

NORDIC JOURNAL OF BOTANY

Research Article

Sinningia pampeana sp. nov. (Gesneriaceae) from the Pampa's rocky outcrops in southern Brazil and Uruguay

Gabriel Emiliano Ferreira^{1,2}, Daniel Alves Spiazzi³, Pedro Henrique Sonsim Barbieri⁴, Alain Chautems⁵ and Andréa Onofre Araújo^{4,6}

¹Departamento de Biologia, Faculdade de Ciências Agrárias e Veterinárias, Universidade Estadual Paulista, Jaboticabal, São Paulo, SP, Brazil

²Marie Selby Botanical Gardens, Sarasota, FL, USA

³Programa de Pós-Graduação em Ciências Ambientais, Universidade do Extremo Sul Catarinense, Criciúma, SC, Brazil

⁴Herbário SORO, Universidade Federal de São Carlos, Sorocaba, São Paulo, SP, Brazil

⁵Conservatoire et Jardin botaniques de Genève, Chambésy, Switzerland

⁶Departamento de Biologia, Centro de Ciências Humanas e Biológicas, Universidade Federal de São Carlos, Sorocaba, São Paulo, SP, Brazil

Correspondence: Gabriel Emiliano Ferreira (gabriel.emiliano@unesp.br)

Nordic Journal of Botany

2026: e05231

doi: 10.1002/njb.05231

Subject Editor: Isa Lucia de Moraes

Editor-in-Chief: Jalil Noroozi

Accepted 6 May 2026

Published X June 2026

Sinningia pampeana is a new rupicolous species from the rocky outcrops of the Pampa biome in southern Brazil and Uruguay. Morphological analyses based on herbarium material, field observations, and detailed illustrations support its recognition as a distinct species from *Sinningia sellovii*. *Sinningia pampeana* is restricted to rock outcrops within the Pampa grasslands, where populations are threatened by grazing, habitat degradation, and potential mining activities. Given the current uncertainty regarding its distribution and sampling completeness, a preliminary conservation assessment of 'Data Deficient' (DD) is proposed under IUCN criteria.

Keywords: Gesneriaceae, new species, Pampa biome, rocky outcrops, *Sinningia*



Introduction

The genus *Sinningia* Nees belongs to the subtribe Ligeriinae (Gesnerieae – Gesneriaceae), which also includes the genera *Vanhouttea* Lem. and *Paliavana* Vell. ex Vand. (Weber et al. 2013, Ogutcen et al. 2021). With 82 recognized species (GRC 2026), *Sinningia* is the largest genus of Gesneriaceae in Brazil, where 78 species occur (Chautems et al. 2022, Araújo et al. 2026). In Uruguay, it is the only genus of the family, with six species recorded (Marchesi et al. 2026). Species of *Sinningia* are characterized by the presence of an annual aerial stem produced after a period of dormancy, which may be absent or, more rarely, may become partially or completely subwoody or succulent and perennial. These plants can be terrestrial, rupicolous, or epiphytic, with corolla campanulate to cylindrical, white, cream, green, yellow, orange, red, violet, lilac, purple, or pink and dry or semi-fleshy fruit (Araújo et al. 2026).

© 2026 The Author(s). Nordic Journal of Botany published by John Wiley & Sons Ltd on behalf of Nordic Society Oikos.

This is an open access article under the terms of the Creative Commons Attribution License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited.



www.nordicjbotany.org

Sinningia first diversified in the Atlantic Forest of southeastern Brazil and later expanded its distribution toward Central America (Perret et al. 2006, 2007, 2013). The Brazilian states with the highest species richness are in the southeast region (Espírito Santo, Minas Gerais, São Paulo, and Rio de Janeiro), with Rio de Janeiro being the most diverse, hosting 29 species (Araújo et al. 2026). In the southern region, 26 species are found, with 18 in Paraná, 18 in Santa Catarina, and 13 in Rio Grande do Sul (Ferreira et al. 2015, Hinoshita et al. 2024, Araújo et al. 2026). In Uruguay, species occupy a broad range of habitats, including rocky outcrops in hilly regions, wetlands, and grasslands, humid rock faces of basalt or sandstone in the northeast, and sodic soils in the west associated with Chacoan vegetation (Grela and Brussa 2005).

The Pampa biome represents the northern sector of the Río de la Plata grassland system and occupies most of Rio Grande do Sul state, also extending into Uruguay and northeastern Argentina (Andrade et al. 2018, IBGE 2019). Across Brazil and Uruguay, it is characterized primarily by extensive native grasslands influenced by long-term fire regimes and grazing, interspersed with a variety of other vegetation types, including shrublands, riparian and slope forests, wetlands, rocky outcrops, coastal restinga formations, and palm-dominated areas (Overbeck et al. 2022, Furquim et al. 2024, Bonifacino et al. 2026). Despite occupying only about 2.3% of the Brazilian territory, the Pampa supports a remarkably high level of biodiversity, encompassing more than 3600 species distributed among 190 families and 1100 genera (Andrade et al. 2023). In Uruguay, by contrast, biodiversity remains insufficiently quantified; although at least 1648 vascular plant species and 664 tetrapods have been documented, no comprehensive inventory is available for the Pampa biome (Grattarola et al. 2020a, 2020b).

Despite this ecological relevance, the biome has received limited attention in national conservation policies and is currently undergoing rapid landscape transformation. Large tracts of native grasslands have been converted to other land uses in recent decades, and formal protection covers only a minimal portion of its area, with many protected sites already degraded (MapBiomas Project 2022). As a result, the Pampa is sometimes regarded as the most environmentally threatened region in Brazil (Overbeck et al. 2015).

