Heringeriana
Jardim Botânico de Brasília
https://revistas.jardimbotanicodf.org/index.php/heringeriana
ISSN 2359-165X

Artigo Original

Going underground: another geoxylic species of *Psidium* (Myrtaceae) is discovered in the Cerrado biome

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Received 10 October 2025 | **Accepted** 09 February 2026 | **Published** 13 March 2026

Citação: Proenca, C. E. B. & Conceição, L. H. S. de M. (2026). Going underground: another geoxylic species of *Psidium* (Myrtaceae) is discovered in the Cerrado biome. Heringeriana, 19ib, e918080. doi.org/10.70782/heringeriana.v19ib.918080

Abstract: *Psidium* is a Neotropical, species rich genus that is distributed from Chihuahua, Mexico to Buenos Aires, Argentina. It is very variable in habit and habitat, ranging from subshrubs to large trees in forests and savannas. In the fire-prone savannas of South America, such as the Cerrado, several mechanisms to resist or tolerate fire evolved in woody genera. Specialized underground organs hide buds and biomass. One of these is the geoxylic habit, where the plant shows significant underground biomass and propagates vegetatively through an extensive network of rhizomes. In Myrtaceae, this type of habit has been recorded in *Eugenia* and *Psidium*. Herein, we elevate a variety to species level: *Psidium eustachyum*, a geoxylic species from the Cerrado biome. This species is distinguished from other species of *Psidium* by its low height, geoxylic habit, glabrous leaves that are usually less than 4 cm long with an inconspicuous venation, 2(-3) locules in the ovary, few ovules per locule (8-11) and up to 5 seeds per fruit. *P. eustachyum* was recently described as *P. salutare* var. *resiliens*; however, an ongoing phylogenetic study shows that the two taxa are not closely related and in fact belong to different sections (*P. salutare* to *Psidium* sect. *Mitranthes* and *P. eustachyum* to *Psidium* sect. *Apertiflora*). Combined with morphological evidence, these results indicate new status at species level is in order for this geoxylic entity.

Keywords: fire, Myrtaceae, rhizome, vegetative propagation.

Resumo: (Explorando o subsolo: outra espécie geoxílica de *Psidium* (Myrtaceae) é descoberta no Cerrado.) *Psidium* é um gênero neotropical, com grande riqueza de espécies, que se distribui de Chihuahua, México, até Buenos Aires, Argentina. É muito variável em hábito e habitat, ocorrendo em florestas e savanas, desde subarbustos a árvores de grande porte. Nas savanas propensas a incêndios da América do Sul, como o Cerrado, vários mecanismos para resistir ou tolerar o fogo evoluíram em gêneros lenhosos. Órgãos subterrâneos especializados escondem brotos e biomassa no subsolo. Um deles é o hábito geoxílico, onde a planta tem uma significativa biomassa subterrânea e se propaga vegetativamente através de uma extensa rede de rizomas. Em Myrtaceae, esse tipo de hábito já foi registrado em *Eugenia* e *Psidium*. Nesse trabalho, elevamos uma variedade para o nível de espécie: *Psidium eustachyum*, uma espécie geoxílica do bioma do Cerrado. *P. eustachyum* distingue-se de outras espécies de *Psidium* pela sua baixa estatura, hábito geoxílico, folhas glabras, geralmente com menos de 4 cm de comprimento e com nervuras inconspícuas, 2(-3) lóculos no ovário, poucos óvulos por lóculo (8-11) e até 5 sementes por fruto. *P. eustachyum* foi tratado recentemente como *Psidium salutare* var. *resiliens*, entretanto um estudo filogenético em andamento demonstra que esses dois taxa não são proximamente relacionados e pertencem a seções distintas (*P. salutare* a *Psidium* seção *Mitranthes* e *P. eustachuym* a *Psidium* seção *Apertiflora*). Em conjunto com as evidências morfológicas, esses resultados indicam que uma elevação de status a nível de espécie é necessária para essa entidade geoxílica.

