps with five mericarps, lacking glochidiate spines (Esteves 2001). The genus encompasses prostate herbs, subshrubs, shrubs and rarely small trees, comprising 250 species worldwide, 224 in the Americas (Fryxell 1999) and 123 in Brazil (Esteves 2010).

Pavonia section *Lebretonia* is a very complex group, comprising many similar species based on minor differences, such as: mericarp height and ornamentation, flower size and color, presence or absence of some types of trichomes, and morphology and width of epicalyx bracts (Krapovickas & Cristóbal 1962, Grings *et al.* 2011). These characters are also used by Fryxell (1999) in his key for species of subsection *Hastifoliae*.

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During a taxonomic and floristic study of the genus *Pavonia* in the state of Rio Grande do Sul, southern Brazil (Grings & Boldrini in prep.), three new species were discovered. One of them, the endemic species *Pavonia secreta* Grings & Krapovickas (2011: 419), has already been described (Grings *et al*. 2011). The other two species are here described and illustrated. Their similarities with other species of the subsection *Hastifoliae* are discussed.

Materials and Methods

Botanical material was collected throughout the state of Rio Grande do Sul, concomitantly with a revision of herbarium material from ICN, HAS, PACA, FLOR, MBM, CTES (Thiers 2010) and from HUCS (unindexed). The description of the new species, as well as comparison with similar species, was carried out with the observation and analysis of herbarium specimens, as well as our own collections. Illustrations were drawn with the aid of a drawing tablet.

Taxonomic Treatment

Pavonia salmonea Grings & Boldrini, *sp. nov.*

(Figure 1 and 3 A–D)

Affinis Pavoniae guerkeanae sed ab ea mericarpiis minoribus plerumque non apiculatis, plerumque sine tuberculiis lateralibus acutis, nervo medio lato, compresso, rugosis, foliis trichomatibus stellatis longioribus, epicalice bracteolis lanceolatis vel ovato-lanceolatis, corolla salmonea, differt.

TABLE 1. Main characters that distinguish *Pavonia salmonea* from *P. guerkeana* and *P. dusenii*.

	Pavonia salmonea	*Pavonia guerkeana*	*Pavonia dusenii*
Corolla ground-color	Salmon-pink	White to pale-pink	Rose-pink
Mericarp	3.5–4.5 × 2.5–3.0 mm , usually muticous (apiculate in a few specimens), generally without acute tubercles on each side of the median nerve, which is wide, compressed and rugose	4.5–5.0 × 3.0–3.5 mm, always apiculate, with lateral acute tubercles; median nerve is narrow and smooth	3.5–4.0 × 2.5–3.0 mm, strongly tuberculate; muticous; median nerve is compressed
Leaf blade indumentum	Stellate trichomes larger and more dense than those of *P. guerkeana*	Stellate trichomes shorter and more sparse than those of *P. salmonea*	Tomentose, stellate trichomes shorter than those of *P. salmonea* and *P.guerkeana*

TABLE 2. Main characters that distinguish *Pavonia exasperata* from *P. friesii* and *P. orientalis*.

	Pavonia exasperata	*Pavonia friesii*	*Pavonia orientalis*
Mericarp	4–6 × 3–4 mm, apiculate, prominently carinate, tuberculate, with two or three acute and prominent tubercles on each side.	3.5–4.0 × 2.5–3.0 mm, muticous, reticulate, with a few more prominent nerves.	3.0–3.5(–4.0) × 2.5 mm, muticous, rare apiculate, reticulate, with one lateral line on each side, abruptly dividing the dorsal region from the lateral faces, rarely with small lateral tubercles.
Basal leaves	Sagittate, hastate or subcordate, sometimes slightly tri ou penta lobate.	Sagittate, hastate or sagittate-hastate	Sagittate, cordate or hastate

