

Ruellia capixaba (Acanthaceae, Acanthoideae), a new scandent species from espírito santo state, with taxonomic updates for other *Ruellia* of the Atlantic Forest of Brazil

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Abstract

Ruellia is the second most species-rich genus in the family Acanthaceae, comprising approximately 375 species that are primarily distributed in tropical and subtropical regions. In Brazil, 104 species of the genus are recorded, occurring across all biomes. The Atlantic Forest, recognized as a biodiversity hotspot, harbors 24 species of *Ruellia*, despite ongoing threats such as deforestation. In this paper, we describe and illustrate the new species *Ruellia capixaba*, endemic to the Atlantic Forest in Espírito Santo State, Brazil. We also propose a new name, *Ruellia fatimae*, for a red-flowered, scandent species transferred from the genus *Stephanophysum*, lectotypify *Ruellia furcata*, another species endemic to this biome, and provide an identification key to the scandent species of *Ruellia* occurring in the Brazilian Atlantic Forest.

Keywords Conservation · Flora of Brazil · Lamiales · new taxon · Ruelliae · taxonomy.

Introduction

The Acanthaceae (Lamiales) comprises 191 genera and ca. 4,900 species, distributed worldwide and commonly found in tropical and subtropical regions (Scotland & Vollesen, 2000; McDade et al., 2008; Manzitto-Tripp et al., 2022). In Brazil, there are 35 genera and 508 species, the majority of which occur in the Atlantic Forest, the Amazon Rainforest, and the Cerrado of central and southeastern Brazil (Flora e Funga do Brasil, 2025).

The morphology of Acanthaceae is highly diverse, with species predominantly represented by herbs, subshrubs, shrubs, and lianas, and rarely trees. Leaves are opposite and decussate, rarely verticillate. Flowers are axillary or arranged in distinctive inflorescences, such as spikes, racemes, dichasium and panicles, often accompanied by colorful and showy bracts. Calyces are gamosepalous, with segments fused at the base, sometimes reduced to a ring-shaped structure. Corollas are zygomorphic, typically pentamerous, frequently labiate to bilabiate. Fruits are usually capsules, explosively dehiscent, with seeds sustained by retinacula (i.e., a woody hook-like structure), and rarely drupaceous (Wasshausen & Wood, 2004; Flora e Funga do Brasil, 2025). This remarkable morphological diversity is largely the result of homoplasy, which has historically

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led to similar traits appearing in unrelated lineages (Manzitto-Tripp et al., 2022). Consequently, classifications have shifted considerably, from Lindau's (1895) subfamilial system (Acanthoideae, Nelsonioideae, Thunbergioideae, and Mendoncioideae) to later revisions that added or removed subfamilies, tribes, and subtribes (Bremekamp, 1965; Hedrén et al., 1995; Scotland & Vollesen, 2000; McDade et al., 2008). With the advent of molecular phylogenetics, however, a more stable framework has emerged. These studies confirmed the inclusion of Avicenniaceae within Acanthaceae as the subfamily Avicennoideae, previously treated as part of Verbenaceae and Avicenniaceae. (Schwarzbach & McDade, 2002; Daniel, 2016; Manzitto-Tripp et al., 2022) as well the family Mendonciaceae, reclassified as the tribe Mendoncieae, under the subfamily Thunbergioideae (Scotland & Vollesen, 2000; Manzitto-Tripp et al., 2022). Today, Acanthaceae is considered monophyletic, comprising four subfamilies: Acanthoideae, Avicennoideae, Nelsonioideae and Thunbergioideae (Manzitto-Tripp et al., 2022). Acanthoideae is the richest and most diverse subfamily, represented by 4,450 species. It can be recognized by its loculicidal, capsular fruits with seeds attached to the retinacula and by the presence of cystoliths in stems and leaves (this latter feature absent only in the tribes Acantheae and Physacanthae) (Manktelow, 2000; Tripp, 2007; Tripp et al., 2013; Manzitto-Tripp et al., 2022).

Ruellieae is the second most diverse tribe of Acanthaceae, comprising 37 genera and approximately 1,200 species and having a pantropical distribution (Manzitto-Tripp et al., 2022). Diagnostic traits of tribe Ruellieae include corollas with left-contorted aestivation, four stamens that are fused at the base forming a filament curtain (a physical partition within the corolla created by the adnation at the base of the filaments of a pair of stamens), unequal filiform stigma lobes, and seeds bearing hygroscopic trichomes (Manktelow, 2000; Tripp et al. 2013; Manzitto-Tripp & Daniel, 2023).

Within this tribe, *Ruellia* L. is the most diverse genus (second within the whole family), encompassing about 375 species worldwide. The genus exhibits considerable habitat and morphological diversity across tropical and subtropical regions. The genus is differentiated from other Acanthaceae by its usually deeply divided calyx lobes, zygomorphic corollas (commonly infundibular to somewhat tubular and not bilabiate), and four didynamous, bithecal, muticous anthers (Ezcurra, 1993; Tripp, 2007; Tripp et al., 2013; Manzitto-Tripp et al., 2022). It is distinguished from the related genera in the tribe, by its coarsely reticulate, triporate, and spheroidal pollen (Manzitto-Tripp & Daniel, 2023).

While the species richness of *Ruellia* is notable in Africa and Madagascar (ca. 60 spp.; Darbyshire et al., 2024; POWO, 2026), the New World can be considered the center of diversity for the genus. In the Americas, *Ruellia* is widely distributed, ranging from the United States to Argentina and

Uruguay, with the highest species richness concentrated in Mexico, Venezuela, Colombia, and Brazil (Tripp, 2007; Tripp & Tsai, 2017; Manzitto-Tripp et al., 2022; Manzitto-Tripp & Daniel, 2023). Recently, 15 monophyletic groups of New World *Ruellia* species were formally classified as sections. Some of these sections include species spanning multiple countries, but two are restricted to Brazil alone (Manzitto-Tripp & Daniel, 2023).

