

# *Sinningia lutea* (Gesneriaceae), a new species from Southern Brazil

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**Abstract.** *Sinningia lutea* (Gesneriaceae) is described and illustrated as a new species from the Pampa Biome, in Southern Brazil. In the literature, this species has hitherto been confused with *S. allagophylla* from which it can be easily separated using a set of floral and vegetative features (especially corolla color and size and leaf shape). An artificial key to separate *S. lutea* from *S. allagophylla* and *S. curtiflora* (another sympatric species, with some morphological similarities) is presented. Some ecological remarks on the differential distribution of *S. lutea* and *S. allagophylla* are also made.

**Key Words:** Rio Grande do Sul, Pampa Biome, taxonomy.

**Resumo.** *Sinningia lutea* (Gesneriaceae) é descrita e ilustrada como uma espécie nova para a ciência, provinda do Bioma Pampa, no Sul do Brasil. Na literatura local precedente, esta espécie tem sido confundida com *S. allagophylla*, espécie da qual pode ser facilmente separada utilizando um conjunto de caracteres de morfologia floral e vegetativa (especialmente a cor e o tamanho da corola e o formato das folhas). Se fornece uma chave dicotômica artificial para separar *S. lutea* de *S. allagophylla* e *S. curtiflora* (outra espécie simpátrica com algumas semelhanças morfológicas). Efeituam-se também algumas considerações ecológicas sobre a distribuição geográfica diferenciada de *S. lutea* e *S. allagophylla*.

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*Sinningia* Nees was originally described in *Annales des Sciences Naturelles* (Nees von Esenbeck, 1825), based on *S. helleri* Nees, a Brazilian species, probably from Rio de Janeiro State. In its current delimitation, this exclusively South American genus comprises approximately 65 species (Chautems, 1990; Chautems, 1991; Chautems & Matsuoka, 2003). Phylogenetic studies of the tribe Sinningieae (Zimmer et al., 2002; Perret et al., 2003) clearly suggest that *Sinningia* (in its current delimitation) is paraphyletic. To achieve monophyly, *Sinningia* should include some species presently assigned to *Paliavana* Vand. and *Vanhouttea* Lem. (Zimmer et al., 2002). If this scenario is confirmed, however, *Paliavana* has nomenclatural priority over both *Sinningia* and *Vanhouttea*. Remarkably, this taxonomic rearrangement

of Sinningieae has yet to be done. In its current delimitation, *Sinningia* embraces an assemblage of rupicolous, terrestrial or epiphytic tuberous plants bearing opposite or verticillate leaves. The sepals and petals are fused and the flowers are always zygomorphic, displaying a subcampanulate calyx and a campanulate to cylindrical corolla tube. The androecium comprises four synantherous and didynamous stamens and a small staminode. The gynoecium is half-inferior to superior and the fruit is a dry or fleshy, loculicidal capsule. Seeds are minute and dust-like (Chautems & Matsuoka, 2003).

Martius (1829) described *Gesnera allagophylla* Mart. based on collections from grasslands in Minas Gerais, southeastern Brazil. Later, this taxon was transferred to *Sinningia allagophylla* (Mart.) Wiehler (Wiehler, 1975).

Traditionally, *S. allagophylla* has been considered a quite variable taxon regarding plant size and floral color (Chautems & Matsuoka, 2003). According to Chautems and Matsuoka (2003) flowers may be red, orange or yellow. After a number of years of fieldwork in the Brazilian State of Rio Grande do Sul, we noticed that populations hitherto assigned to *S. allagophylla* (see Chautems, 1993) found from the Pampa Biome region display a number of consistent features that, in our opinion, justify their recognition as a distinct species. These populations comprise consistently smaller plants with short, yellow flowers. This suggestion is also supported by statistical analyses (Table I) and by the fact that these populations are geographically isolated from plants fitting the original description of *S. allagophylla* (Martius, 1829). Therefore, we herein propose the recognition of this taxon as a new species.

### Materials and methods

Specimens were collected during field work at several localities from 2008 to 2010. All pressed material was deposited in the ICN, PACA and RSPF herbaria. Some flowers were preserved in 70% ethanol and used to draw floral features. Living specimens were photographed in the field and laboratory using a digital camera (Sony Cyber-shot DSC-H7). Additional collections (ca. 32 sheets) from ICN, PACA, RSPF, HAS, K and P were also studied.

To statistically compare diagnostic floral features in *Sinningia lutea* and *S. allagophylla*, a Student's t-test, with  $p < 0.05$  was performed. This analysis was performed with  $n=9$  for each species.