Here, we formally describe a new species uncovered through more than a decade of taxonomic investigation, initially detected during the first author's MSc research. Although the new species is morphologically similar to *Sinningia sellovii* (Mart.) Wiehler, it exhibits distinct structural characters and is markedly differentiated by its occurrence on dry, sun-exposed rocky outcrops, a habitat particularly characteristic of the Pampa landscape.

Material and methods

The discovery presented here resulted from long-term taxonomic investigations that ultimately provided sufficient evidence to recognize this taxon as a distinct species. The initial

evidence that it could be a new taxon was based on material collected at Cerro Palomas, in the municipality of Santana do Livramento, Rio Grande do Sul, Brazil. Further studies, including the analysis of additional specimens from other areas of the Pampa in Brazil and from Uruguay, revealed that these populations, both from Cerro Palomas and from other localities, belong to the same, previously undescribed species. Specimens from the herbaria F, L, MO, US, HAS, ICN, PEL, and HUEFS were examined during this study. Living specimens were photographed in the field, and some flowers were preserved in 70% ethanol for detailed illustrations of floral structures. Morphological analyses were conducted using a stereomicroscope. Terminology for morphological descriptions follows Beentje (2010). The type material and protologue of most morphologically similar species were consulted.

The extinction risk assessment followed the IUCN Red List Categories and Criteria (2024). For this preliminary assessment, field observations, collection localities, and population estimates obtained during fieldwork were considered. The area of occupancy (AOO) and extent of occurrence (EOO) were calculated based on herbarium records using the GeoCat tool (Bachman et al. 2011).

Taxonomic treatment

***Sinningia pampeana* G.E.Ferreira and Chautems sp. nov. (Fig. 1–2)**

Diagnosis

Sinningia pampeana differs from *S. sellovii* by its consistently red, horizontally oriented corollas (versus whitish pink to lilac or yellowish and pendent corollas), included anthers (versus exserted), a slightly bilabiate limb with enlarged dorsal lobes (versus a corolla tubular with subequal lobes), and the presence of only one to ca four flowers per bract axil (versus 3–9 flowers).

Type: Brazil, Rio Grande do Sul: Caçapava do Sul, localidade de Guaritas, 30°50'03"S, 53°30'17"W, 11 Jan. 1997, J.A. Jarenkow and E.N. Garcia 3607 (holotype: MBM [MBM227166]; isotypes: FLOR [FLOR0030670], PEL [PEL0004200]).

Etymology

The specific epithet '*pampeana*' refers to the Pampa biome, characterized by grasslands and rocky outcrops across southern Brazil, Uruguay, and Argentina. The name derives from the Quechua word '*pampa*', meaning 'plain' or 'open field'.

Description

Shrubs with erect stems arising from tubers; stems 40–60 cm long, scabrous, unbranched, rarely branched, purple. Leaves arranged in 3–6 nodes, three-whorled, rarely opposite-decussate, subequal, basifixed, sessile or petiole to 1–3 mm long, tomentose, multicellular, septate trichomes; blade ovate to lanceolate, 4.3–7.6 cm long, 2.2–4.1 cm