In Brazil, *Ruellia* is represented by 104 species, 65 of which are endemic, occurring across a wide range of vegetation types and elevations and distributed throughout all Brazilian biomes (Flora e Funga do Brasil, 2025). The Atlantic Forest is the most species-rich biome in the country, harboring 21,514 angiosperm species, of which 12,134 are endemic. Within this biome, *Ruellia* is represented by 20 species (Flora e Funga do Brasil, 2025). Recognized as one of the 34 global biodiversity conservation hotspots (Myers et al., 2000), the Atlantic Forest is situated in the most densely populated region of Brazil, with approximately 130 million inhabitants. This demographic pressure poses severe threats to its biodiversity, including deforestation and fire (de Praga Baião et al., 2023).

Despite widespread deforestation in the Atlantic Forest, the municipality of Santa Teresa, in Espírito Santo State, retains nearly 30% of its territory under native forest cover, of which 12.4% consists of primary forests (SOS Mata Atlântica, 2024). Although some forested areas have been lost to coffee cultivation (Castro & Queiroz Neto, 2009), the municipality supports several protected areas, such as the Estação Biológica de Santa Lúcia and the Reserva Biológica Augusto Ruschi. Both are strictly protected reserves that continue to serve as biodiversity refuges and yielding new species discoveries year after year (Aoyama & Indriunas, 2022; Pauli et al., 2023; Asprino et al., 2024; Rossetto et al., 2024; Zavatin et al., 2025).

During a field expedition organized by the project “Conservation of Threatened Species in a High Diversity Area in the Brazilian Atlantic Forest: Scientific Research, Public Engagement and Arts in a Synergic Action (CEAMA Project—Conservation Leadership Program)”, a specimen of *Ruellia* was collected, even though this was not part of the project's original goals. Further investigation revealed that the specimen could not be identified, which prompted a deeper study of Brazilian *Ruellia* and other Acanthaceae, particularly those occurring in the Santa Teresa region. Based on this research, we hypothesized that the specimen represented a new species of *Ruellia*. This investigation also uncovered nomenclatural issues involving two other species of the genus from the same region.

Here we describe a new scandent species of *Ruellia*, providing an illustration, photographs, a distribution map, a preliminary conservation assessment, taxonomic notes, and an identification key for all of the scandent *Ruellia* species known from the Atlantic Forest. Additionally, we propose *Ruellia fatimae* as a new name for *Stephanophysum hirsutum*

Mart. ex Nees, a scandent red-flowered species, and we lectotypify *Ruellia furcata* (Nees) Lindau.

Material & Methods

The morphological description of the new species was based on the type specimen collected in the field and stored at MBML (herbarium acronyms according to Thiers, 2023). In addition, we examined other specimens deposited at ESA, MBML, and RB using digital images available through their virtual herbaria (REFLORA, 2025; SpeciesLink, 2025). A

stereomicroscope with 10–60× magnification was used to analyze the morphological features of each specimen. Morphological terminology follows Radford et al. (1974) and Harris & Harris (2001), and Latin and Greek designations follow Stearn (2004). Morphological descriptions and taxonomic comparisons were based on Ezcurra (1993), Braz et al. (2020) and Fernandes et al. (2024). The distribution map was generated in QGIS (version 3.16; QGIS Development Team, 2021), and the preliminary risk of extinction assessment followed the categories and criteria of IUCN (2012, 2024). The area of occupancy (AOO) and extent of occurrence (EOO) were calculated using GEOCAT (Bachman et al., 2011).

Taxonomic Treatment

Identification Key to *Ruellia capixaba* and Similar Species

1. Inflorescences bearing one flower, corollas white to lilac, stamens included.....*R. jiboia* E.C.O.Chagas & Costa-Lima
1. Inflorescences 2–12-flowered, corollas red, orangish-red, fuchsia, stamens exserted or subexserted..... 2
2. Leaves glabrous..... *R. affinis* (Schrad.) T. Anderson
2. Leaves sparsely to densely pubescent on at least one surface..... 3
3. Leaves with domatia in the axils of the primary with secondary veins, corollas fuchsia, stamens subexserted.....
.....*R. capixaba* Zavatin, U.G.Fern. & Kameyama
4. Leaves densely pubescent, blades with bases cuneate to rounded, apices acute to acuminate, corollas with the expanded portion tubulose to ventricose.....
.....*R. fatimae* U.G.Fern. & Kameyama
4. Leaves sparsely pubescent, denser on main vein, blades with cuneate-attenuate bases, apices acute to slightly rounded, corollas with the expanded portion obconic.....*R. chamaedrys* (Nees) Angely

Ruellia capixaba Zavatin, U.G.Fern. & Kameyama, **sp. nov.** TYPE: Brazil: Espírito Santo, Santa Teresa, Reserva Biológica Augusto Ruschi, Interior de Mata, 19°54'10.2"S 40°32'35.9"W, 636 m, 12 Aug 2022, D. A. Zavatin, H. L. Fonseca, A. V. Suzuki, R. S. Ribeiro & E. J. Lirio 903 (holotype: MBML [!]; isotypes: to be distributed to MEXU [!], NY[!], RB[!], SP[!]). Figs. 1, 2, 3.

Diagnosis. *Ruellia capixaba* morphologically resembles *R. affinis* and *R. capotyra*, but can be distinguished by its stems bearing conspicuously swollen scars (resulting from previous inflorescences), the presence of domatia along the leaf venation, geminate flowers in the axils of terminal leaves forming a paniculate inflorescence, a fuchsia corolla, and corolla lobes with irregularly ciliate margins. *Ruellia affinis* and *R. capotyra* lack stems with swollen scars and domatia in their leaf venation, and *R. affinis* has glabrous stems and leaves, inflorescences that are usually 1–2-flowered racemes, and red corollas with regularly ciliate margins on the lobes. Despite the similar corolla color of *R. capotyra*, its lobes margins are glabrous, and its inflorescence is an axillary dichasium with second-order branches that are irregularly dichasial or monochasial.