### Results and discussion

***Sinningia lutea* Buzatto & R. Singer, sp. nov.** Type: Brazil. Rio Grande do Sul: Porto Alegre, Morro Tapera, 30°08'11.059" S, 51°11'15.550" W, 15 Dec 2009, C. R. Buzatto 588 (holotype: ICN; isotypes: PACA, RSPF). (Fig. 1)

*Sinningiae allagophyllae* affinis, sed ab ea inflorescentiis congestis, floribus semper minoribus et flavis solidagineis, foliis ovato-lanceolatis differt. Plantae rupicolae vel terricolae.

Terrestrial or rupicolous herbs, 25–50(–70) cm tall, the roots fibrous producing small tubers to about 4.7 cm diam, the stems simple or rarely branched, cylindric-angular, laterally compressed, densely pilose; internodes (1.4–) 2.2–6 cm long. Leaves concolorous, verticillate, subequal; petioles 3–5 mm long, pubescent; blades ovate-lanceolate, 4.5–8.2 cm × 1.2–3.1 cm, the base cordate, the margins irregularly toothed, the apex acute, the adaxial surface strigose, the abaxial surface setose. Inflorescences terminal, spicate, with 16–50 flowers, 3 flowers per axil, borne in whorls along the inflorescence axis; subtending bracts 8–13 mm × 3–5 mm. Flowers protandrous; pedicels 1 mm long, glandular-pubescent; calyx subcampanulate, glandular-pubescent, fused for 3–8 mm, 7–11 mm × 4–7 mm, the lobes lanceolate, 4–6 mm long, puberulous, margins entire; corolla tubular, pale to vivid yellow, 9–14 mm × 5–9 mm, with lobes of about 2 mm; tube diameter about 3–5 mm, the tube base bearing annular swelling of about 3–7 mm wide, the throat 3–5 mm wide, puberulent; stamens 4, didynamous, the fifth stamen represented by a small staminode, the filaments adnate to corolla, strigose, the anthers 2 mm long; ovary superior, conic, puberulent, the style and stigma slightly exerted at female phase; nectaries 5, subequal, present at the ovary base. Fruit not seen.

*Distribution and ecology.*—*Sinningia lutea* is known only from Rio Grande do Sul State at altitudes from 143 to 311 m. The species occurs in grassland formations and granitic hilltops within the Pampa Biome (Overbeck et al., 2007). These floristic formations are especially rich in Asteraceae, Poaceae, Fabaceae, Cyperaceae, and other families as such as Rubiaceae, Verbenaceae, and Orchidaceae (Ferreira et al., 2010; Setubal & Boldrini, 2010).

*Phenology.*—Plants flower from October to March.

*Etymology.*—From the Latin *luteus*, yellow, in allusion to the color of the flower.

**Additional specimens examined. BRAZIL. Rio Grande do Sul:** Porto Alegre, Teresópolis, 27 Jan 1981, O. Bueno 2918 (HAS); Guaíba, 11 Feb 2007, C. R. Buzatto 270 (RSPF), 26 Jan 2009, C. R. Buzatto 503 (ICN); Porto Alegre, Morro Pelado, 27 Jan 2009, C. R. Buzatto 505 (ICN, PACA, RSPF); Porto Alegre, Morro Tapera, 27 Oct 2009, C. R. Buzatto 560 (ICN-spirit);