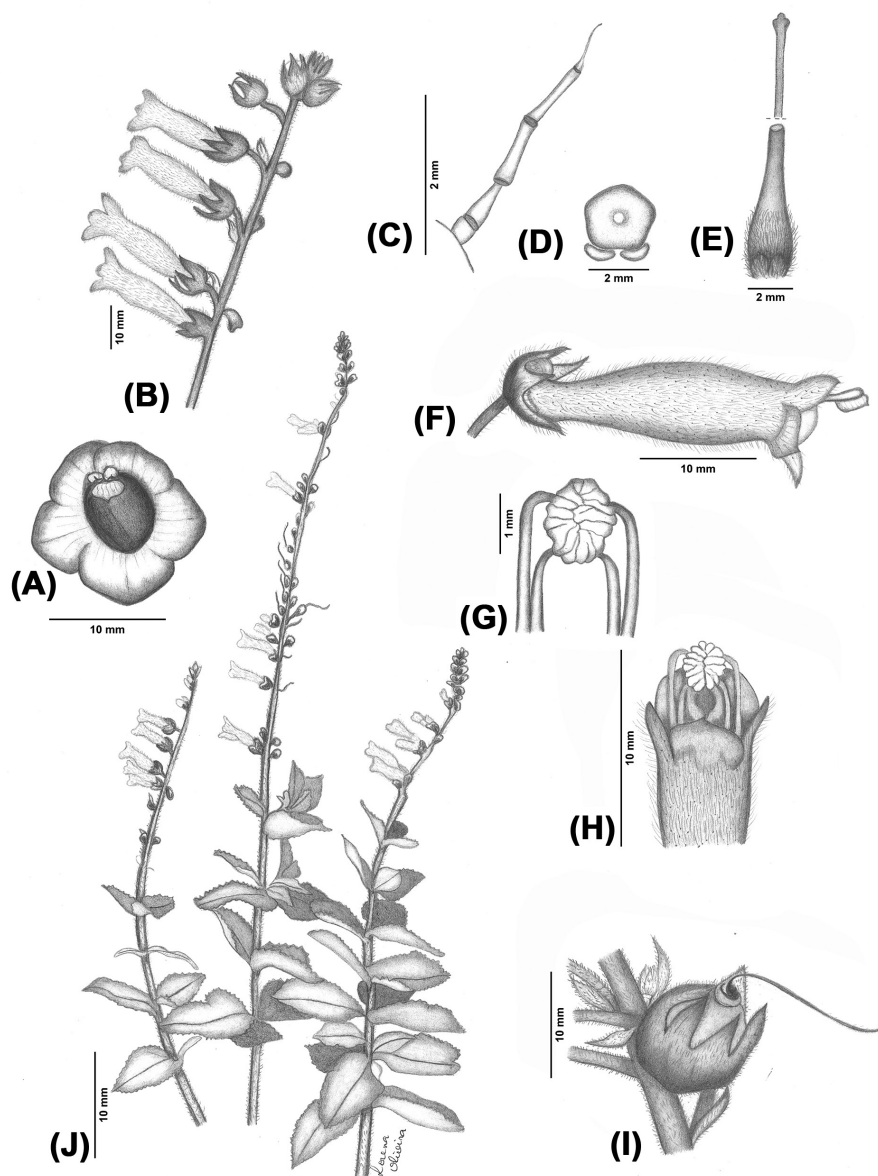


Figure 1. *Sinningia pampeana* sp. nov. (A) Corolla, frontal view, (B) inflorescence, detail, (C) trichome structure, (D) ovary, transverse section showing the nectary consisting of two separate dorsal glands, (E) ovary, style, and nectary, (F) calyx and corolla showing stamens, (G) coherent anthers, detail, (H) corolla throat, detail showing stamens and anthers, (I) immature capsule, (J) habit. Drawn from Jarenkow and Garcia 3607.

wide, obtuse at the apex, subcordate or sometimes oblique at the base, margin crenate, 10–16 pairs of veins, adaxial dark green, puberulous, abaxial pale green, pubescent. Inflorescence terminal, racemiform, 1–2(–4) flowers per bract axil, rarely in a paired-flower cyme, horizontally oriented; pedicel 1.0–1.8 cm long, vinaceous, pubescent. Calyx subcampanulate, tube 2–4 long, 3–4 wide, strigose, lobes lanceolate, 4–5 mm long, acuminate, margin entire, green, sometime reddish to the apex, strigose. Corolla horizontal relative to the calyx, tubular, 1.9–3.0 cm long, red, pilose with tector trichomes, base with two gibbosities between

the calyx lobes, tube constricted above base, 2–3 wide, then expanding gradually to 5–7 mm at throat, limb spreading, lobes 5, red, unequal, slightly bilabiate, the two dorsal ca 4–6 × 2 others ca 3 × 2 mm; stamens four, included, filaments 2.2–3.2 cm long, glabrous, anthers coherent, star-shaped, pollen white, nectary consisting of two separate dorsal glands; ovary 6–8 long, ca 2 mm wide, pubescent, style 1.9–2.8 cm long, green, pubescent. Fruit a dry two-valved capsule, 0.9–1.1 long, and 0.4–0.6 cm wide, acuminate, reddish brown, pubescent; seeds narrowly ellipsoid, brown.