Palavras-chave: fogo, Myrtaceae, rizoma, propagação vegetativa.

Introduction

The genus *Psidium* Linnaeus (1753) is a large, Neotropical genus of Tribe Myrteae, subtribe Pimentinae (Lucas et al., 2019). Seventy-eight species are considered accepted by POWO (2025) with the true number of species estimated to be approximately 100 (A. Tuler

et al., 2020). It has the widest longitudinal amplitude of any genus of Myrtaceae, extending from ca 27° 02'N (Chihuahua, Mexico) to 37° 50' S (Buenos Aires, Argentina); a total latitudinal range of almost 65° (Proença et al., 2025). In habit and habitat, it is very variable genus, ranging from subshrubs to large trees in rainforests, dry forests, montane forests and savannas, as well as riverine and seasonally flooded forests (Proença et al., 2022).

The savannas of South America became a highly fire-prone ecosystem with the rise to dominance of inflammable C-4 grasses during the last 10 million years (Simon et al., 2009). Several mechanisms to resist or tolerate fire evolved in woody genera. Some are trees and evolved thick, corky, insulating bark; others became shrubby and developed specialized underground organs, e.g., woody rhizomes, lignotubers and xylopodia (for a review see Pausas et al., 2018), that protect plant biomass and buds from fire and heat by hiding them below ground. Even a thin covering of earth provides efficient insulation from high temperatures and plants that have significant underground biomass and propagate vegetatively through rhizomes are called geoxylic.

Woody rhizomes were first described from Cerrado vegetation in Warming's (1908) seminal work. Well-known examples of geoxylic species bearing woody rhizomes (soboles *sensu* Pilon et al., 2021) and spreading over large areas are *Andira humilis* Mart. ex Bentham (1837) in the Fabaceae (Simon et al., 2009), *Pradosia brevipes* (Pierre) T.D. Pennnington (1990) in the Sapotaceae and *Jacaranda decurrens* Chamisso (1832) in the Bignoniaceae. In the latter species, Alves et al. (2013) estimated a single genet occupied an area of ca. 22 m in diameter and had an age of >3,800 years. The cespitose, xylopodiferous habit, where many erect, aerial branches arise from a woody xylopodium is much more common than the geoxylic habit, both globally and in the Cerrado (Pausas et al., 2018; Pilon et al., 2021). Xylopodiferous subshrubs are sometimes called recurrent shrubs (e.g., Eiten, 1991), because the aerial parts may resprout from the xylopodium after the dry season or a fire.

In Cerrado Myrtaceae the cespitose, xylopodiferous habit is frequent. It occurs in *Campomanesia* Ruiz Lopez & Pavón (1794), *Eugenia* Linnaeus (1753), *Myrcia* de Candolle (1827) and *Psidium* (Lima et al., 2011; Villarroel & Gomes-Bezerra, 2015; Villarroel et al., 2016; Proença et al., 2022; Rosa et al., 2021; Pilon et al., 2021). A detailed study of plant strategies for post-fire recovery in a Cerrado community recorded 10 species of Myrtaceae (Pilon et al., 2021): four were trees that resprouted after fire, one from gemmiferous roots and three from xylopodia; four were shrubs that resprouted from xylopodia; two were geoxylic subshrubs provided with woody rhizomes (which they called soboles) that responded to fire by vegetative propagation. The two geoxylic species were both species of *Eugenia*: *Eugenia pitanga* (O.Berg) Niedenzu (1893), belonging to section *Eugenia* (Giaretta et al., 2022) and *E. anomala* D.Legrand (1936), belonging to section *Hexachlamys* (Mazine et al., 2016). Another known geoxylic *Eugenia* is *E. stolonifera* (D.Legrand & Mattos) Mazine in Mazine et al. (2016), belonging to section *Pseudeugenia*; these three sections are basal within *Eugenia* (Mazine et al., 2018; Giaretta et al., 2022). Rotman (1976) recorded that *Psidium incanum* (O.Berg) Burret, now considered *P. salutare* var. *sericeum* (Cambess.) Landrum (2003), had many woody rizomes emerging from a deep xylopodium; this variety grows only in Rio Grande do Sul in Brazil, besides Argentina, Uruguay, Bolivia and Paraguay (Landrum, 2003).