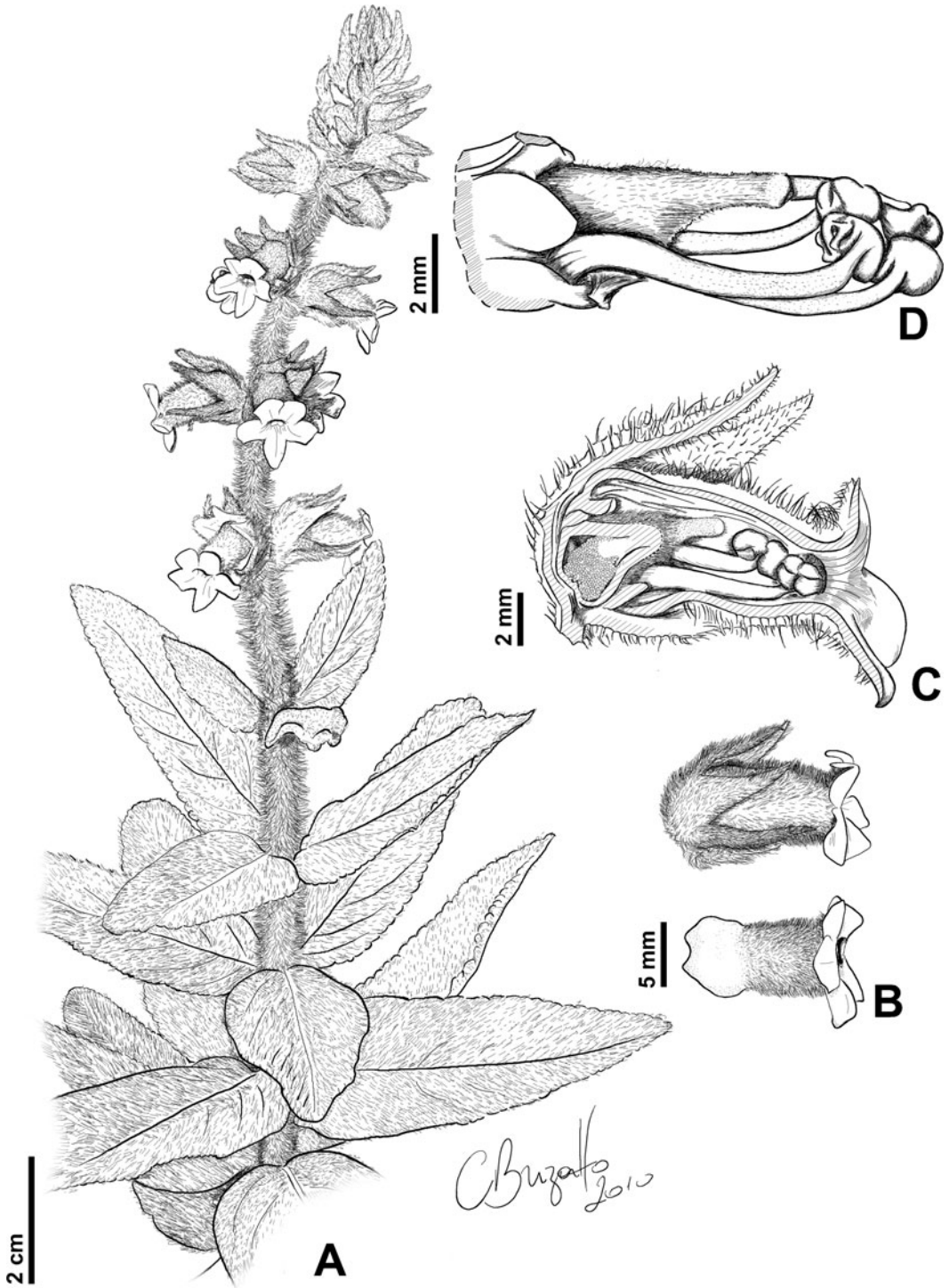


FIG. 1. *Sinningia lutea*. A. Habit. B. Whole flower (top) and corolla (bottom) in lateral view. C. Flower in lateral view, longitudinal section. D. Ovary and didynamous stamens. (Drawn from the holotype.)