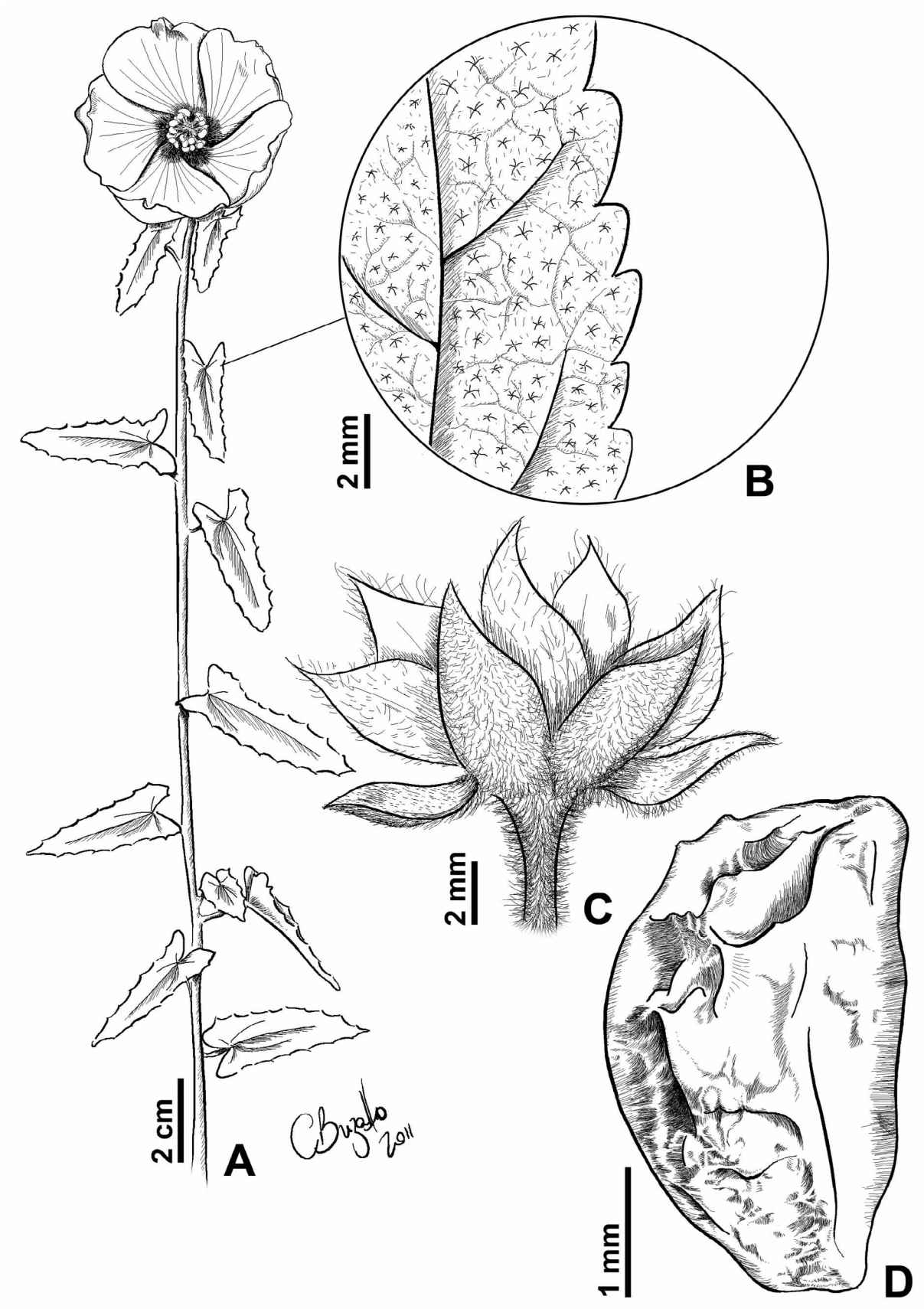

FIGURE 1. *Pavonia salmonea*. **A.** Habit (*M. Grings 938*, ICN). **B.** Leaf indumentum with large trichomes. **C.** Upper part of the peduncle, epicalyx and calyx. **D.** Mericarp.