Proença (1991) cited two herbarium specimens of this species (Irwin & Grear Jr. 12210 and Irwin & Fonseca 26671, both at UB), identified by Carlo Diego Legrand as *P. decussatum* de Candolle (1828). Although these collections were thought somewhat unusual, they were included within *Psidium luridum* (Sprengel) Burret (1941), now considered a synonym of *P. salutare* (Kunth) O.Berg (1856). Later in the year, one of us (C.E.B.P.) first became aware of this species while doing a post-doctoral field work in the Reserva Ecológica do IBGE in the Distrito Federal in 1991, due to its unusual habit. After decades of field experience, phylogenomic data and recent collections, we became convinced that it was a separate entity.

This entity was treated firstly by Landrum (2003) as *P. salutare* var. *decussatum* (DC.) Landrum (2003). After examination of the type of *P. decussatum*, we disagreed with Legrand and Landrum (2003) over its identity. The leaves and flowers were remarkable similar, but the long branches suggested a tree, and other details did not match, such as the bracteoles which were all deciduous in the type specimen, but persistent in the specimens we had examined. Moreover, the geographic location of the type of *P. decussatum*, a Martius collection from Contendas, Minas Gerais, is not typical highland cerrado where the geoxylic species occurred. Martius' itinerary (Urban, 1904) indicates: 'Arr. De Formigas (12.— 17. VII.), Serra de Vicente (Cabeceira do Rio dos Boys), Rib. Riachao, Contendas (per tres hebdomades - for three weeks), Campos Geraes de S. Felipe, Faz. Tamandua (12. VIII.), Tapera, Rio S. Francisco'. By investigating early toponyms in IBGE Cidades (2025), between Arrayal de Formigas (currently Montes Claros, Minas Gerais) and the São Francisco River, we discovered that Contendas is almost certainly the current municipality of Brasilia de Minas, that originated from the 'parish Santana de Contendas, founded in 1832' and is situated between Montes Claros and the São Francisco River. This area is in the so called 'Agreste Mineiro', a transitional zone between Cerrado and Caatinga. Although Cerrado species are dominant (Camargo et al., 2020), it also has typical caatinga species, such as *Psidium schenckianum* Kiaerskov (1893) and *Cereus jamacuru* de Candolle (1828), as well restricted endemics such as *Calliandra carrascana* Barneby (1998), *Chamaecrista calixtana* (H.S.Irwin & Barneby) H.S.Irwin & Barneby (1982) and *Helicteres longepedunculata* K.Schum. in Martius (1886).

We later adopted the name *Psidium decussatum* for a small-leaved species of *Psidium* in the Flora of Sergipe (Proença et al., 2013). Targeted DNA sequencing with the Angiosperms353 probe set of *Psidium* has shown that this was an error (Conceição n.d., unpubl. data) and suggest that this taxon belongs to an undescribed species. Con-

ceição's study included a modern collection from northern Minas Gerais that is an excellent match for the type of *Psidium decussatum* (Pirani 3851, ASU), a specimen of the small-leaved *Psidium* from Sergipe (Proença 4717, ASE), a specimen of *Psidium salutare* var. *decussatum sensu* Landrum (2003) (Proença 1458, UB), and a specimen of *P. salutare* var. *salutare* (Faria 6888, HDJF). The results showed that these plants were not closely related. *P. salutare*, *P. decussatum*, and small-leaved Sergipe species emerged within *Psidium* sect. *Mitranthes*, whereas *P. salutare* var. *decussatum* (*sensu* Landrum, 2003) emerged within sect. *Apertiflora* (Conceição n.d., unpubl. data).