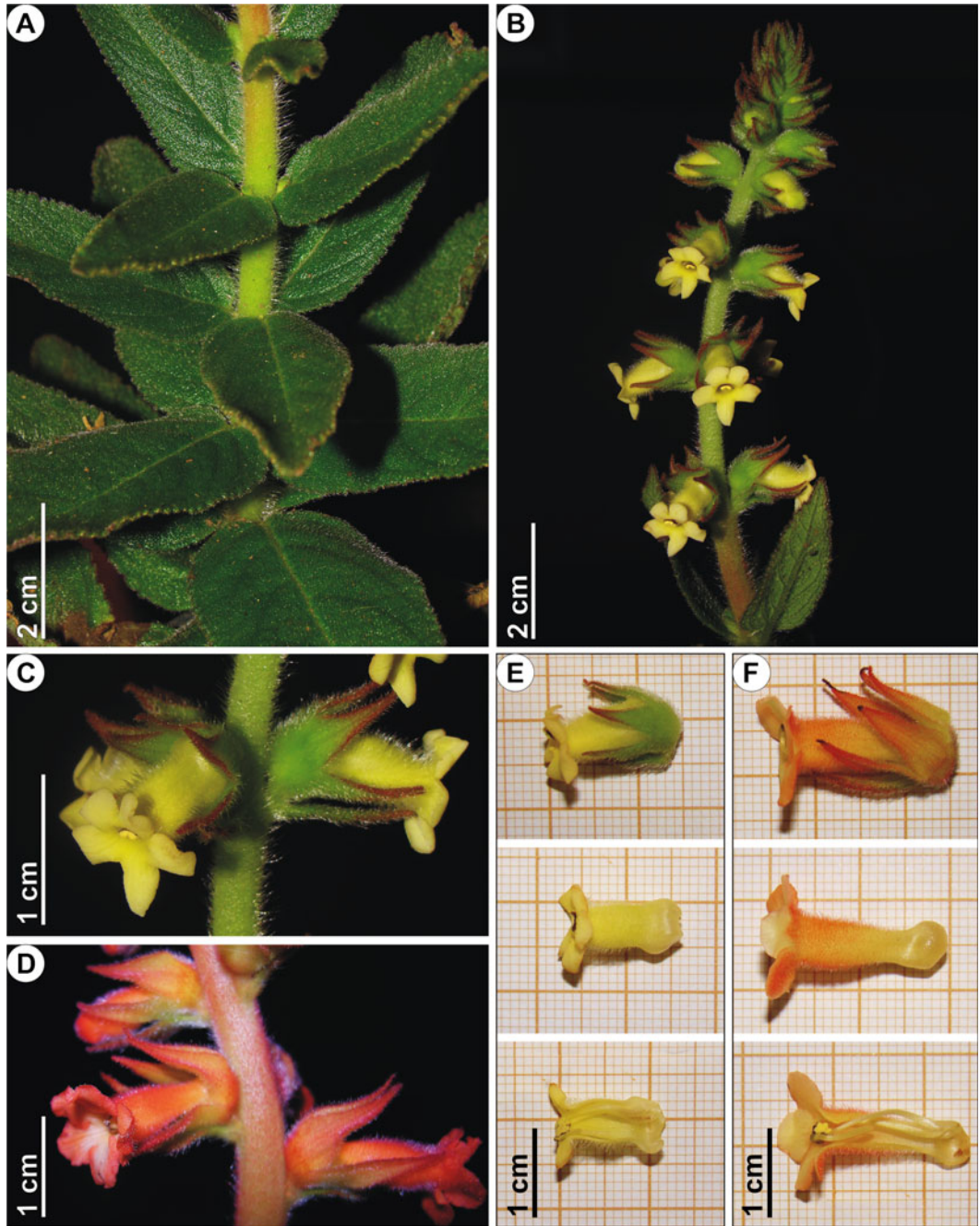


FIG. 2. *Sinningia lutea* and *S. allagophylla*. A. *S. lutea*, leaves. B. *S. lutea*, inflorescence. C. *S. lutea*, flowers. D. *S. allagophylla*, flowers. E. *S. lutea*, whole flowers (top), corolla (center), and longitudinal section with stamens (bottom). F. *S. allagophylla*, whole flowers (top), corolla (center), and longitudinal section with stamens (bottom). (A–C, E from Buzatto 588, ICN; D, F from Buzatto & Singer 584, ICN.)

Porto Alegre, Morro Aberto, 3 Nov 2009, C. R. Buzatto 570 (ICN); Viamão, Capão da Porteira, 17 Dec 2009, C. R. Buzatto 601 (ICN, PACA); Porto Alegre, Morro do

Osso, 4 Jan 2006, P. M. A. Ferreira & L. Eggers s.n. (ICN 122844); Porto Alegre, Morro Santana, 3 Dec 2002, V. F. Kinupp 2530 & P. Brack (ICN); Dom

Feliciano, 26 Dec 1994, *J. Larocca et al. 94053* (ICN); Sarandi, 11 Jan 1982, *J. Mattos 22895* (HAS); Alegrete, 7 Dec 1982, *J. Mattos 23965* (HAS); Caçapava do Sul, 29 Nov 1983, *J. Mattos 24867* (HAS); Pinheiro Machado, 1 Dec 1983, *J. Mattos 25343* (HAS); São Lourenço do Sul, 14 March 1978, *J. Mattos s.n.* (HAS 84168); Santo Angelo, 9 Feb 2011, *E. Pasini 701* (ICN); Viamão, Morro do Araçá, 4 Oct 2002, *M. Pinheiro 501* (ICN); Barra do Ribeiro, 15 Dec 2008, *R. Trevisan 1032* (ICN); Porto Alegre, Morro São Pedro, 11 Dec 2005, *R. Setubal 80* (ICN); São Pedro do Sul, 6 Dec 1986, *G. L. Webster et al. 25979* (ICN).