Type:—BRAZIL. Santa Catarina: Bom Jardim da Serra, s.l., 28º23.488 S 49º33.772 W, 27 February 2009, 1333 m, *M. Grings, R.B. Setubal & L.C.P. Lima 661* (holotype ICN!, isotypes CTES!, SP!, NY!). *Subshrubs or shrubs* up to 1.6 m tall; stems densely covered with long stellate trichomes. *Leaf blades* lanceolate, subtriangular to oval-lanceolate, seldom suborbicular, 0.5–6.0 × 0.4–2.5 cm, base sagittate to subcordate, apex acute to subobtuse, margin crenate, sometimes serrate, palmately 5-nerved, both surfaces covered with long stellate trichomes, abaxial surface with simple trichomes on the main nerves, seldom sparse simple trichomes in the adaxial surface; petioles 0.4–2.5 cm long, covered with short stellate trichomes and with sparse long simple trichomes; stipules subulate 3–4 mm long with short stellate trichomes and seldom with simple trichomes in the apex. *Flowers* solitary in the leaf axils, peduncle 1.2–3.5 cm long, densely covered with stellate trichomes, longer in the apex, along with long simple trichomes; epicalyx bracts 5, oval-lanceolate to slightly ovate, 4–7 × 2–4 mm, covered with short stellate trichomes, with long stellate trichomes and with some simple and long trichomes in the base; calyx 6–9 mm long, covered with stellate and some simple trichomes, both long and on the nerves; corolla salmon-pink, petals 1.5–2.5 × 1.4–2.4 cm, veins vinaceous, with basally vinaceous center; staminal column 7–8 mm long; free parts of the stamens 2–3 mm long; styles 3–4 mm longer than the staminal column. *Mericarps* 3.5–4.5 × 2.5–3.0 mm, muticous (seldom apiculate), sparsely pubescent, tuberculate, seldom with acute tubercles, median nerve wide, compressed and rugose. *Seeds* smooth and tufted at each end of the hilum.

Distribution:—Brazil, Brazilian Atlantic Rainforest biome (IBGE 2004), in Santa Catarina and Rio Grande do Sul states (Figure 4).

Phenology:—Flowering and fruiting specimens have been collected from November to April.

Habitat:—In highland grasslands, scrub, rocky grasslands and in edges of *Araucaria* forest.

Etymology:—From the Latin "*salmoneus*", referring to the salmon-pink color of the flowers.

Additional specimens examined (paratypes):—BRAZIL. Rio Grande do Sul: Bom Jesus, road Bom Jesus-São Joaquim, between Santo Inácio and Cerquinha river S 0580537 W 6843726 UTM, 24 January 2010, *M. Grings & A. M. Z. Lunkes 969* (ICN); Canela, s.l., February 1986, *M. Sobral & R. Silva 4942* (ICN, CTES); Jaquirana, Parque Estadual do Tainhas, S 29º04'47.5" W 050º21'57.3", 08 January 2010, *M. Grings & G.B. Stahlberg 938* (ICN); São Francisco de Paula, Josafá, April 1984, *M. Sobral 2976* (ICN), Josafá, S 29º21'45.3" W 50º04'51.6", 09 January 2010, *M. Grings, G.B. Stahlberg, I. Buffon, S. Kronbauer & R.C. Printes 934* (ICN), Taimbé, 23 February 1960, *A. Sehnem 7649* (PACA), Taimbesinho, 14 February 1946, *B. Rambo 32199* (PACA); São José dos Ausentes, 4 Km from "Desnível dos rios", S 28º35'08.6" W 49º57'31.5", 27 December 2009, *M. Grings & N. J. Grings 894* (ICN); Santa Catarina: Bom Retiro, Campos Novos do Sul, 09 March 2005, *G. Hatschbach, A.C. Cervi & E. F. Costa 78960* (MBM), begin of road to Urubici, 15 February 1995, *G. Hatschbach et al. 61625* (MBM, HUCS); Lages, 14 Km E de Lages, road to São Joaquim, 24 November 1980, *A. Krapovickas & R. Vanni 36886* (MBM); São Joaquim, Passo das Contas, 29 January 1950, *R. Reitz 4992* (PACA); Urubici, 08 February 2007, *G. Hatschbach & O. S. Ribas 79708* (MBM), 16 February 1995, *G. Hatschbach & O.S. Ribas 61681* (MBM), Parque Nacional de São Joaquim, 10 February 2007, *G. Hatschbach & O.S. Ribas 79882* (MBM), Morro da Igreja, 1820 m, 24 May. 1991, *D. B. Falkenberg 5516* (FLOR).