These results had several consequences. The name *P. decussatum* DC. was re-established at species rank and the entity previously known as *P. salutare* var. *decussatum* became nameless (Conceição et al., 2025). Landrum (2025), in his recent monograph of the genus *Psidium*, proposed a new name for this entity at varietal level, *P. salutare* var. *resiliens* Landrum. However, as discussed in the previous paragraph, there is strong phylogenomic evidence indicating that this taxon belongs to a lineage distinct from *P. salutare* (Kunth) O.Berg (1857). Morphogically, it is distinct enough within sect. *Apertiflora* to be recognized at species level. Normally the epithet *resiliens* would be adopted in the interest of nomenclatural parsimony; however, Landrum's monograph was only published on 20th December 2025 (when the current paper had already been submitted and reviewed) so it is safe to assume it is not yet in use. Since Art. 11.2 of the International Code of Botanical Nomenclature for algae, fungi and plants (Turland et al., 2025) states that "a name has no priority outside the rank at which it is published", we are adopting the epithet originally chosen.

Material and Methods

Specimens from the CEN, HEPH, IBGE, K, RB and UB were examined *in loco*, and virtual herbaria Species Link (2025) and Herbário Virtual Reflora (2025) were searched for additional specimens of the geoxylic *Psidium*. Four flowers from different collections were dissected for the floral descriptions, and four fruits of three different specimens were examined for the seed count and seed description. The list of examined material and distribution maps were respectively produced with the BRAHMS 7.9 tools for preparing taxonomic accounts and for mapping with an interface to Google Maps (BRAHMS, 2025).

TAXONOMY

***Psidium* L.**

Trees or shrubs. Bark smooth and peeling or more rarely rough and fissured. Young branches cylindrical, slightly to strongly flattened distally or strongly to obscurely tetragonal. Flowers isolated, axillary or simple 3-flowered dichasia with sessile flowers in the forks and pedicellate lateral flowers (rarely compound dichasia with 7–15 flowers or botryoids), or sometimes short racemes, subterminal, axillary or cauline, auxotelic or not, with 1–3(4) pairs of opposite flowers. Mature flower buds 4–15 mm; bracteoles free, deciduous in the young flower bud or persistent until fruiting. Flowers pentamerous or, rarely, pentamerous and tetramerous flowers on the same individual, sepals free (petal globe exposed), partially fused (petal globe apically visible through a rounded, tetragonal, or pentagonal pore), or sepals fully fused to the apex (bud fully closed and hidden petal globe), sometimes apiculate. Flowers opening by unfurling of calyx lobes without tearing, by the opening of the calyx lobes with a slight to deep tearing of the hypanthium, generating 5 regular lobes or 2–5 irregular lobes, or by a perfect or imperfect calyptra; white or cream petals, sometimes pink in the flower bud; 80–300(–700) stamens, arranged in 3–12 whorls; anthers rounded to oblong, crowned by a single apical gland, or with 1–20(–22) glands scattered along the connective, or eglandular; ovary with 2–5(6) locules; placentas lamellar or peltate, little to very developed, if developed, the lamellae intrusive, extrusive or parallel to the internal walls of the locules, with 1–8 rows of ovules on their margins; stigma usually capitate to peltate. Fruits generally green, yellowish–green or yellow, more rarely reddish, dark carmine or black at maturity; seeds (1–)4–80(–320) with a bony testa, (5–) 8–30 cells thick at narrowest point, rough or opaque surface, with an operculum; cochlear embryo with rudimentary apical cotyledons (description adapted from Landrum et al. 2025 and Tuler et al., 2025).