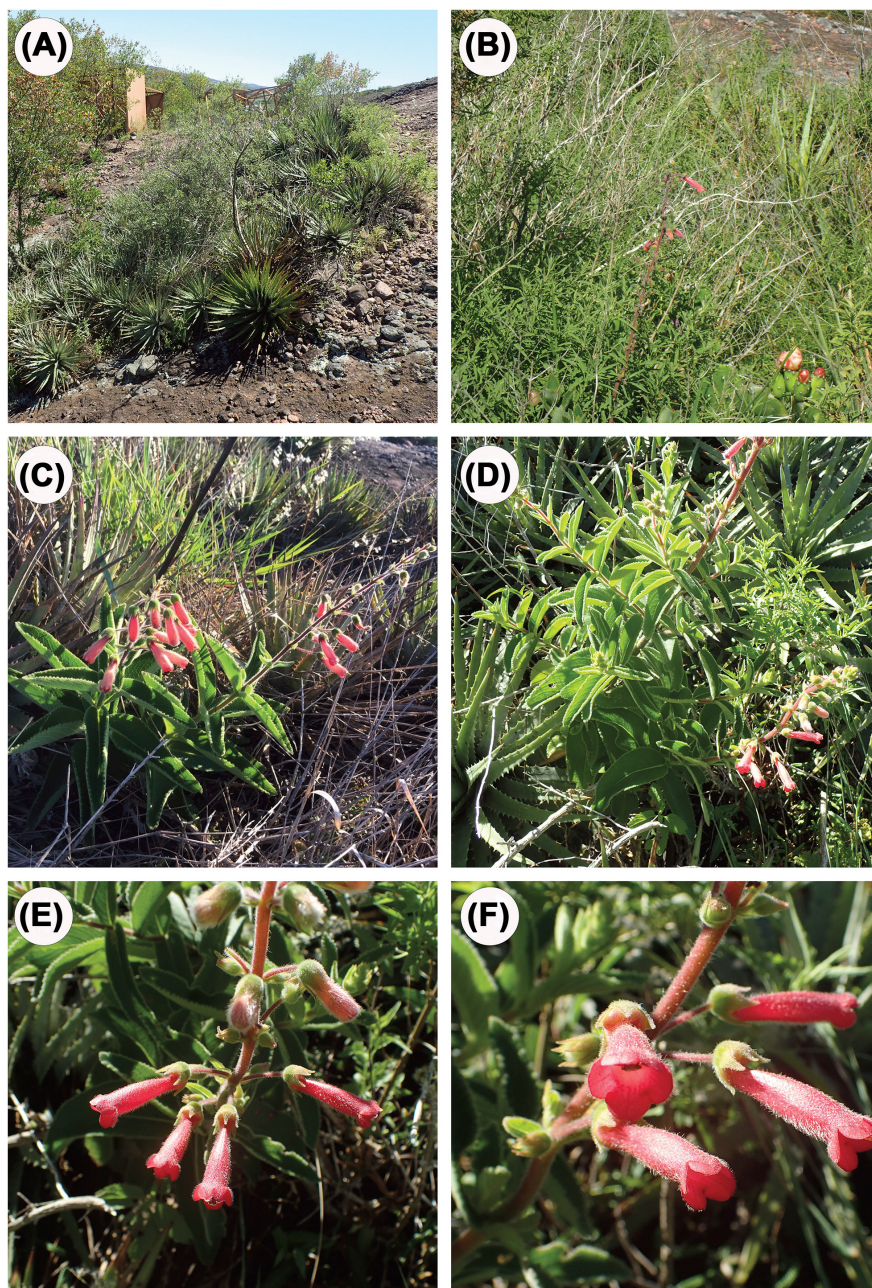


Figure 2. Morphology of *Sinningia pampeana* sp. nov. (A) Habitat on rocky outcrop, (B) inflorescence in the shrub vegetation, (C) inflorescence, (D) habit, (E) axillary flowers, (F) close-up of the calyx and corolla. Photo by A. Chautems.

Phenology

The species flowers and fruits from mid-October to January.

Distribution and ecology

The species occurs in the Pampa region (Fig. 3), particularly in Rio Grande do Sul (Brazil) and in the departments of Rivera and Treinta y Tres (Uruguay). It is mainly found on steep rocky outcrops, especially on isolated residual hills ('cerros') that emerge from the surrounding plains, and on small hills, typically associated with granite, sandstone, and

conglomerate substrates. Field observations indicated that its flowers are visited by hummingbirds.

Conservation status

Sinningia pampeana is known from the central portion of the Pampa in Rio Grande do Sul (Brazil), particularly within the Serra do Sudeste region, and two sites in Uruguay. Its estimated extent of occurrence (EOO) is 47 249 km² and its area of occupancy (AOO) is 36 km². Although the AOO falls within the threshold for 'Endangered' (EN) under

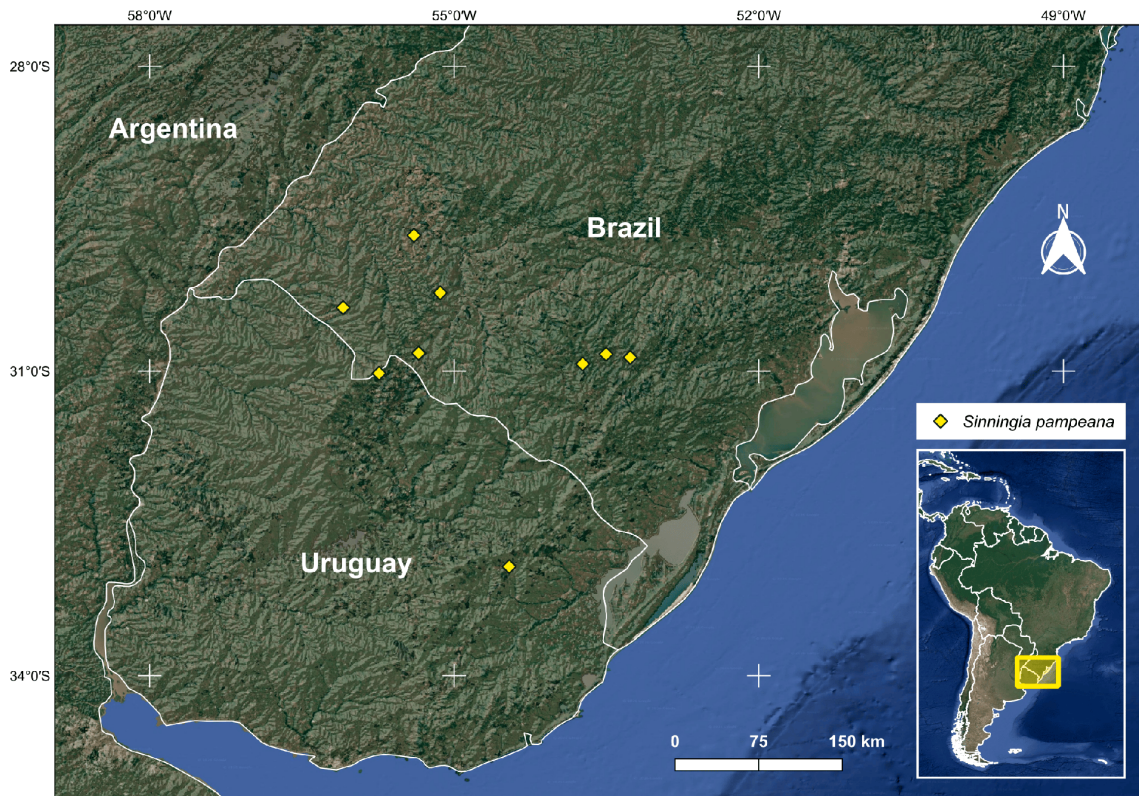


Figure 3. Distribution of *Sinningia pampeana* sp. nov. across the Pampa biome, showing confirmed records in southern Rio Grande do Sul (Brazil) and the departments of Rivera and Treinta y Tres (Uruguay).

subcriterion B2 ($AOO < 500 \text{ km}^2$), estimates based on AOO may be strongly influenced by sampling effort, especially for recently described taxa. In such cases, IUCN guidelines recommend caution and the use of EOO as a more robust metric when sampling is incomplete (Fig. 4).

Known populations are associated with rocky outcrops ('cerros') and small mountain formations, which are naturally patchy and spatially isolated habitats. These areas are subject to multiple pressures, including grazing by domestic goats, mineral extraction (particularly in the Caçapava do Sul region, the type locality; MapBiomias Project 2022), expansion of temporary crop agriculture, and shading from commercial forestry plantations. These factors may affect habitat quality, population persistence, and connectivity among suitable sites.