At the type locality, Gesneriaceae is only represented by *Sinningia lutea* and *S. macrostachya* (Lindl.) Chautems. The latter species is easily separable from *S. lutea* through a number of vegetative (big tubers and much wider leaves) and floral (flowers longer, slightly incurved, always red colored) features. It is possible that *S. lutea* also occurs in Paraguay and neighboring countries that share the Pampa Biome with Brazil (Uruguay and Argentina). The illustrations, measurements, and description given by Chautems (1993, Flora del Paraguay, p. 17) under *S. allagophylla* strongly suggest that material on which they are based may be assignable to *S. lutea*. *Sinningia allagophylla* is widespread in Rio Grande do Sul, but occurs at much higher altitudes (884–1075 m), in grassy formations surrounding *Araucaria angustifolia* (Araucariaceae) forests, within the Atlantic Rain Forest Biome (Overbeck et al., 2007). In Eastern and Central Brazil, *S. allagophylla* also occurs within the Cerrado Biome (Chautems & Matsuoka, 2003). In other words, *S. lutea* and *S. allagophylla* are geographically and altitudinally isolated and we have never found both species coexisting, nor we have found plants with intermediate vegetative or floral features.

When Martius (1829) described *Gesnera allagophylla* (*Sinningia allagophylla*) he characterized the flowers as having scarlet corollas and a calyx of four to five lines (1 linea=2.1 mm) in length (Fig. 2D, F). *Sinningia lutea* consistently differs from *S. allagophylla* in a number of floral characters, including flower size and color (Fig. 2). The flowers of *S. lutea* are yellow to golden-yellow (Fig. 2B, C, E), with shorter floral tubes and calices (up to 0.822 cm). A statistical comparison of floral features in both species, showing

significant difference in the eight characters studied is summarized in Table I. High-quality digital photos of the type specimens (*Martius 4*, at K and P) of *S. allagophylla* were examined, and the labels clearly state that the flowers are orange. Chautems and Matsuoka (2003) mention the occurrence of yellow-flowered specimens of *S. allagophylla*. However, in the context of Rio Grande do Sul State, the only yellow-flowered specimens we are aware of constitute what we herein propose as a new species. All specimens collected at higher altitudes have orange to red flowers (Fig. 2D, F), consistent with the protologue of *S. allagophylla* (Martius, 1829). Chautems (1993) mentioned the occurrence of yellow-flowered populations of *Sinningia allagophylla* in Paraguay and Rio Grande do Sul, but we have not seen the Paraguayan specimens cited by Chautems. However, the cited measurements and the illustration (Chautems, 1993) strongly suggest that these specimens also belong to *S. lutea*. If these specimens

TABLE I  
STATISTICAL COMPARISON (STUDENT'S T-TEST) OF DIAGNOSTIC FLORAL CHARACTERS OF *SINNINGIA LUTEA* AND *S. ALLAGOPHYLLA*. VALUES REPRESENT MEAN (CM) ±STANDARD DEVIATION. ONLY TUBE BASE DIAMETER SCORED STATISTICALLY NON-SIGNIFICANT VALUES.

Character	<i>S. lutea</i> (n=9)*	<i>S. allagophylla</i> (n=9)**
Calyx		
length	0.822±0.139	1.078±0.268
width	0.567±0.100	0.867±0.100
lobe	0.522±0.067	0.689±0.117
Corolla		
length	0.989±0.169	1.589±0.232
width	0.644±0.159	0.967±0.166
lobes	0.144±0.053	0.489±0.033
tube apex diameter	0.411±0.060	0.522±0.067
tube base diameter	0.478±0.120	0.533±0.050
throat diameter	0.422±0.067	0.289±0.060

\*Buzatto 588 (ICN, PACA, RSPF); Buzatto 601 (ICN, PACA); Webster et al. 25979 (ICN); Larocca et al. 94053 (ICN); Pinheiro 501 (ICN); Ferreira & Eggers s. n. (ICN); Setubal 80 (ICN); Trevisan 1032 (ICN); Kinupp 2530 & Brack (ICN).

\*\*Schneider 1487; Sobral 3637; Schultz 3404; Buzatto 473; Buzatto 584; Rügolo et al. 1522; Boldrini & Eggers 1331; Longhi-Wagner 3681; Porto s.n. (all at ICN).

prove to be *S. lutea*, the expanded distribution of the taxon should still be in agreement with the delimitation of the Pampa Biome *sensu lato* (see Bilenca & Miñarro, 2004).