***Psidium eustachyum* Proença & L.Conc., stat. nov. = *Psidium salutare* var. *resiliens* Landrum** in Canotia 21: 156. 2025. Type: — BRAZIL. Paraná, Rio Branco do Sul, along road to Cerro Azul, 7 Jan 1982 (fr), Landrum 4110 (holotype MBM barcode MBM081899; isotypes NY barcode 0685871, MICH). Figure 1.

Subshrubs 5-30 cm high, sometimes forming multiple horizontal underground or superficial rhizomes, these sometimes spreading to 1m2, if erect then densely branched branches, glabrous except for the minutely ciliate calyx lobes. **Rhizomes** 3 to 8 mm in diameter. **Branches** terete, bark dark brown, glandulose, thin, splitting and peeling when older. **Leaves** pinkish or bronze-green when new, spathulate or elliptic, (1.35–)2–3.6(–6) x 0.7–1.2(–1.6) cm, 2.2–4.8 times as long as wide; apex usually rounded or less frequently obtuse; base attenuate to acute, involute in young leaves in the live plants and decurrent on the petiole; petiole 0.5–1 mm long, 0.2–0.5 mm wide, canaliculate, the base appressed to the stem in young leaves; venation inconspicuous, with 4–9 lateral veins but appearing more due to interlaterals, leaving the midvein at angles of ca. 50–60°; interlaterals admedial, frequently bi- or trifurcating; marginal vein usually weakening and disappearing towards the apex, or both sides meeting just below the apex of the leaf; blades chartaceous, densely glandular on both surfaces, glands sometimes impressed on the upper surface and elevated on the lower surface in mature leaves, margins plane. **Floral buds** pyriform, when mature ca. 5.5–7 x 4.5–5.5 mm; hy-

panthium plus calyx tube ca. 3–4 mm long, widening at summit of ovarian disk, attenuate at base; pedicels 4–18.5 x c. 0.7 mm wide, compressed, elliptic in cross-section, borne in the axils of leaves, at leafless nodes, or in the axils of cataphylls; bracteoles persisting in buds and frequently in open flowers and fruits. **Flowers** flanked by 1–2 dark colleters, 0.7–1.7 mm long; calyx lobes green with pinkish-green margins in fresh flowers, 1.0–2.3 x 2–3 mm, wide-deltoid, obtuse or rounded, thin, tearing minutely between lobes at anthesis; petals pinkish in bud, white in open flowers, 7.5–8 x 3.5–5 mm long, strongly reflexed at anthesis, cucullate in the centre with revolute margins in fresh flowers, eciliate, with many minute glandular dots; disk glabrous, the staminal ring flush with the ovarian disk, ca. 4 mm wide at anthesis; stamens 96–136; anthers white or sometimes pinkish, wide-elliptic, 0.7–1 mm long, with a minute terminal gland; style ca. 5–6 mm long, glabrous; stigma capitate; ovary 2(3)-locular, ovules 5-11 per locule in a single row, 19–26 per flower; placenta V-shaped, incurved, two-armed, ovules ca. 8-11 per locule in a single row. **Fruits** pale greenish-yellow when mature, 1–1.2 cm in diameter, sometimes with a reddish flush on the insulated side, globose, crowned by the calyx lobes; seeds (2–)4–5 per fruit, 3-5 mm long, rounded; operculum depressed or slightly protruding.



Figure 1: *Psidium eustachyu*m Proença & L.Conc. A. Geoxylic habit. B. Plant with earth removed to expose the rhizomes. C. Recently open flower visited by syrphid fly (*Dioprosopa* cf. *clavatus* (Fabricius, 1794)). D. Flowering plant with pinkish buds. E. Plant with mature fruits and seeds. Vouchers: A. *Faria et al. 5266* (holotype, UB); B. *Conceição et al. 335*; *C. Proença 5627.* D, E. *Faria & Ribeiro 10184*.