Given the relatively large EOO and the current uncertainty regarding the total number of locations and sampling completeness, a preliminary conservation assessment based solely on AOO is not considered appropriate. Therefore, *S. pampeana* is here best classified as 'Data Deficient' (DD) until further field surveys allow a more robust evaluation of its distribution, population size, and threats.

Similar species (Fig. 5)

Sinningia pampeana is morphologically similar to *S. sellovii*, particularly in its reddish flowers arranged along a racemose inflorescence, three-whorled leaves, and rarely branched stems. However, the two species differ in several floral and

ecological traits. In *S. sellovii*, the corolla color ranges from whitish-pink to lilac or rarely yellowish, whereas in *S. pampeana* the flowers are consistently red. *S. pampeana* also bears fewer flowers per axil (1–4 versus 3–9 in *S. sellovii*), and its flowers are horizontally oriented, contrasting with the pendent flowers of *S. sellovii*. Furthermore, *S. pampeana* has a slightly tubular, bilabiate corolla with two more prominent upper lobes, whereas *S. sellovii* has a tubular corolla constricted below the lobes, with lobes of similar size (Table 1).

Habitat differences further distinguish the two species: *S. pampeana* occurs on dry, sun-exposed rocky outcrops, whereas *S. sellovii* grows on moist rock formations, typically near waterfalls and in shaded environments. The species also differ phenologically, with *S. sellovii* flowering in early spring, from September onward, whereas *S. pampeana* flowers later in the season, beginning in mid-October and peaking in December.

Another species resembling *S. pampeana* is *Sinningia warmingii*, as both are horizontal, tuberous herbs with racemose inflorescences and whorled leaves. However, *S. warmingii* differs in its taller (40–120 cm), often branched stems, elliptic to oval-elliptic pubescent leaves, and tubular corollas 3.3–5.0 cm long, salmon to red-yellowish with equal lobes. It occurs in southeastern and southern Brazil, Paraguay, Bolivia, and along the Andes up to Peru, whereas *S. pampeana* stems are 40–60 cm long and bear tubular corollas 1.9–3.0 cm long that are consistently red, and is restricted to dry, sun-exposed rocky outcrops in the Pampa.

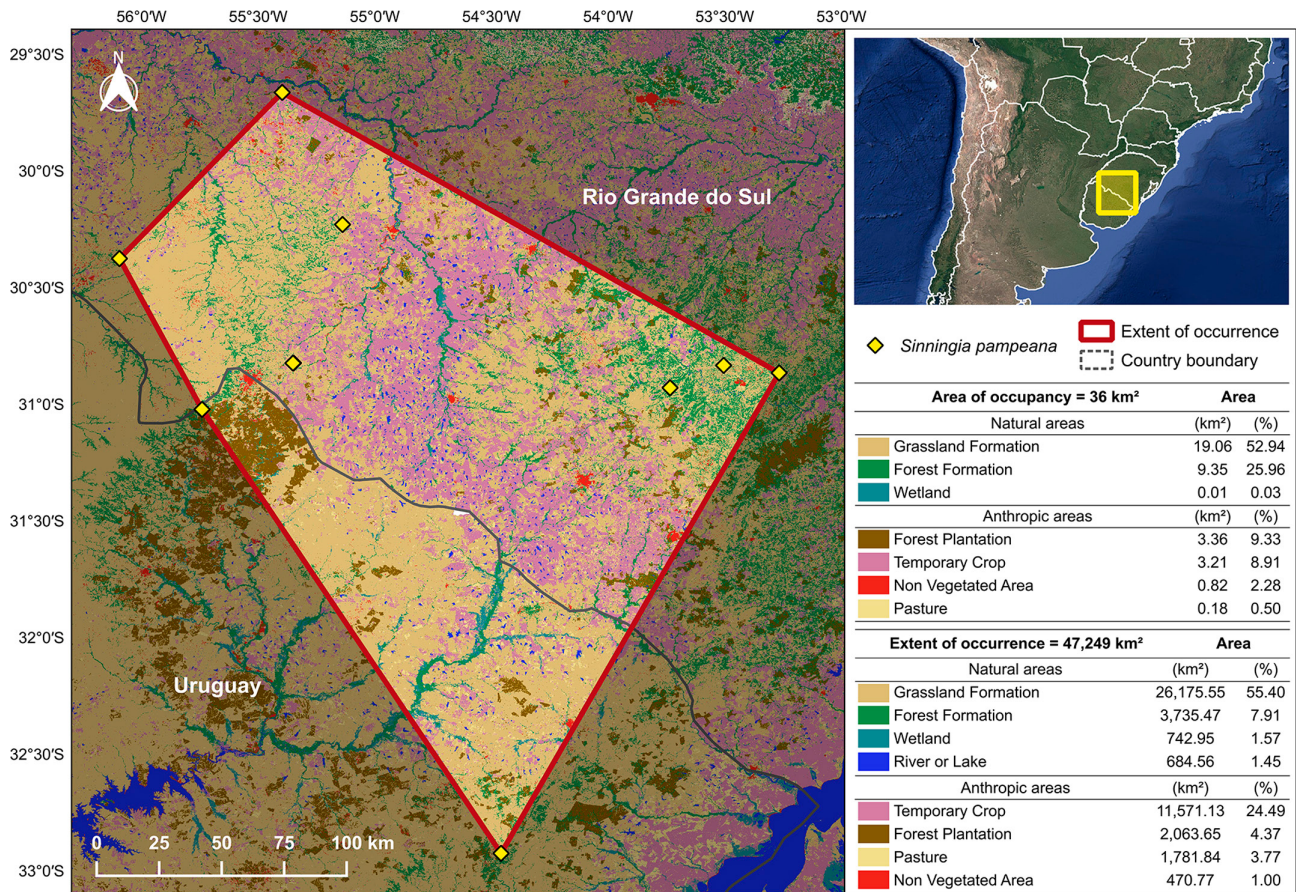


Figure 4. Distribution of *Sinningia pampeana* sp. nov. in southern Brazil and Uruguay, illustrating its extent of occurrence (EOO) and area of occupancy (AOO) in relation to land-use patterns based on MapBiomas Project data (2023).