Description. Subshrubs, scandent to lianescent, up to 4 m tall. Younger stems subquadrangular to terete, villose; older stems glabrescent, striated, with swollen scars of previous inflorescences. Leaves decussate; petioles 0.4–1 cm long; blades with sparse adpressed trichomes on the adaxial surface, glabrous on the abaxial surface, discolorous, elliptic, narrowly elliptic to lanceolate, 2–12×0.7–3.5 cm, base decurrent, margins entire subrevolute to revolute, apex acute, venation brochidodromous, primary and secondary veins prominent on both surfaces, domatia on the abaxial surface in the axils or upon the primary and secondary veins. Flowers pedicellate, geminate in the axils of terminal leaves, forming a 2–12 flowered racemose inflorescence; bracteoles 2, lanceolate with glandular trichomes; pedicel 4–6 mm long, with glandular trichomes. Calyx 2.5–2.8 cm long, not accrescent in fruit, fused portion 3–4 mm, segments equal, linear-lanceolate, 1.8–2.4×0.1–0.2 cm, apex acute, villose with glandular trichomes. Corolla, fuchsia, bent-infundibular, 4.5–6.5×1–1.2 cm, internally glabrous, externally pubescent, with glandular and non-glandular trichomes, the narrow unexpanded portion (basal tube) 2.5–2.7×0.3–0.4 cm, opening abruptly to the expanded portion (throat), obconic, 2–3.8×0.9–1.2 cm, lobes spreading, orbicular to suborbicular,

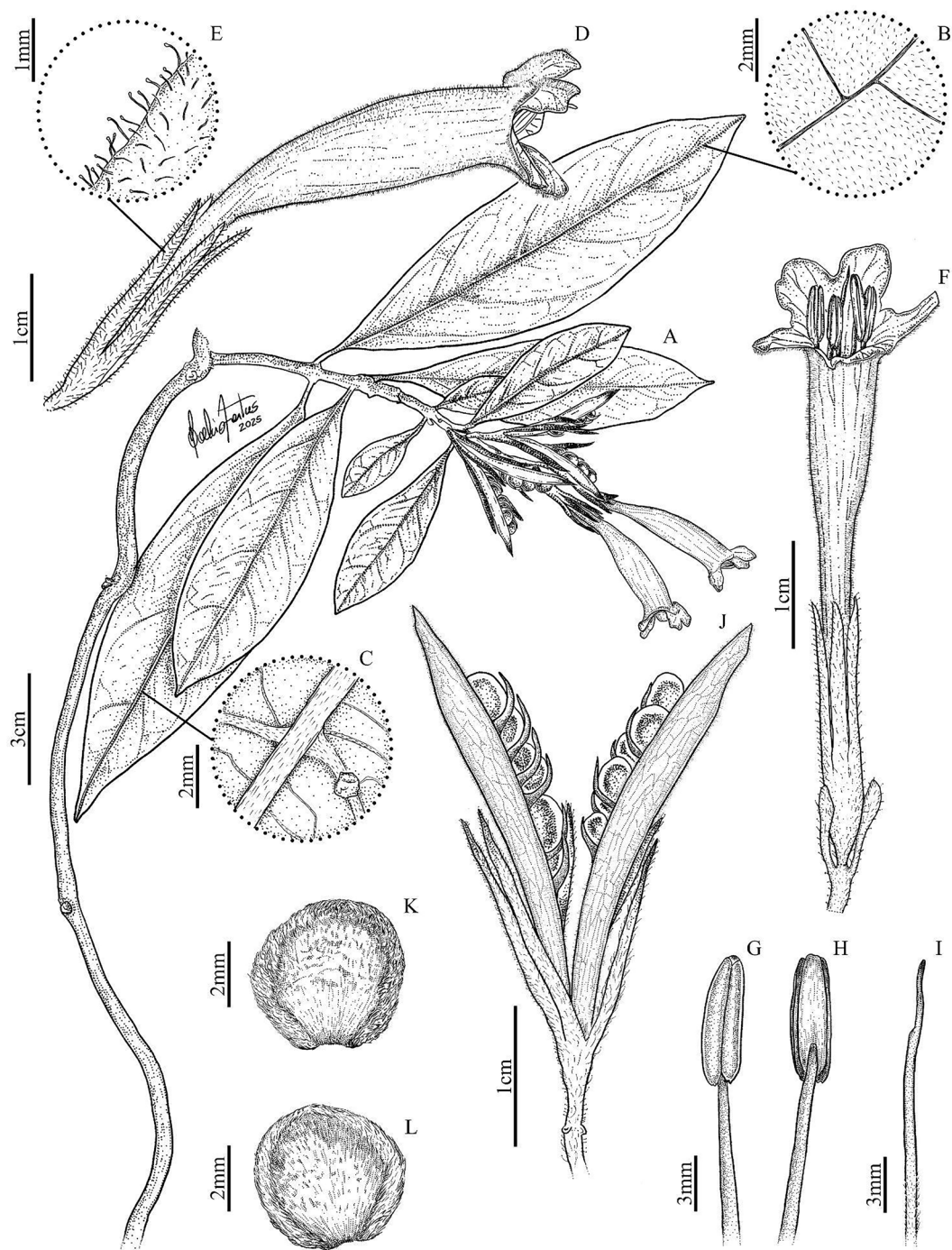


Fig. 1. *Ruellia capixaba*. **A.** Branch with inflorescence. **B.** Magnification of the adaxial surface showing the indumentum. **C.** Magnification of the abaxial surface showing a domatium upon the secondary vein. **D.** Flower in lateral view. **E.** Magnification of the calyx. **F.** Flower in frontal view. **G.** Stamen in frontal view. **H.** Stamen in posterior view. **I.** Style and stigma. **J.** Dehiscent fruit. **K.** Seed in frontal view. **L.** Seed in posterior view. (Illustrations by Joelcio Freitas.).