Paratypes: BRAZIL. Distrito Federal. Brasília, Fazenda Água Limpa, 21 Nov 1979, veg., 15°57’00" S, 47°56’00" W, *H.L. Cesar 245* (UB); *Ibidem*, 7 Dec 2024, bud, fl., 15°56’36" S, 47°56’37" W, Alt: 1066m, *L.H.M.S. Conceição et al. 335* (UB, UNOP, SPF, BHCB); Reserva Ecológica do IBGE, 03 Dec 2015, 15°55’10" S, 47°52’43" W Alt: 1148m, *J.E.Q. Faria et al. 5266* (HUEG, HUFSJ, IBGE, K, UB, UFG); Estação Ecológica Jardim Botânico de Brasília na divisa com a Reserva Ecológica do IBGE, 30 Jan 2020, mat. fr., 15°55’08" S, 47°52’38" W, *J.E.Q. Faria et al. 10184* (HEPH, UB); Ca. 12 km W. of Taguatinga on road to Brasilândia, 26 Nov 1965, bud, fl., 15°48’ S, 48°09’ W, Alt: 1250m, *H.S. Irwin 10699* (NY); Fazenda Água Limpa, 07 Dec 2024, bud, fl., *Y. Kilsztajn et al.* 106 (UB); INMET - Instituto Nacional de Meteorologia, 27 Sep 2012, fl., *A.L. Lima et al.* 62 (UB); Reserva Ecológica do IBGE, entre a Sede e o Córrego Roncador, 8 Out 1991, bud, fl., 15°56’00" S, 47°53’00" W, Alt: 1100m, *C. Proença 736* (IBGE); Campus da UnB, atras da Termobiologia, 25 Nov 2024, bud, fl., *C. Proença 5627* (UB); Reserva Ecológica do IBGE, 11 Dec 2019, bud, fl., 15°57’24" S, 47°53’07" W, *Projeto Barcode Cerrado et al. 6_57* (UB); Reserva da Embrapa Cerrados, Planaltina, Apr 2014, 15°38’00" S, 47°43’ W, *M.N.S. Rios 262* (UB); 21 Jan 1999, fr., *A.B. Sampaio 307* (CEN, UB); Campus da UnB, Reserva do Centro

Olímpico, 3 Dec 2015, 15°45’59" S, 47°51’22" W, Alt: 1020m, *J.E.Q. Faria et al. 5254* (HUEG, K, UB); Parque Ecológico Burle Marx, 5 Dec 2020, bud, fl., 15°44’30" S, 47°54’25" W, Alt: 1062m, *M. Figueira et al. 1592* (CEN, HUFU); 2 Feb 1966, Alt: 950m, *H.S. Irwin et al. 12210* (NY, UB); Ca. 2 km E. of Lago Paranoá, DF-6, Alt: 1000m, H.S. Irwin 26671 (NY); Chapada da Contagem, road NE edge, Parque Nacional de Brasília, 10 Jul 1995, 15°46’12" S, 47°55’47" W, Alt: 1160m, *C. Proença et al. 1458* (ASU, UB); Chapada da Contagem, road NE edge Parque Nacional de Brasília, 10 Jul 1995, Alt: 1160m, *C. Proença et al. 1464* (UB); Fazenda Água Limpa, 11 Oct 1999, *L.H. Soares-Silva et al. 784* (SPF, UB); Fazenda Sucupira, próximo ao Riacho Fundo II, 22 Mar 2023, fr., 15°55’49" S, 48°01’39" W, Alt: 1080m, *B.M.T. Walter et al. 6971* (CEN). **Goiás: Alto Paraíso de Goiás:** Rodovia BR 010 ca. de 2,5 km de Alto Paraíso logo antes do depósito de lixo municipal, 24 Mar 2012, fr., 14°06’31" S, 47°31’56" W, Alt: 1365m, *L.M. Borges et al. 613* (USP); **Cristalina:** Serra dos Cristais, ca. 10 km W. of Cristalina, 5 Mar 1966, fr., 16°46’48" S, 47°38’24" W, Alt: 1200m, *H.S. Irwin 13458* (NY); **Ipameri:** GO 020 a 17.8 km a leste da BR 050, 15 Nov 2016, 17°19’10" S, 47°37’15" W, Alt: 947m, *G. Pereira-Silva et al. 16849* (CEN, UB). **Minas Gerais. Coromandel:** 37Km a nordeste de Patrocínio, Morro das Pedras, 29 Jan 1970, 18°39’06" S, 46°56’33" W, Alt: 1000m, *H.S. Irwin et al. 25600* (NY, UB); **Presidente Olegário:** Proximidades da cidade, 29 Dec 2005, fl., 18°25’ S, 46°25’ W, *H. Lorenzi 6014* (HPL).