Pavonia salmonea is similar to *P. guerkeana* R.E.Fries (1908: 57) and to *P. dusenii* Krapovickas (1977: 313); specimens from different herbaria were sometimes identified as the first and sometimes as the later. The mericarps of *P. salmonea* are usually muticous (apiculate in a few specimens), somewhat smaller than those of *P. guerkeana*, usually without acute tubercles on each side of the median nerve, which is wide, compressed and rugose. The mericarps of *P. guerkeana* are always apiculate, with lateral acute tubercles and a narrow and smooth median nerve. Conversely, the mericarps of *P. dusenii* are strongly tuberculate and the median nerve is little prominent. Concerning the indumentum of the leaf blades, the stellate trichomes of *P. salmonea* are larger and denser than those of *P. guerkeana*. On the other hand, in *P. dusenii* the trichomes of the leaf blades are shorter than those of *P. salmonea* and *P. guerkeana*, and the indumentum is tomentose. The color of the corolla also differs, all three species having petals with wine-colored veins and claw, but in *P. salmonea* the ground-color of the petals is salmon-pink, in *P. guerkeana* white to pale-pink, and in *P. dusenii* rose-pink.

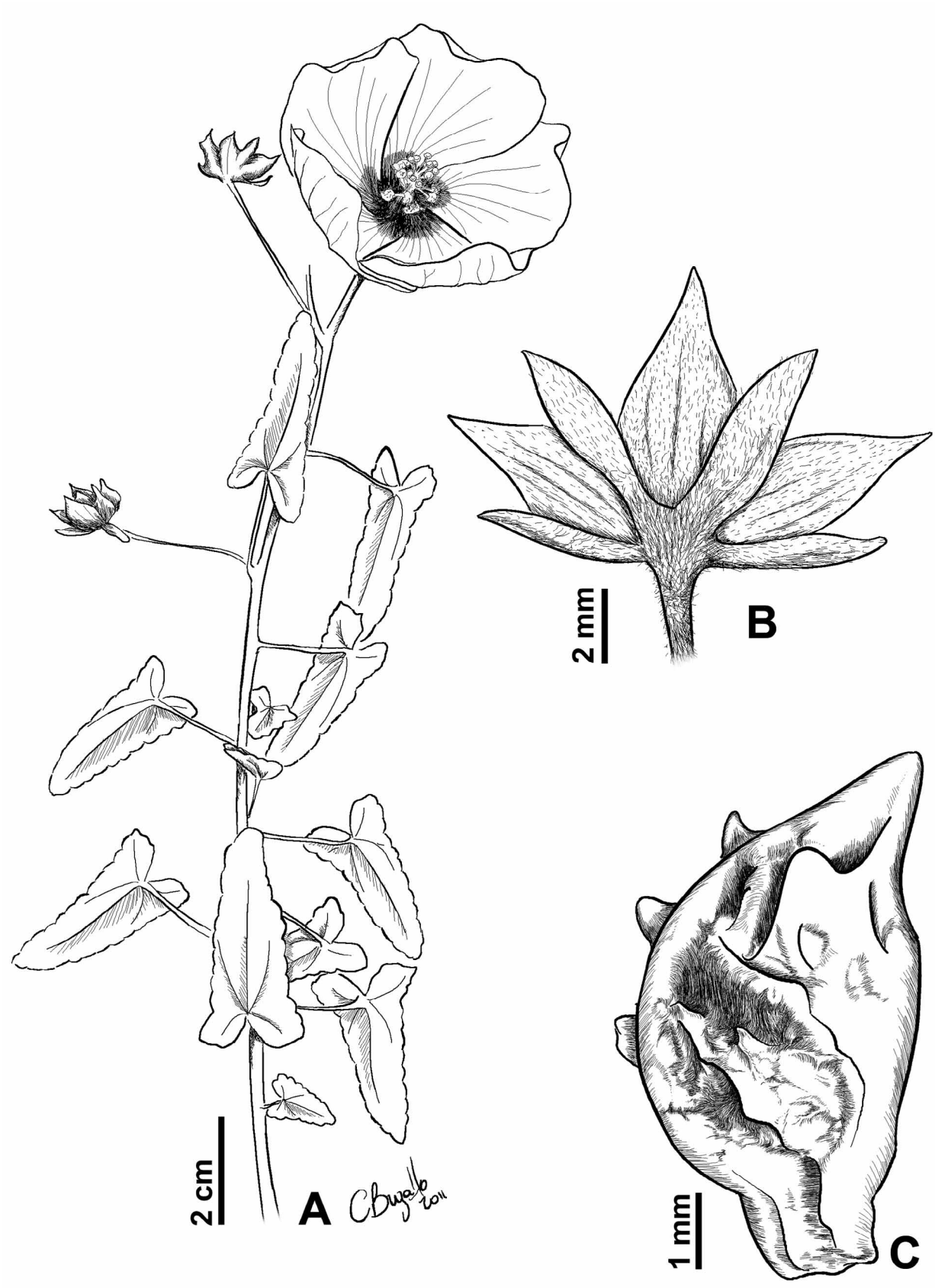

FIGURE 2. *Pavonia exasperata*. **A.** Habit (*M. Grings 844*, ICN). **B.** Upper part of the peduncle, epicalyx and calyx. **C.** Mericarp.

FIGURE 3. **A–D.** *Pavonia salmonea*. **A.** Flower and flower buds. **B.** Branch with flower, flower buds and immature fruits, emphasizing the epicalyx bracts**. C.** Branch with leaves, flower and immature fruits. **D.** Habit and habitat in shrubland; mericarp bottom left**. E–I.** *Pavonia exasperata*. **E.** Branch with flower, immature fruit, and leaf. **F.** Abaxial face of the corolla, calyx and epicalyx with narrowly elliptic bracts. **G–H.** Branches with flower buds and fruits. **I.** Habit and mericarp bottom left.

Pavonia exasperata* Grings & Boldrini. *sp. nov.
(Figure 2 & 3 E–I)