6–7 × 5–6 mm, internally glabrous, externally glandular and non-glandular trichomes, apices emarginate to round, irregularly ciliate with glandular and non-glandular trichomes. Stamens glabrous, subexserted, didynamous, the free portion of the longer pair of filaments 8–10 mm long, that of the shorter

pair 7–9 mm long, filament curtain glabrous, connective glabrous, anthers 7 mm long. Ovary ensiform, 6 mm long, villose; style 6 cm long, pubescent then glabrescent distally; stigma bilobed, subexserted, the anterior lobe erect, ca. 1 mm long, the posterior lobe patent, 3–4 mm long. Capsule obovoid,



Fig. 2. *Ruellia capixaba*. **A.** Plant habit. **B.** Magnification of the branch showing the bloated stems scars. **C.** Calyx. **D.** Magnification of a sepal. **E.** Flower in inferior view **F.** Flower in lateral view. **G.** Magnification of the ciliate lobes' margin. **H.** Flower in frontal view. **I.** Stamen in frontal view. **J.** Stamen in posterior view. **K.** Stamen in lateral view. **L.** Stigma and style. (A–B, photos by V.S. Faller, taken at the site of V.S. Faller & R.Z. Rocha 670; C–L, photos by D.A. Zavatin, taken at the site of D.A. Zavatin et al. 903.).



Fig. 3. *Ruellia capixaba* seen in its habitat. **A–B.** General view of the specimen in its habitat. **C.** Closer view of the specimen. (Photos by V.S. Faller.).

19–39×6–8 mm, with a solid base c. 4 mm long, the surface pubescent, retinacula 4–5 mm long; seeds 12, suborbicular, 4.5–5 mm diam., brown to dark brown, with hygroscopic trichomes restricted to the margins forming a rim around the seed.

Additional Specimens Examined. **BRAZIL.** **Espírito Santo:** Fundão, Goiapaba-Açu, início da trilha do cruzeiro, 11 Oct 2003, *A.P. Fontana & N. Toniato* 616 (MBML21992 [!]). Santa Leopoldina, RPPN Rancho Chapadão, Bragança, 20°06'38.7"S 40°33'14.8"W, 580 m, 1 Jul 2013, *A.M. Assis & J. Freitas* 3859 (MBML49242 [!]); *ibid.*, Pousada Pau-Apique, Propr. Assunta Salvador, 20°7'43"S 40°33'20.5"W, 550–660 m, 23 Oct

