



Justicia cordifolia, a new combination in Brazilian Acanthaceae

LUÍS ADRIANO FUNEZ^{1,3*} & DENISE MONTE BRAZ^{2,4}

¹ Programa de pós-graduação em Biologia de Fungos, Algas e Plantas, Depto. Botânica, Universidade Federal de Santa Catarina, Campus Trindade, 88040-900, Florianópolis, SC, Brazil

² Departamento de Botânica, Instituto de Ciências Biológicas e da Saúde, Universidade Federal Rural do Rio de Janeiro, BR-465, km 7, 23890-000, Seropédica, RJ, Brazil

³ ✉ lfunezz@gmail.com; <https://orcid.org/0000-0002-0008-1061>

⁴ ✉ dmbraz@ufrj.br; <https://orcid.org/0000-0001-6104-1971>

*Author for correspondence: ✉ lfunezz@gmail.com

Abstract

Sericographis cordifolia is reinstated and a new combination *Justicia cordifolia* is proposed when transferred to *Justicia*. Additionally, a detailed morphologic description for this species, field photographs, taxonomic and nomenclatural comments, and species conservation status assessed according to IUCN criteria are provided.

Key words: Atlantic rainforest; Acanthoideae; Justicieae; morphology; nomenclature; taxonomy; threatened species

Introduction

Justicia Linnaeus (1753: 15) is the largest genus in family Acanthaceae comprising about 600 species worldwide (Ezcurra 2002, Kiel *et al.* 2018). In Brazil, there are 158 species, of which 94 are endemic and 63 are in the Atlantic Forest (Flora do Brasil 2020). *Justicia* is characterized by the bilabiate corolla, with the upper lip slightly bilobed and the lower lip 3-lobed, two stamens with unequal, asymmetrical or divergent bithecae anthers, and the capsule clavate with sterile base and four ovules, attached to the modified hookshaped funiculum (retinaculum) (Graham 1988).

There is a great lack of systematic studies for this genus in Brazil, limited to the studies done by Ezcurra (2002), who reviewed the genus for southern South America, and by Côrtes & Rapini (2013), who treated the tribe Justicieae for part of the Northeastern region of Brazil. Wasshausen & Smith (1969) recognized 18 species of *Justicia*, including cultivated and some synonymized species for Santa Catarina State in a volume of “Flora Ilustrada Catarinense”. Currently, 17 species are recognized in this State (Flora do Brasil 2020). Thus, the discovery of new species is not surprising (Côrtes & Rapini 2011, Braz 2015, Silva & Kameyama 2019, Alcantara *et al.* 2020). Furthermore, because of the several generic epithets synonymized under *Justicia*, some new combinations have been made (Graham 1988), but many are still necessary. In the present work, a new combination is proposed below.

Material and methods

Field work was conducted in Santa Catarina State and its neighbouring areas in southern Brazil from 2008 to 2019. Specimens of *Justicia* were studied from the following Brazil herbaria: FLOR, FURB, JOI, RB and US (acronyms follow Thiers 2020), and also collections from European herbaria available in specific sites in the world net (B, K, M, GZU). Laboratory and plant morphology analyses were carried out at Department of Natural Sciences, Universidade Regional de Blumenau, and at Department of Botany, Universidade Federal Rural do Rio de Janeiro. The description terminology follows Ezcurra (2002), Wasshausen & Wood (2003) and other works on the family. The extent of occurrence (EOO) and area of occupancy (AOO) was calculated using GeoCAT (Bachman *et al.* 2011). The conservation status assessment followed the IUCN Standards and Petitions Subcommittee (2017) criteria.



FIGURE 1. Holotype of *Justicia cordifolia* (RB 58492). With permission by Rafalela Campostrini Forzza, from Jardim Botânico do Rio de Janeiro (RB Herbarium).

Nomenclature

Justicia cordifolia Rizzini (1952: 194) Funez & Braz, *comb. nov.* \equiv *Sericographis cordifolia* Rizzini (1952: 194) **Type**:—BRAZIL.