It is important to stress that *S. allagophylla* and *S. lutea* also differ in non-floral characters. Plants of *S. allagophylla* tend to be taller (up to 85 cm) than those of *S. lutea*, and both species display different foliar shapes (see key). Other than this, *S. lutea* and *S.*

*allagophylla* may be closely related. Both species share the same general habit, inflorescences, and flower structure (Fig. 2B–F). Phylogenetic analyses have placed *S. allagophylla* within the so-called *Corytholoma* clade (Perret et al., 2003). Because *S. allagophylla* and *S. lutea* share a number of morphological features, it is probable that *S. lutea* is also inserted within this clade. However, this has yet to be tested.

### Artificial key to separate *Sinningia lutea* from morphologically similar species native to Rio Grande do Sul State

1. Leaves elliptic-lanceolate; corolla >1.5 cm long.....*S. allagophylla*  
 1. Leaves ovate-lanceolate; corolla <1.5 cm long.  
 2. Plants 50–150 cm tall; corolla 0.7–0.9 cm long, magenta.....*S. curtiflora*  
 2. Plants 24–50 (70) cm tall; corolla 0.9–1.4 cm long, yellow or golden-yellow.....*S. lutea*

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### Literature Cited

- Bilenca, D. N. & F. O. Miñarro. 2004. Identificación de áreas valiosas de pastizal en las pampas y campos de Argentina, Uruguay y sul de Brasil. 1 ed. Argentina: Fundación Vida Silvestre. 323pp.  
 Chautems, A. 1990. Taxonomic revision of *Sinningia* Nees: nomenclatural changes and new synonymies. *Candollea* 45: 381–388.  
 ———. 1991. Taxonomic revision of *Sinningia* Nees (Gesneriaceae) II: New species from Brazil. *Candollea* 46: 411–425.  
 ———. 1993. Gesneriaceae. In: R. Spichiger & L. Ramella (eds.), *Flora del Paraguay*. Geneva. Vol. 22, 40pp.  
 ——— & C. Y. K. Matsuoka. 2003. Gesneriaceae. In: M. G. L. Wanderley, G. J. Shepherd, A. M. Giulietti & T. S. Melhem (eds.), *Flora fanerogâmica do Estado de São Paulo*. São Paulo, Fapesp: Rima. 3: 75–103.

- Ferreira, P. M. A., S. C. Müller, I. I. Boldrini & L. Eggers. 2010. Floristic and vegetation structure of a granitic grassland in Southern Brazil. *Revista Brasileira de Botânica* 33(1): 21–36.  
 Martius, C. F. P. 1829. *Nova genera et species plantarum: quas in itinere per Brasiliam. 1817–1820 jussu et auspiciis Maximiliani Josephi I., Bavariae regis augustissimi collegit et descripsit C.F.P. de Martius*. Munich: Impensis Auctoris. Vol. 3. 198pp.  
 Nees von Esenbeck, C. G. D. 1825. Sur un nouveau genre de la famille des Gesneriées *Annales des sciences naturelles*. 6: 290–299.  
 Overbeck, G. E., S. C. Müller, A. Fidelis, J. Pfdenhauer, V. D. Pillar, C. C. Blanco, I. I. Boldrini, R. Both & E. D. Forneck. 2007. Brazil's neglected biome: The south Brazilian campos. *Perspectives in Plant Ecology, Evolution and Systematics* 9: 101–116.  
 Perret, M., A. Chautems, R. Spichiger, G. Kite & V. Savolainen. 2003. Systematics and evolution of tribe Sinningieae (Gesneriaceae): Evidence from phylogenetic analyses of six plastid DNA regions and nuclear ncpGS. *American Journal of Botany* 90: 445–460.  
 Setubal, R. B. & I. I. Boldrini. 2010. Floristic and characterization of grassland vegetation at a granitic hill in Southern Brazil. *Revista Brasileira de Biociências* 8: 85–111.  
 Wiehler, H. 1975. Name changes in neotropical Gesneriaceae. *Selbyana* 1: 32–35.  
 Zimmer, E. A., E. H. Roalson, L. E. Skog, J. K. Boggan & A. Idnurm. 2002. Phylogenetic relationships in the Gesnerioideae (Gesneriaceae) based on nrDNA ITS and cpDNA trnL-F and trnE-T spacer region sequences. *American Journal of Botany* 89: 296–311.