2007, V. Demuner, et al. 4308 (MBML32046 [!]). Santa Maria de Jetibá, Entorno da represa Rio Bonito, morro ao lado da comporta, 10 Sep 2011, E.J. Lirio et al. 337 (RB644911 [!]). Santa Teresa, Estação Biológica de Santa Lúcia, Valsugana Velha, Mata Atlântica de encosta, 500–950 m, 11 Oct 1994, C.C. Chamas & R.R. dos Santos 265 (MBML11960 [!]); ibid., 500–950 m, 30 Nov 1994, C.C. Chamas & R.R. dos Santos 312 (MBML11211 [!]); ibid., Trilha do Palmito, 500–950 m, 26 Sep 1994, C.C. Chamas & R.R. dos Santos 249 (MBML11958 [!]); ibid., L. Kollmann & E. Bausen 4554, 14 Sep 2001 (MBML15184 [!]); ibid., Propriedade do Sr. Giacomini, 600 m, 12 Nov 1984, W. Pizziolo 169 (RB36954 [!]); ibid., floresta baixo montana, 19 Sep 1988, H.Q.B. Fernandes & E. Bausen 2531 (MBML5220; RB36972 [!]); ibid., Mata Atlântica de encosta, 725 m, 20 Dec 1994, C.C. Chamas & R.R. dos Santos 344 (MBML11957 [!]); ibid., Aceiro à D, 25 Sep 1996, R.R. dos Santos 5 (RB607786 [!]); ibid., Trilha do rio, 19°58'47"S 40°32'47"W, 25 Jan 2013, A. Indriunas & E.M. Ayoama 87 (MBML45396 [!]); ibid., Trilha do Túmulo do Ruschi, 19°57'12"S 40°31'13"W, 650–660 m, 22 Jun 2023, E. Ramos & J. Freitas 710 (MBML57479 [!]); ibid., Floresta pluvial baixo montana, 6 Oct 1988, H.Q.B. Fernandes 2611 (MBML5209 [!]); ibid., Trilha do Palmiteiro, 30 Sep 1999, V. Demuner et al. 52 (MBML10930 [!]); ibid., Trilha do Rio, 19°58'55"S 40°32'46"W, 25 Jan 2013, A. Indriunas & M. Aoyama 79 (MBML45393 [!]); ibid., Mata Atlântica de encosta, 700 m, 22 Sep 1994, C.C. Chamas & R.R. dos Santos 242 (MBML11956 [!]); ibid., Valsugana Velha, 700–850 m, 21 Sep 1989, H.Q.B. Fernandes & D.C. Wasshausen 2873 (MBML5789 [!]); ibid., Trilha do Indaiaçu, 665–780 m, 2 Apr 2022, D.R. Couto et al. 5986 (MBML55627 [!]); ibid., 23 Sep 1996, R.R. dos Santos 7 (MBML12462 [!]); ibid., 500–950 m 14 Dec 1994, C.C. Chamas & R.R. dos Santos 331 (MBML11959 [!]); ibid., Trilha do Saguí próximo ao encontro com a trilha do Indaiaçu, 802 m, 5 Oct 2025, V.S. Faller & R.Z. Rocha 670 (MBML [!]); ibid., Nova Lombardia, 17 Oct 1985, H.Q.B. Fernandes 1563 (MBML1797 [!]; RB36963 [!]); ibid., 31 Oct 1984, J.M. Vimerat 243 (MBML1761, RB36984 [!]; US3237884 [!]); ibid., 17 Oct 1985, W.W. Hoffmann 254 (MBML1793 [!]); ibid., Reserva Biológica Augusto Ruschi, 800 m, 16 Oct 2001, L. Kollmann & E. Bausen 4858 (MBML15507 [!]); ibid., divida trilha da tronqueira, 4 Sep 2002, R.R. Vervloet et al. 820 (RB607428 [!]); ibid., próximo ao marco 112, seguindo o córrego, 27 Aug 2003, J. Rossini & E. Bausen 485 (MBML21483 [!]); ibid., 5 Nov 2002, R.R. Vervloet et al. 1348 (MBML18183 [!]); ibid., Goiapabo-Açu, Marco 78, 77, 76, 29 Oct 2002, R.R. Vervloet et al. 1311 (MBML18237 [!]; RB607431 [!]); ibid., Antiga Sede, Lado Esquerdo, 5 Sep 2002, R.R. Vervloet et al. 864 (MBML17883 [!]; RB607429 [!]); Reserva Biológica Nova Lombardia, 27 Sep 1993, H.Q.B. Fernandes 1512 (RB1225971 [!]; US3197607 [!]; MBML1742 [!]); ibid., 27 Sep 1993, L.C. Giordano 1558 (RB119801 [!]); Estrada para Goiapaba-Açu, depois da Reserva Biológica Augusto Ruschi, 15 Sep 2006, L. Kollmann & S. Krause 9297 (MBML28257 [!]; São Lourenço, Estação Biológica da Caixa D'água, 700 m, 5 Mar 1999, L. Kollmann et al. 2035 (MBML10195 [!]); ibid., Mata da Prefeitura, 10 Oct 1984, W.A. Hoffmann s.n (MBML1730 [!]; RB36978 [!]; US 3237874 [!]); ibid., 21 Oct 1985, W. Pizziolo 175 (RB36990 [!]; MBML1796 [!]; US 3237891 [!]); Santo Antônio, Sítio do Boza, 19°54'37"S 40°35'24"W, 780 m, 27 Nov 2006, E.J. Lucas et al. 741 (ESA053741 [!]); ibid., terreno do Boza, 19°54'23"S 40°35'25"W, 860 m, 29 Oct 2010, L. Kollmann 12,054 (MBML40586 [!]); Mata Fria, 18 Sep 1985, H.Q.B. Fernandes 1512 (MBML1742 [!]; RB36948 [!]; US3197607 [!]); ibid., 18 Sep 1985, W. Boone 786 (MBML1748 [!]; RB); Penha, Sítio do R. Pizziolo, 16 Sep 2005, L. Kollmann 8328 (MBML28168 [!]); Sítio do Zurlo, 750 m, 19 Aug 1998, L. Kollmann et al. 415 (MBML7973 [!]; RB607792 [!]); Vargem Alta, 2 Jul 1985, W. Boone 550 (MBML1750 [!]; US3197618 [!]); Várzea Alegre, Cachoeira do Madalão, 29 Sep 2006, L. Kollmann et al. 9370 (MBML29015 [!]); Trilha Bonita, 750 m, 3 Sep 1998, L. Kollmann et al. 471 (MBML8458 [!]; RB607787 [!]).

Phenology. Reproductive structures have been recorded almost all year-round. Fruiting typically occurs from January to July, while flowering is most pronounced in September and October. Evidence suggests the species may bloom twice a year, as fruits and flowers have been observed on the same specimen (L. Kollmann 12,054, MBML-40586).

Etymology. The epithet of this species is a tribute to the demonym *capixaba*, referring to the people from Espírito Santo, where the species is endemic.

Vernacular names. *Ruélia-capixaba*, *Ruélia-do-espírito-santo* (both Brazilian Portuguese).

Preliminary conservation assessment. *Ruellia capixaba* has an EOO of 597,686 km² and an AOO of 88 km², and has five known locations. The primary threat is habitat loss, as the Atlantic Forest retains only 12.4% of its original vegetation (Fundação SOS Mata Atlântica & INPE, 2021). Urban expansion, agriculture, and livestock farming contribute to fragmentation and habitat degradation. Pasturelands occupy significant portions of the municipalities where the species is found: 38.6% in Fundão, 22% in Santa Teresa, 17.5% in Santa Maria de Jetibá, and 17.3% in Santa Leopoldina (LAPIG, 2025). Additionally, increasing droughts and fires pose a serious threat to the region's endemic species (Fraga et al., 2019). These factors suggest a continuing decline in habitat quality and fragmentation, except for the species occurring within the fully protected areas of Estação Biológica de Santa Lúcia and Reserva Biológica Augusto Ruschi, which were not observed to pose threats to the species. As such, the new species qualifies for the endangered category [EN B2ab(i,ii,iii)] according to the Red List categories and criteria (IUCN, 2012, 2024).

Habitat & Distribution. Most of the specimens collected are from the protected areas of Estação Biológica de Santa Lúcia and Reserva Biológica Augusto Ruschi. *Ruellia capixaba* occurs in the Ombrophilous Low Montane Forest (Fig. 3) in the municipalities of Fundão, Santa Leopoldina, Santa Maria de Jetibá, and Santa Teresa (Fig. 4).