PARANÁ: “Habitat ad viam Arraial, Botafogo, Morretes”, 28 July 1946, *G. Hatschbach* 339 (holotype: RB! bacordes RB 58492) [Fig. 1]; isotypes: RB barcodes RB76947, US barcode US2282232). (Fig. 2)



FIGURE 2. *Justicia cordifolia*. **A.** Inflorescence. **B.** Bracts and calyx lobes. **C.** Leaf blade. **D.** Stems.

Description:—Shrubs 0.5–1.7 m high, stem 0.2–0.4 cm diameter, younger parts densely reddish-hispid to glabrous in older parts, quadrangular, woody at base. Leaves petiolate, membranaceous; petioles 15–55 mm, densely hispid; blades 35–125 × 24–59 mm, elliptic, apex acute to acuminate, base obtuse to cordate, hispid on both surfaces, cystoliths linear, conspicuous on both surfaces, secondary veins 5–7 pairs, brochidodromous. Inflorescences in terminal and axillary pedunculate cymes, 3–5-flowered, 44–73 mm long; peduncle 11–15 mm long; rachis reddish-hispid; bracts 11–17 × 3–9 mm, green, spatulate, hispid, reddish; bracteoles 10–11 × 2–3 mm, green, spatulate, hispid, reddish. Flowers subsessile; pedicel to ca. 1 mm; calyx green, 5-lobed to ca. 1.5 mm above base, lobes 6–8 × 1.1–1.2 mm, subulate, hispid; corolla orange, 3.7–4.3 cm long, sparsely glandular, bilabiate, upper lip triangular, 1.0–1.4 cm long, 0.6–0.9 cm wide at base, 2-lobed, lobes ca. 0.5 mm long, lower lip 3-lobed, lobes oblong, 12–14 × 5–6 mm, apex truncate; stamens 2; filaments 3.2–3.5 mm long, inserted 1.4 cm above the corolla base, fused to corolla 1.4–1.6 cm, glabrous, anthers 2.6–2.9 × 1 mm, glabrous, thecae almost superposed, falciform, similar in shape, not appendaged; nectariferous disk expanded, ca. 0.8 mm tall; ovary deltoid, 1.2–1.5 mm long, 0.5–0.6 mm diameter, glabrous, style ca. 4.0 cm long. Capsules and seeds not seen.

Distribution and habitat:—This species has a restrict distribution between southern Paraná State, from Piraquara municipality to Vale do Itajaí region, up to northern Santa Catarina State, in Rio dos Cedros municipality. This species was only collected in the understory of pristine Atlantic rainforest.

Conservation status:—*Justicia cordifolia* has an extent of occurrence (EOO) of 5,050 km², and an area of occupancy (AOO) of 56 km². Because this species grows in very fragmented habitat and was not recorded in any environmentally protected area, it is assessed to be Endangered (EN: B2 ab iii,iv,v) according to IUCN categories and criteria (IUCN 2017).

Additional specimens examined:—BRAZIL. PARANÁ: Guaratuba: Serra de Araraquara, 25 June 1968, *G. Hatschbach* 19426 (K). Morretes: Estrada Graciosa, Alta da Serra, 30 July 1968, *G. Hatschbach* 19756 (RB). Morretes, 21 July 1985, *J. Cordeiro* 107 (HEPH, ASU). Piraquara: Mananciais da Serra, 30 March 2003, *M.G. Caxambú* 63 (HCF). 6 July 2002, *R. Goldenberg* & *P. Labiak* 576 (UPCB). 25 June 1968, *L.T. Dombrowski* & *P. Schrerer Neto*