Additional specimen examined (paratype)

Brazil, Rio Grande do Sul; Alegrete, Serra do Caverá, 19 Dec. 2013, R.A.X. Borges et al. 1241 (ICN); Alegrete, Ponte de Pedra, 2 Dec. 2016, P.J.S. Silva-Filho 2305 (HVAT, ICN); Caçapava do Sul, 15.9 km SW da BR-153, na RS-194 para Lavras do Sul, 11 Nov. 2006, L.P. de Queiroz 12358 (HUEFS); Quaraí, Fundão do Quatepe, rupícola, na beira do arroio, 5 Dec. 2019, P.P.A. Ferreira et al. 1512 (HAS); Santana da Boa Vista, Cerro do Diogo, 6 Jan. 1995, J.A. Jarenkow and M. Sobral 2535 (PEL); Santana do Livramento, Cerro Palomas, 14 Oct. 1974, M.L. Porto 998 (ICN); Santana do Livramento, Cerro Palomas, 11 Nov. 2017, J. Küllkamp et al. 352 (ICN); Santana do Livramento, Cerro Palomas, 18 km E de Livramento, 15 Oct. 1971, J.C. Lindeman et al. s.n. (ICN); Santana do Livramento, Cerro Paloma, November 1986, O. Bueno 3266 (HAS); Santana do Livramento, no Cerro Paloma, nas rochas do costão do morrinho, 18 Oct. 1984, J.R. Mattos and N. Silveira 26968 (HAS); Santana do Livramento, Cerro Paloma, nas escarpas íngremes do cerro, nas rochas, fl. vermelhas, 22 Oct. 1986, J.R. Mattos and N.F. Mattos 31636 (HAS); Santana do Livramento, estrada Don Pedrito–Cerro Paloma, 14 Oct. 1974, S.M. Callegari 170 (HAS). Uruguay, Rivera; ‘Galgo’, 2 Dec. 1933, W. Herter 1387 (F, L, MO). Treinta y Tres; Quebrada de los Cuervos, Isla Patrulla, Mar. 1945, B. Rosengurt B-4831 (US).

Conclusions

The recognition of *S. pampeana* as a distinct species highlights the underestimated botanical diversity of the Pampa biome, particularly on isolated rocky outcrops. Detailed morphological analyses and field observations support its separation from morphologically similar species, especially *S. sellovii* and *S. warmingii*. The discovery of this taxon reinforces the importance of continued taxonomic exploration in southern South America and emphasizes the conservation relevance of rocky outcrop habitats within the Pampa, which remain under increasing anthropogenic pressure.

Key to *Sinningia* species morphologically similar to *S. pampeana* sp. nov. in Rio Grande do Sul (Brazil) and Uruguay

1. Flowers pendulous, corolla white-pinkish to lilac, tubular with constriction below the lobes, stamens with exserted anthers.....*S. sellovii*
- horizontal, corolla salmon to red, tubular, lacking a constriction below the lobes, stamens with anthers included.....2