Similar Species & Remarks. *Ruellia capixaba* morphologically resembles *Ruellia affinis* (Schrad.) T. Anderson and *Ruellia capotyra* Braz & I. Azevedo, and all of these species occur in Espírito Santo state. There are a significant number of collected individuals of *R. capixaba*, some of which were previously identified as *R. affinis*, but *R. capixaba* can be easily separated from *R. affinis* mainly by its striated stems, villose to glabrescent (vs. sulcate and glabrous in *R. affinis*); stems scars that are conspicuous and bloated (vs. inconspicuous in *R. affinis*); the leaf adaxial surface with sparse trichomes (vs. glabrous on both surfaces, with adaxial surface lustrous in *R. affinis*); the presence of domatia on the leaf venation (vs. absent in *R. affinis*); the multi-flowered inflorescence (vs. solitary to geminate axillary flowers in *R. affinis*); the fuchsia corolla color (vs. red in *R. affinis*); the smaller size of the corolla lobes (vs. bigger in *R. affinis*); the indumentum of the corolla lobes, which is irregularly ciliate with glandular and non-glandular trichomes (vs. ciliate with glandular and non-glandular trichomes); capsules with 12 seeds (vs.

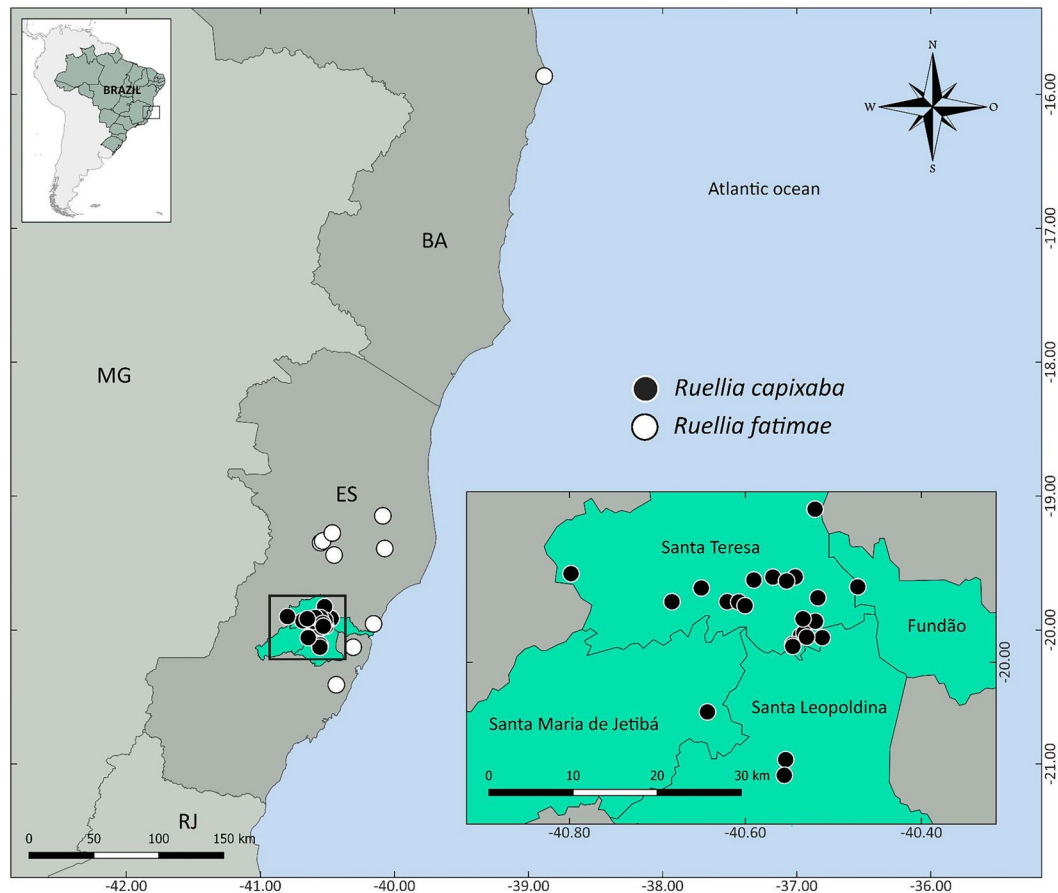


Fig. 4. Geographic distribution of *Ruellia capixaba* (black circles) and *Ruellia fatimae* (white circles). BA = Bahia, ES = Espírito Santo, MG = Minas Gerais, and RJ = Rio de Janeiro.

6–8 seeds per capsule). *Ruellia capixaba* can also be distinguished from *R. capotyra* mainly by its scandent habit (vs. shrub to subshrub); stems that are striated and villose to glabrescent (vs. slightly sulcate and glabrous in *R. capotyra*); stem scars that are present and conspicuously bloated (vs. absent in *R. capotyra*); the smaller petioles and leaves (vs. bigger in *R. capotyra*); the presence of domatia on the leaf venation (vs. absent in *R. capotyra*); corolla lobes that are glabrous internally but with densely glandular and non-glandular trichomes externally (vs. having sparse glandular and non-glandular trichomes on both surfaces in *R. capotyra*); corolla lobes with irregularly ciliate margin having glandular and non-glandular trichomes (vs. glabrous in *R. capotyra*). These and other traits are summarized in Table 1.

The combination of morphological characteristics found in *R. capixaba* (i.e., liana habit, leaves glabrous, bent-infun-dibular, fuchsia corollas, stamens subexserted, not extended beyond the limb of the corolla, and capsules obovoid and pubescent, bearing 12 seeds with hygroscopic trichomes

restricted to the margin) suggests a placement of this species in *R. sect. Brasilia* E.Tripp & T.F.Daniel (Manzitto-Tripp & Daniel, 2023), the same section that includes *R. affinis*.

Ruellia fatimae U.G.Fern. & Kameyama, **nom. nov.** *Stephanophysum hirsutum* Mart. ex Nees in Mart.. Fl. Bras. 9: 50 (1847); non *Ruellia hirsuta* Elliott (1822), nec *R. hirsuta* Vell. (1829), nec *R. hirsuta* Nees (1847), nec *R. hirsuta* T.Anderson (1868). TYPE. [Brazil:] Bahia. Belmonte, in sylvis ad Rio Belmonte, without date on sheet [1816, according to Flora Brasiliensis itinerary (Urban, 1906)], M.A.P. Wied-Neuwied s.n. (**lectotype, here designated**: BR, barcode BR0000006952174 [image!]; isolectotype: GZU, barcode GZU000250528 [image!]).