7505 (MBM). SANTA CATARINA: Corupá: RPPN Emílio Fiorentino Batistella, 10 August 2007, *A.L. Gasper et al.* 531 (FURB). UA 2/951 IFFSC, 29 July 2017, *A. Kassner-Filho, D. Santos, G. Bollmann & D.A. Silva* 607 (FURB). Garuva: Monte Crista, rio do Cristo, 20 July 2006, *F.C.S. Vieira* 1812 (JOI). Jaraguá do Sul: Morro da Antena, 28 May 2018, *A. Kassner-Filho* 2897 (FURB). Joinville: Barragem do 8º Santo, Serra do Piraí, 18 August 2010, *A. Korte & A. Kniess* 4070 (FURB). Cubatão, 6 July 2010, *T.J. Cadorim, B. Grosch & C.P. Lopes* 2914 (FURB). Serra Queimada, 19 August 2010, *A. Korte & A. Kniess* 4148 (FURB). Massaranduba: Morro da Boa Vista, 24 July 2016, *P. Schwirkowski* 1784 (FURB). Rio dos Cedros: Vale dos Ventos, 23 April 2018, *L.A. Funez & A.E. Zermiani* 7699 (FURB).

Notes:—This species was originally described as *Sericographis cordifolia* by Rizzini (1952) based on the specimens collected from Morretes Municipality, State of Paraná. Since then, few specimens were collected in Paraná and Santa Catarina States. *Sericographis* Nees von Esenbeck (1847: 107) was synonymized under *Justicia* by Graham (1988). Although the name *Justicia cordifolia* B. Heyne in Wallich (1830: n. 2482) was proposed for another species of the genus *Justicia*, this name is a *nomem nudum*, and not validly published. Thus, this epithet “cordifolia” available to the new combination *Justicia cordifolia* (Rizzini) Funez & Braz according to Art. 53.1 of the *International code of Nomenclature for algae, fungi and plants* (Turland et al. 2018).

Sericographis cordifolia was erroneously synonymized under *Justicia brasiliensis* Roth (1821: 17) by Ezcurra & Kameyama (2008) in *Catálogo de las plantas vasculares del Cono Sur*. Nevertheless, they are quite distinct species as pointed out by Profice (2010). *Justicia cordifolia* can be easily distinguished from *J. brasiliensis* by its quadrangular stems, covered by dense reddish hispid trichomes; leaf blades elliptic, densely hispid, base cordate; inflorescences terminal and axillary; bracts and bracteoles spatulate, densely hispid; anthers with appendage absent, whereas *Justicia brasiliensis* has cylindrical and glabrous or glabrescent stems, leaf blades elliptic-lanceolate, base cuneate, inflorescences axillary, bracts and bracteoles subulate, glabrous or glabrescent, anthers with thecae basally appendiculate.

Acknowledgements

The authors thank to Rafalela Campostrini Forzza (Jardim Botânico do Rio de Janeiro) and Paula Moraes Leitman (Reflora project) for sending the digital images of the holotype of *Justicia cordifolia* for our studies. This work was supported by the CNPq / Capes / FAPs / BC-Fundo Newton / PELD nº 15/2016 and FAPESC / 2018TR0928.

References

- Alcantara, C., Soares, G., Santos, F.A.R. & Alves, M. (2020) A new species of *Justicia* (Acanthaceae: Acanthoideae: Justiceae) from northeastern Brazil. *Systematic Botany* 45(2): 328–333.
<https://doi.org/10.1600/036364420X15862837791177>
- Bachman, S., Moat, J., Hill, A.W., de la Torre, J. & Scott, B. (2011) Supporting Red List threat assessments with GeoCAT: Geospatial conservation assessment tool. *ZooKeys* 150: 117–126.
<https://doi.org/10.3897/zookeys.150.2109>
- Braz, D.M. (2015) *Justicia paracambi*, a new Brazilian species of Acanthaceae. *Phytotaxa* 236(2): 184–190.
<http://dx.doi.org/10.11646/phytotaxa.236.2.7>
- Côrtes, A.L.A. & Rapini, A. (2011) Four new species of *Justicia* (Acanthaceae) from the Caatinga biome of Bahia, Brazil. *Kew Bulletin* 66: 453–461.
<https://doi.org/10.1007/s12225-011-9295-7>
- Côrtes, A.L.A. & Rapini, A. (2013) Justiceae (Acanthaceae) do Semiárido do Estado da Bahia, Brasil. *Hoehnea* 40(2): 253–292.
<http://dx.doi.org/10.1590/S2236-89062013000200003>
- Ezcurra, C. (2002) El género *Justicia* (Acanthaceae) en Sudamérica Austral. *Annals of the Missouri Botanical Garden* 89: 225–280.
<https://doi.org/10.2307/3298565>
- Ezcurra, C. & Kameyama, C. (2008) Acanthaceae. In: Zuloaga, F.O., Morrone, O., Belgrano, M.J. (Eds.) *Catálogo de las plantas vasculares del Cono Sur* (Argentina, sur de Brasil, Chile, Paraguay y Uruguay). *Monographs in Systemic Botany Missouri Botanical Garden* 107: 985–1006.
- Flora do Brasil (2020) *Jardim Botânico do Rio de Janeiro*. Available from: <http://floradobrasil.jbrj.gov.br/>. (Accessed on 22 October 2020)