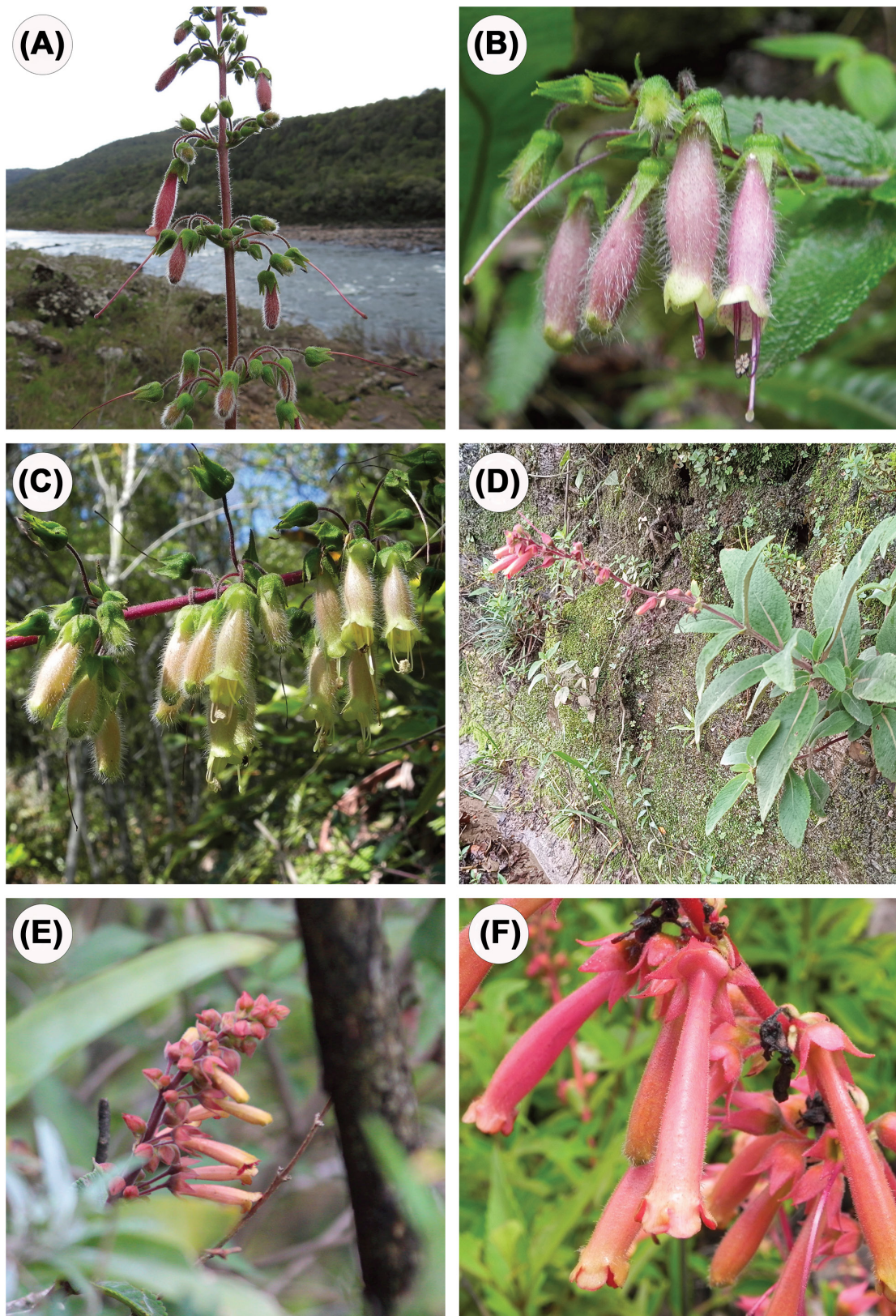


Figure 5. Morphologically similar species to *Sinningia pampeana* sp. nov. (A)–(C) *S. sellovii*: (A) inflorescence, (B) detail of calyx and corolla, (C) inflorescence. (D)–(F) *S. warmingii*: (D) habit, (E) inflorescence, (F) detail of calyx and corolla. Photos (D)–(E) by D. Spiazzi; (A)–(C) and (F) by G. E. Ferreira.

Table 1. Morphological comparisons among *Sinningia pampeana* sp. nov., *S. sellovii*, and *S. warmingii*. Traits of *S. sellovii* and *S. warmingii* according to Ferreira et al. (2015). The most distinctive characters are in bold.

Traits/Species	<i>S. pampeana</i>	<i>S. sellovii</i>	<i>S. warmingii</i>
Stems	rarely branched	branched	branched
Petiole length (cm)	Sessile or petiole to 0.1–0.3	0.5–1.0	0.5–2.0
Leaf blade length (cm)	4.3–7.6	7.0–12.0	3.0–12.0
Leaf blade indumentum on adaxial side	puberulous	pubescent	pubescent
Flowers per inflorescence	1–2(–4)	3–9	1–3 per whorl
Flower position	horizontal	pendulous	horizontal
Calyx indument	strigose	pubescent	pubescent
Corolla colour	red	whitish-pink to lilac	salmon to red-yellowish
Corolla length (cm)	1.9–3.0	1.8–2.6	3.3–5.0
Corolla lobes	the two dorsal ca 4–6 × 2 mm long others ca 3 × 2 mm	equal, ca 2–3 × 4 mm	equal, ca 4 × 5–6 mm
Distribution	Pampa	Atlantic Rainforest	Widespread in South America

2. Corolla 3.3–5.0 cm long, the 5 corolla lobes equal.....*S. warmingii*
 – 1.9–3.0 cm long, the 2 dorsal corolla lobes larger than the others 3.....*S. pampeana*

Acknowledgements – We thank Lorena Oliveira for the preparation of the illustrations. DAS acknowledges the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) for an MSc fellowship. PHSB acknowledges the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) for an undergraduate fellowship. AOA thanks the Ministério da Ciência, Tecnologia e Inovação/Financiadora de Estudos e Projetos (MCTI/FINEP Convênio 01.25.0110). The Article Processing Charge for the publication of this research was funded by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - Brasil (CAPES) (ROR identifier: 00x0ma614).

Funding – GEF acknowledges the Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP) under grant no. 2024/22328-2. The authors also thank The Gesneriad Society for financial support through the Elvin McDonald Research Grant.

Conflict of interest – The authors declare no conflict of interest.

Author contributions

Gabriel Emiliano Ferreira: Conceptualization (lead); Formal analysis (lead); Investigation (lead); Methodology (lead); Writing – original draft (lead); Writing – review and editing (equal). **Daniel Alves Spiazzi:** Investigation (supporting); Resources (supporting). **Pedro Henrique Sonsim Barbieri:** Formal analysis (supporting); Visualization (lead); Writing – review and editing (supporting). **Alain Chautems:** Conceptualization (lead); Investigation (equal); Resources (equal); Writing – review and editing (equal). **Andréa Onofre Araújo:** Writing – review and editing (lead).

Data availability statement

Data are available from the Mendeley Data Repository: <https://doi.org/10.17632/53m3jm7fs3.1> (Ferreira et al. 2026).

References

Andrade, B. O., Marchesi, E., Burkart, S., Setubal, R. B., Lezama, F., Perelman, S., Schneider, A. A., Trevisan, R., Overbeck, G.