Diagnosis. Scandent shrubs to lianescent, stems quad-rangular, younger stems densely pubescent to villose, older stems glabrescent, becoming woody; leaves petiolate, blades discolored, dark green on adaxial surface, lighter on abaxial

Table 1. Comparative table indicating the main differences between *Ruellia capixaba* and the morphologically most similar species, *R. affinis* and *R. capotyra*

Characters	<i>Ruellia capixaba</i>	<i>Ruellia affinis</i>	<i>Ruellia capotyra</i>
Stems surface	striated, villose to glabrescent	slightly sulcate, glabrous	slightly sulcate, glabrous
Stem scars of the previous inflorescence	present, conspicuous bloated	present, inconspicuous	not present
Petiole length (cm)	0.4–1	0.5–2.6	3–7.2
Leaf size (cm)	2–12 × 0.7–3.5	5–16 × 3.5–7.5	11.2–17.5 × 3–4.9
Leaf indumentum	sparse adpressed trichomes on the adaxial surface and glabrous on the adaxial surface	glabrous, lustrous on adaxial surface	glabrous, sparse trichomes on the primary vein
Leaf venation domatias	present	absent	absent
Inflorescence	rachis absent, thyrses-like, 2–12 flowered per branch	rachis absent, solitary to geminate flowered	rachis present, 2–6 flowered per rachis
Pedicel length (mm)	4–6	1–2	1–1.5
Corolla colour	fuchsia	deep red	pink
Corolla size (cm)	4.5–6.5 × 1–1.2	7.5–9.5 × 0.8–1	5–6.7 × 0.6–0.8
Corolla lobes length (cm)	0.6–0.7 × 0.5–0.6	3–4.5 × 3–4.2	0.7–1.5 × 0.9–1.3
Corolla lobes indumentum	glabrous internally, with densely glandular and nonglandular trichomes externally	glabrous internally, glandular and non glandular trichomes externally	sparse glandular and nonglandular trichomes on both surfaces
Corolla lobes margin indumentum	irregularly ciliate with glandular and nonglandular trichomes	ciliate with glandular and nonglandular trichomes	glabrous
Number of seeds per capsule	12	6–8	6–8
Mature seeds indumentum	trichomes covering the entire surface	trichomes restricted to the margins	trichomes covering the entire surface

surface, ovate, bases rounded, margins slightly sinuose, apices acute to acuminate, venation eucamptodromous becoming brochidodromous distally, densely pubescent, denser on abaxial surface and on the primary vein; Inflorescence reduced axillary dichasium that bears 1–2 flowers; bracts 2, ovate, lanceolate to narrowly elliptic, densely pubescent with eglandular trichomes; calyx pubescent, segments lanceolate to narrowly elliptic, apices acute, densely pubescent with eglandular trichomes; corolla red or pinkish-red to orangish-red, bent-infundibular pubescent, the narrow unexpanded portion (basal tube) opening abruptly to the expanded portion (throat), tubulous to slightly ventricose, lobes spreading, elliptic to ovate, apices emarginated to rounded; stamens exerted; style reddish-pink; capsules not seen.

Additional Specimens Examined. **Espírito Santo:** Linhares. Reserva Natural Vale, Estrada Jueirana Facão, 19°08'50.6"S 40°05'12.2"W, 44 m, 26 Jul 2013, A. Indriunas et al. 95 (RB00853546 [!]; CVRD 14466 [!]); *ibid.*, Área 133 P14, Estrada Municipal do MME, 30 Sep 2004, D.A. Folli, 4949 (RB00853540 [!]; CVRD 8922); *ibid.*, Jueirana Facão, 13 Dez 2008, D.A. Folli, 6257 (RB00853543 [!]; CVRD 12030); *ibid.*, Estrada Jueirana Facão, –19,147207° –40,086324°, 31 m, 18 Sep 2007, G.S. Siqueira, 351 (RB00853538 [!]; CVRD 10454), Marilândia, Liberdade (Água Viva, Pedra do Cruzeiro), 19°20'53.7"S 40°33'03.6"W, 150–850 m, 13 Jul 2006, V. Demuner et al. 2614 (RB00569845 [!]; MBML27315 [!]); Serra. Mestre Álvaro. Trilha Principal, 5 Sep 2012 (VIES040161 [!]). Santa Cruz. Aldeia Candeias Velha., 13 Oct 1995, M.A. Assis, 650 (SPF127510 [!]; HRCB). Marilândia, Parcela 14 para os estudos do EIA do Mineroduto Morro do Pilar/MG—Linhares/ES, 19°26'24" S 40°27'0" W, 21 Jul 2012, E.M. Saddi et al. 804 (RB00780798 [!]), *ibid.*, Liberdade, propr.: Sonia (Reinaldo

Bautz), 19°20'8"S 40°32'8"W, 400–550 m, 14 Jun 2007, V. Demuner 4276 (MBML030316 [!]). Viana. Tanque. 20°24'31" S 40°26'1" W, 20 m, 12 Nov 2020, A.M. Assis & R.S. Cribari 4911 (VIES 56695 [!]). Governador Lindenberg, Santa Luzia, Firmino, 19°16'33"S 40°27'48"W 350–650 m, 2 Aug 2007, R.R. Vervloet et al. 3143 (MBML31005 [!]).

Phenology. *Ruellia fatimae* has been collected with flowers from June to December.

Etymology. The specific epithet honours the memory of the late Fátima Otavina de Souza-Buturi, a Brazilian botanist and dear friend, who inspired and mentored several biologists and botanists, including the first and the last authors of this manuscript.