Affinis Pavoniae friesii, sed ab ea mericarpiis majoribus, apiculatis et 2 aut 3-tuberculiis lateralibus acutis ambobus lateribus nervo medio, foliis basilaribus interdum lobatis differt.

Type:—BRAZIL. Rio Grande do Sul: near "Pedra do Segredo", 26 abr. 2009, *M. Grings* & *P. Brack 659* (holotype ICN!, isotypes CTES!, NY!). *Subshrubs* up to 0.8 m tall; stems covered with stellate trichomes, more dense in younger stems; sometimes with glandular trichomes, more dense in younger stems. *Leaf blades* subtriangular, triangular, ovate-triangular or suborbicular, sometimes with basal leaves slightly 3-5 lobed, 1.5–6.5 × 0.8–3.9 cm, sagittate, hastate or subcordate, apex acute or subobtuse, margin crenate-serrate, ciliate, 5–7-nerved, adaxial surface with sparse stellate trichomes, with sparse simple trichomes, seldom with sparse glandular trichomes, usually in young leaf blades, abaxial surface hoary stellate, usually with a tuft of setose trichomes in the base; petioles 0.8–3.5 cm long, indumentum similar to that of the stems and usually with a tuft of setose trichomes in the apex; stipules subulate 2–6 mm long, with short stellate trichomes and sometimes with setose trichomes in the apex. *Flowers* solitary in the leaf axils, peduncle 1.0–3.6 cm long, articulated 3–6 mm beneath the epicalyx, indumentum similar to that of the stems and usually with sparse setose trichomes, more dense in the apex; epicalyx bracts 5, lanceolate or narrowly elliptic, somewhat more narrow in the base, 7–11 × 1–2(–3) mm, stellate-tomentose, sometimes with setose trichomes in the base; calyx 9–10 mm long, with more dense and larger stellate trichomes on the nerves; corolla white to pale-rose, petals 2.4–3.2 × 2.4–3.0 cm, with wine-red veins and claw; staminal column 7–10 mm long; free parts of the stamens 2–4 mm; styles (1–)3–4 mm longer than the staminal column. *Mericarps* 4–6 × 3–4 mm, sparsely pubescent, apiculate, prominently carinate, median nerve compressed and with rugosities, tuberculate, with two or three acute and prominent tubercles on each side. *Seeds* smooth with a tuft of trichomes at opposite ends of the hilum.