- E. and Boldrini, I. I. 2018. Vascular plant species richness and distribution in the Río de la Plata grasslands. – *Bot. J. Linn. Soc.* 188: 250–256.
- Andrade, B. O. et al. 2023. 12,500+ and counting: biodiversity of the Brazilian Pampa. – *Front. Biogeogr.* 115: e59288.
- Araujo, A. O., Chautems, A. and Rossini, J. 2026. *Sinningia*. – Flora e Funga do Brasil. Jardim Botânico do Rio de Janeiro. <https://floradobrasil.jbrj.gov.br/FB7879> (Accessed: 23 Feb 2026).
- Bachman, S., Moat, J., Hill, A. W., de la Torre, J. and Scott, B. 2011. Supporting Red List threat assessments with GeoCAT: geospatial conservation assessment tool. – *Zookeys* 150: 117–126.
- Beentje, H. 2010. The Kew plant glossary: an illustrated dictionary of plant terms. – Royal Botanical Gardens, Kew.
- Bonifacino, J. M. et al. 2026. Uruguay's online flora: a new resource connecting science, society, and conservation. – *Taxon* 75: e70085.
- Chautems, A., Cardoso, D. and Perret, M. 2022. Two new species of *Sinningia* (Gesneriaceae) endemic to Bahia, Brazil. – *Candollea* 77: 137–144.
- Ferreira, G. E., Chautems, A. and Waechter, J. L. 2015. Taxonomy of *Sinningia* Nees (Gesneriaceae) in Rio Grande do Sul, southern Brazil. – *Acta. Bot. Bras.* 29: 310–326.
- Ferreira, G. E., Spiazzi, D., Barbieri, P. H. S., Chautems, A. and Araújo, A. 2026. *Sinningia pampeana* sp. nov. (Gesneriaceae) from the Pampa's rocky outcrops in southern Brazil and Uruguay. – Mendeley Data, Repository, <https://doi.org/10.17632/53m3jm7fs3.1>.
- Furquim, F. F., Scasta, J. D. and Overbeck, G. E. 2024. Interactive effects of fire and grazing on vegetation structure and plant species composition in subtropical grasslands. – *Appl. Veg. Sci.* 27: e12800.
- Grattarola, F., González, A., Mai, P., Cappuccio, L., Fagúndez-Pachón, C., Rossi, F., Teixeira de Mello, F., Urtado, L. and Pincheira-Donoso, D. 2020a. Biodiversidata: a novel dataset for the vascular plant species diversity in Uruguay. – *Biodivers. Data J.* 8: 1–21.
- Grattarola, F., Martínez-Lanfranco, J. A., Botto, G., Naya, D. E., Maneyro, R., Mai, P., Hernández, D., Laufer, G., Ziegler, L., González, E. M., da Rosa, I., Gobel, N., González, A., González, J., Rodales, A. L. and Pincheira-Donoso, D. 2020b. Multiple forms of hotspots of tetrapod biodiversity and the challenges of open-access data scarcity. – *Sci. Rep.* 10: 22045.
- Gesneriaceae Resource Centre (GRC) 2026. – Royal Botanic Garden Edinburgh. <https://padme.rbge.org.uk/GRC> (Accessed: 23 Feb 2026).

- Grela, I. A. and Brussa, C. A. 2005. *Sinningia macrostachya* (Lindl.) Chautems, nuevo registro de gesneriaceae para la flora del Uruguay. – *Iheringia. Ser. Bot.* 60: 249–252.
- Hinoshita, L. K. R., de Araújo, A. O., Chautems, A. and Goldenberg, R. 2024. Flora of *Sinningia* (Gesneriaceae) in the state of Paraná, Brazil. – *Rodriguesia* 75.
- IBGE 2019. Mapa de biomas e sistema costeiro- marinho do Brasil. – www.ibge.gov.br.
- MapBiomas Project 2022. Collection 8 of the annual series of land cover and land use Maps of Brazil. Available online: <https://plataforma.brasil.mapbiomas.org/> (Accessed: 23 Feb 2026).
- Marchesi, E., Mailhos, A. and Bonifacino, J. M. 2026. Gesneriaceae Rich. & Juss. – In: Marchesi, E., Mailhos, A. and Bonifacino, J. M. (eds), *Flora Uruguaya: flora vascular del Uruguay*. ISSN 3121-2050, V1.0. [Data set] 13-01-2026, Zenodo. <https://doi.org/10.5281/zenodo.18278454>.
- Ogutcen, E., Christe, C., Nishii, K., Salamin, N., Möller, M. and Perret, M. 2021. Phylogenomics of Gesneriaceae using targeted capture of nuclear genes. – *Mol. Phylogenet. Evol.* 157: 107068.
- Overbeck, G. E., Vélez-Martin, E., Scarano, F. R., Lewinsohn, T. M., Fonseca, C. R., Meyer, S. T., Müller, S. C., Ceotto, P., Dadalt, L., Durigan, G., Ganade, G., Gossner, M. M., Guadagnin, D. L., Lorenzen, K., Jacobi, C. M., Weisser, W. W. and Pillar, V. D. 2015. Conservation in Brazil needs to include non-forest ecosystems. – *Divers. Distrib.* 21: 1455–1460.
- Overbeck, G. E. et al. 2022. Placing Brazil's grasslands and savannas on the map of science and conservation. – *Perspect. Plant Ecol. Evol. Syst.* 56: 125687.
- Perret, M., Chautems, A. and Spichiger, R. 2006. Dispersal–vicariance analyses in the tribe Sinningieae (Gesneriaceae): a clue to understanding biogeographical history of the Brazilian Atlantic Forest 1. – *Ann. Missouri Bot. Gard.* 93: 340–358.
- Perret, M., Chautems, A., Spichiger, R., Barraclough, T. G. and Savolainen, V. 2007. The geographical pattern of speciation and floral diversification in the neotropics: the tribe Sinningieae (Gesneriaceae) as a case study. – *Evolution* 61: 1641–1660.
- Perret, M., Chautems, A., De Araujo, A. O. and Salamin, N. 2013. Temporal and spatial origin of Gesneriaceae in the New World inferred from plastid DNA sequences. – *Bot. J. Linn. Soc.* 171: 61–79.
- Weber, A., Clark, J. L. and Moeller, M. 2013. A new formal classification of Gesneriaceae. – *Selbyana* 31: 68–94.