Preliminary Conservation Assessment. *Ruellia fatimae* has an EOO of 16,073 km² and an AOO of 40 km², based on specimens collected in seven localities of Espírito Santo and Bahia states. A formal assessment has not been conducted, but considering that this species is under the same threats as *R. capixaba*, *R. fatimae* would probably be categorized as endangered [EN B1ab(iii) + B2ab(ii,iii)] according to IUCN criteria (IUCN, 2012; 2024).

Habitat & Distribution. *Ruellia fatimae* has mostly been collected in Espírito Santo state (Fig. 4) except for the type specimen, which was collected in the municipality of Belmonte, Bahia. This species occurs in Ombrophilous Low Montane Forest (Tabuleiro Forest) and Ombrophilous Montane Forest, in forest borders and riparian forests. The

Tabuleiro Forest is a lowland seasonal forestry physiognomy that occurs along part of Brazilian coast, from Rio de Janeiro to Amapá state, at elevations up to 200 m, covering a coastal sedimentary deposit of the Barreiras formation (Rizzini, 1963), dated from the late Pliocene and early Pleistocene (Garay & Rizzini, 2003; Fontana et al., 2016).

The *Tabuleiro* Forest occurs on coastal plateaus characterized by flattened tops and steep marginal slopes, often dissected by deep valleys. These areas host seasonally dry tropical forests, which exhibit a complex forest structure and high levels of biodiversity compared to other Atlantic Forest coastal environments. The species richness is primarily composed of semideciduous and deciduous trees. In contrast, this physiognomy displays low epiphyte diversity (Rizzini, 1963) when compared to other Atlantic Forest formations, such as Ombrophilous Dense Forest, Restinga, and Mangroves, which are characterized by a higher frequency of evergreen species and a greater abundance of epiphytes.

Similar Species & Remarks. *Ruellia fatimae* is a scandent shrub, densely pubescent to villose on the stems, leaves, inflorescences, and calyces. The inflorescences are axillary, 1–2-flowered reduced dichasia, with tubulose to ventricose red corollas. This species resembles two other red-flowered scandent species, *R. affinis* and *R. chamaedrys* (Nees) Angely, which also occur in the Atlantic Forest. It differs by its leaves, with a densely pubescent to villose indumentum (vs. glabrous in *R. affinis*, and sparsely pubescent in *R. chamaedrys*), the leaf blades, with cuneate to rounded bases (vs. cuneate-attenuate bases in *R. chamaedrys*), and the corollas, with the unexpanded portion of the corolla tubulose to ventricose (vs. unexpanded portion of the corolla not ventricose).

Considering the morphological characteristics cited above, the placement of *Ruellia fatimae* matches that of *R. sect. Brasilia* E. Tripp & T.F. Daniel.

Taxonomic Notes. *Stephanophysum hirsutum* Mart. ex Nees was described by Nees, in Martius' (1847) *Flora Brasiliensis*. In Engler's *Die Natürlichen Pflanzenfamilien*, Lindau (1895) transferred several species of the genus *Stephanophysum* to *Ruellia*, but not this one. A new combination in *Ruellia* based on the basionym *S. hirsutum* would be rejected as a later homonym because this name is already occupied (ICN Article 53.1, Madrid Code, Turland et al., 2025). Considering Article ICN 11.4.c "the final epithet of the next earliest legitimate name at the same rank is to be used instead or, if there is no final epithet available, a replacement name or the name of a new taxon may be published.". This being the case, we propose a new name.

Ruellia furcata (Nees) Lindau, Nat. Pflanzenfam. 4, Abt. 3b: 310 (1895). *Dipteracanthus furcatus* Nees in Mart. Fl.

Bras. 9: 34 (1847). TYPE: [Brazil:] n.l., n.d., *Sellow s.n.* (**lectotype, here designated:** GZU, barcode 000249510 [image!]); isolectotypes: B [probably destroyed] [image!] at F, F5922!], K, barcode K000534156 [image!]).

Taxonomic Notes. *Ruellia furcata* (Nees) Lindau is an erect to prostrate, pubescent to villose subshrub with subsessile inflorescences, and flowers with white to pale lilac corollas occurring in Bahia, Espírito Santo, and Rio de Janeiro states. This species is similar to *Ruellia solitaria* Vell., which is sympatric from northern Rio de Janeiro to southern Bahia. It differs mainly by the indument of the stem, leaves, and bracteoles, which are glabrous or rarely sparsely puberulent in *R. solitaria*.

Nees von Esenbeck (1847a, b) described this species in Martius' *Flora Brasiliensis*, as *Dipteracanthus furcatus* Nees. Later, the species was transferred to *Ruellia*, with the new combination *Ruellia furcata*, by Lindau (1895) in Engler's *Die Natürlichen Pflanzenfamilien*.

In Nees' (1847) protologue, a specimen collected by Sellow in "*australioribus Brasiliae*", without specific location, was cited. In the same year, in de Candolle's *Prodrromus Systematis Naturalis*, Nees made a more detailed and complete taxonomic treatment for the species of Acanthaceae from all over the world. In this work, he clearly indicated that the type specimen of *D. furcatus* description was housed at Herbarium Berolinensis (B).

Considering that this specimen was probably destroyed during World War II (Field Museum image F5922), we here designate the specimen with Nees' handwriting housed at GZU as the lectotype.

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Authors' contributions

All authors contributed to the production of this work across various stages. DAZ collected the type specimen, made the species description, led the writing of the manuscript, conducted identifications of online specimens, and produced both the botanical plates and a portion of the photographs. JF and EJJ generated the distribution map and conducted the conservation status assessment; they also provided the description of the fruit based on material curated at their institution. VSF performed recent field collections and photographed the species' habit and habitat. JP reviewed the original draft, focusing on language, typification, and nomenclature. CK and UGF supervised the study, reviewed the manuscript, designated the lectotypes, and contributed to the writing of the text.

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Declarations

Conflict of interest

The authors declare that they have no known competing interests that could be perceived to have compromised the objectivity or integrity of the work reported in this paper.

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