Distribution:—Brazil, occurring in the Pampa biome (IBGE 2004) only in Rio Grande do Sul state (Figure 4).

Phenology:—Flowering specimens have been collected from December to May. This species has cleistogamous flowers, observed in the beginning of November, fruiting from November to May.

Habitat:—Forest edges, scrub and rocky grasslands.

Etymology:—From the Latin "*exasperatus*", meaning rugose, but with prominent tips, referring to the lateral acute tubercles of its mericarps.

Additional specimens examined (paratypes):—BRAZIL. Rio Grande do Sul: Bagé, BR 153, near the limit with Caçapava do Sul, S 30º52'37.3" W 53º36'48.7", 01 November 2009, *M. Grings & C. Buzzato 792* (ICN), property of Telmo Dias Dutra, 15 January 1992, Girardi-Deiro & Gonçalves 825 (HAS); Caçapava do Sul, BR 290 Km 313, 12 December 2009, *M. Grings & R. Paniz 844* (ICN), 07 December 1978, *A. Krapovickas y C. L. Cristóbal 34213* (CTES, ICN), Minas do Camaquá, 06 December 1978, *A. Krapovickas y C. L. Cristóbal 34196* (CTES, ICN), Guaritas, 12 October 1985, *D. B. Falkenberg 2748* (FLOR), Passo dos Enforcados, S 30º50'39.2" W 053º36'27.6", 03 November 2010, *M. Grings & P. J. Silva Filho 1114* (ICN); Lavras do Sul, Rincão do Inferno, Cabanha Macanudo, S 30º51'38.2" W 53º42'29.7", 06 December 2009, *M. Grings, R. Paniz & R. Both 842* (ICN), s.l., 10 April 2008, *I. I. Boldrini, R. Trevisan & A. Schneider 1498* (ICN); Santana da Boa Vista, Faz. Passo da Chácara, 29 March 1975, *A. Sehnem 14597* (PACA).

Pavonia exasperata is similar to *P. friesii* Krapovickas (1977: 318) and *P. orientalis* Krapovickas (1977: 320) due to its similar narrow epicalyx bracts, usually sagittate leaf blades, and white or pale pink petals with basally vinaceous center and veins. However, *P. exasperata* differs from these species mainly in its larger mericarps with two to three lateral tubercles at each side of the median nerve. In addition, this species may present slightly lobate leaf blades, especially in basal leaves.