- Graham, V.A.W. (1988) Delimitation and infra-generic classification of *Justicia* (Acanthaceae). *Kew Bulletin* 43(4): 551–624.
<https://doi.org/10.2307/4129957>
- IUCN Standards and Petitions Sub-committee (2017) Guidelines for using the IUCN Red List categories and criteria. Version 13. Available from: <http://www.iucnredlist.org/documents/RedListGuidelines.pdf> (accessed 22 October 2020)
- Kiel, C.A., Daniel, T.F. & McDade, L.A. (2018) Phylogenetics of New World ‘justicioids’ (Justicieae: Acanthaceae): major lineages, morphological patterns, and widespread incongruence with classification. *Systematic Botany* 43(2): 459–484.
<https://doi.org/10.1600/036364418X697201>
- Linnaeus, C. (1753) *Species Plantarum* 1. Impensis Laurentii Salvii, Stockholm, 560 pp.
- Nees von Esenbeck, C.G.D. (1847) Acanthaceae. In: Martius, K.P., Eichler, A.G. & Urban, I. (Ed.) *Flora brasiliensis* 9. F. Fleischer, Lipsiae. pp. 1–164.
- Proffice, S.R. (2010) Novas combinações para espécies brasileiras de Acanthaceae. *Rodriguésia* 61(sup.): S85–S88.
<https://doi.org/10.1590/2175-7860201061138>
- Rizzini, C.T. (1952) Acanthacearum delectus Brasiliensium. *Dusenya* 3: 181–196.
- Roth, A.W. (1821) *Novae Plantarum Species praesertim Indiae Orientalis*. Sumptibus H. Vogleri, Halberstadii, 400 pp.
- Silva, F.A., Gil, A.S.B. & Kameyama, C. (2019) *Justicia carajensis*, a new species of Acanthaceae from the Serra dos Carajás, Pará, Brazil. *Phytotaxa* 388 (4): 266–274.
<https://doi.org/10.11646/phytotaxa.388.4.2>
- Thiers, B. (2020) *Index Herbariorum: a global directory of public herbaria and associated staff*. New York Botanical Garden’s Virtual Herbarium. Available from: <http://sweetgum.nybg.org/science/ih> (accessed 22 October 2020).
- Turland, N.J., Wiersema, J.H., Barrie, F.R., Greuter, W., Hawksworth, D.L., Hereunder, P.S., Knapp, S., Kusber, W.H., Li, D.Z., Marhold, K., May, T.W., McNeill, J., Monro, A.M., Prado, J., Price, M.J. & Smith, G.F. (2018) *International code of Nomenclature for algae, fungi and plants (Shenzhen code)*. Regnum Vegetabile 159. Koeltz Botanical Books, Glashütten, 254 pp.
<https://doi.org/10.12705/Code.2018>
- Wasshausen, D.C. & Smith, L.B. (1969) Acanthaceae. In: Reitz, R. (Ed.) *Flora Illustrada Catarinense*. Herbário Barbosa Rodrigues, Itajaí. 134 pp.
- Wasshausen, D.C. & Wood, J.R.I. (2003) Notes on the genus *Justicia* in Bolivia. *Kew Bulletin* 58: 769–831.
<https://doi.org/10.2307/4111199>