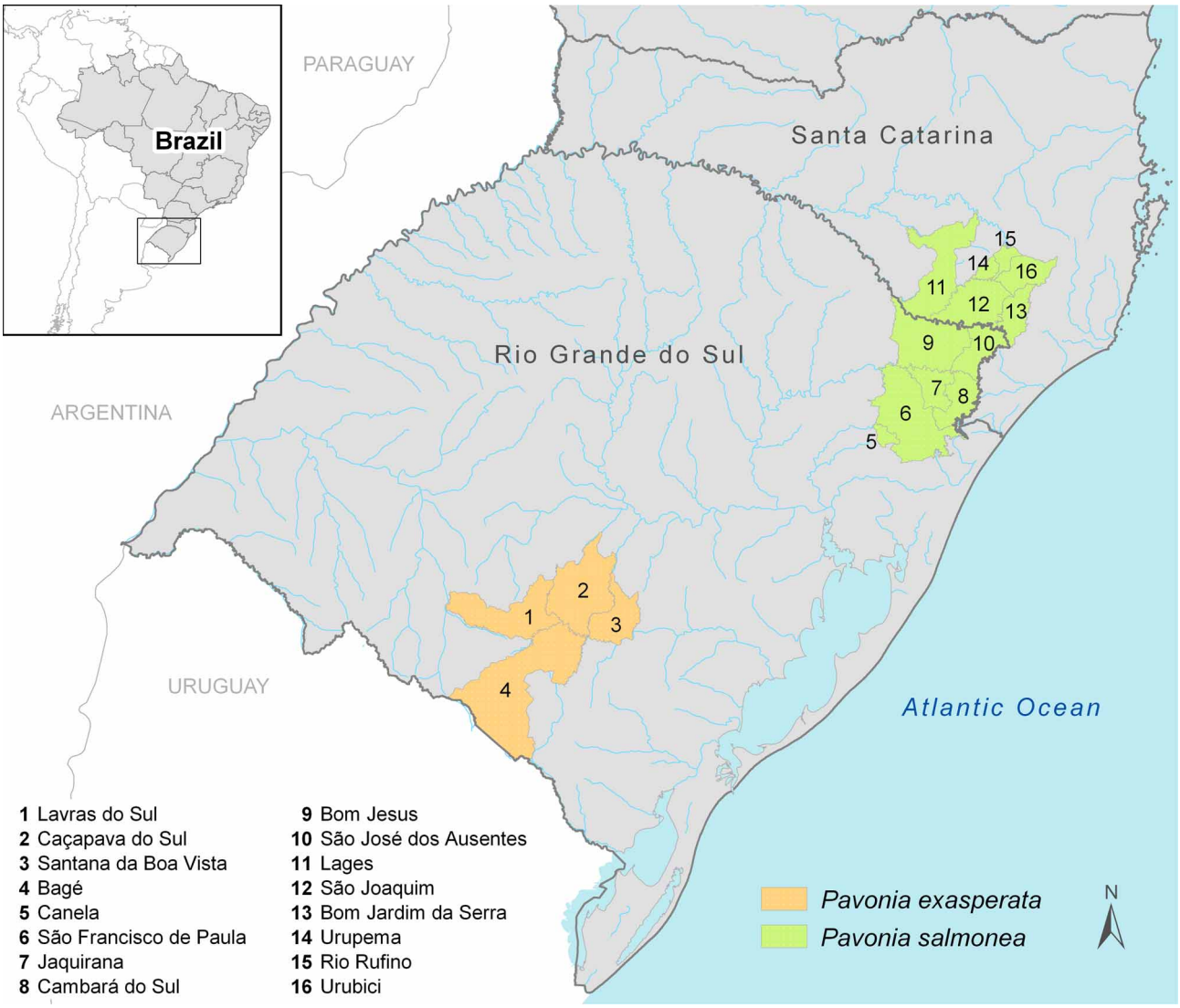

FIGURE 4. Distribution of *Pavonia salmonea* and *P. exasperata* in southern Brazil, in municipalities from Rio Grande do Sul and Santa Catarina states.

Key to the species

The following identification key can be used to distinguish *Pavonia salmonea* and *Pavonia exasperata* from similar species.

1. Epicalyx bracts oval-lanceolate, slightly ovate to ovate, 4–9 × 2–5 mm 2
- Epicalyx bracts lanceolate to narrowly elliptic, 6–11 × 0.8–2.0(–3.0) mm 4
2. Epicalyx bracts ovate; mericarps 4.5–5.0 × 3.0–3.5 mm, apiculate, with 2–3 lateral tubercles on each side of the median nerve, which is narrow and without rugosities ..... *Pavonia guerkeana*
- Epicalyx bracts oval-lanceolate, seldom slightly ovate; mericarps 3.5–4.0 × 2.5–3.0 mm, muticous (seldom apiculate), with median nerve compressed and rugose 3
3. Corolla rose-pink; mericarps densely tuberculate, muticous; leaves tomentose ..... *Pavonia dusenii*
- Corolla salmon-pink; mericarps sparsely tuberculate, seldom apiculate; leaves sparsely covered with large stellate trichomes ..... *Pavonia salmonea*
4. Mericarps 4–6 × 3.0–4.0 mm, apiculate, with two to three acute tubercles on each side of the median nerve, basal leaves sometimes slightly lobate ..... *Pavonia exasperata*
- Mericarps 3–4 × 2.5–3.0 mm, muticous (seldom slightly apiculate in *P. orientalis*) without lateral acute tubercles

and without basal lobate leaves 5

5. Mericarps 3.0–3.5(–4.0) × 2.5 mm, with a lateral line on each side of the median nerve, abruptly dividing the dorsal region from the lateral faces, seldom with small lateral tubercles..... *Pavonia orientalis*

- Mericarps 3.5–4.0 × 2.5–3.0 mm, without a lateral line on each side of the median nerve, without lateral tubercles .. .. *Pavonia friesii*

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