Etymology: The epithet commemorates Jair Eustáquio Quintino de Faria, Myrtaceae specialist and prolific collector; he collected and photographed several of the paratypes.

Ecological notes: It has been collected with flowers in October, November December, and with fruits in January, February and March. The reproductive episode is short. Anatomical studies are necessary to establish whether the rhizomes are woody, originate from a burl or fibrous, and if development is monopodial or sympodial.

Distribution: It occurs in the Central Brazilian Highlands, in western Minas Gerais, Goiás and the Distrito Federal, in typical cerrado and fields above 900m, and in campos in Paraná. Its apparent absence from the State of São Paulo (Fig. 2) is surprising, but in spite of extensive searches, none were found. It is estimated that the Cerrado occupied 14% of the state of São Paulo at the beginning of the 20th century, of which half (7%) was left by the beginning of the 21st century (Durigan et al., 2003). We believe the absence of specimens from São Paulo in herbaria is probably a result of its small habit, few favourable areas, and chance rather than true disjunction.

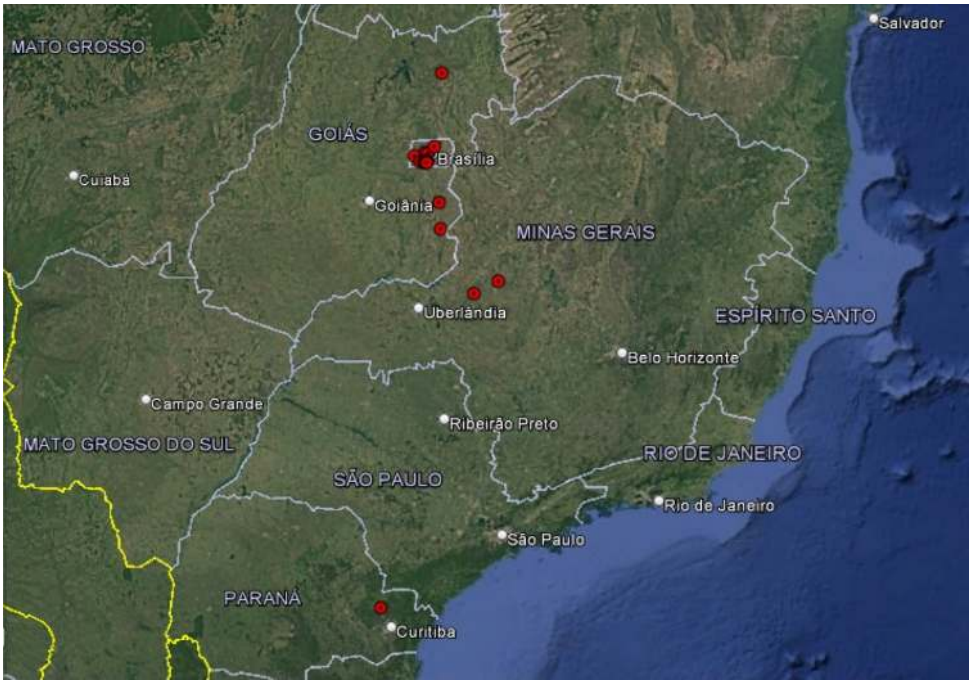

Figure 2: Geographic distribution of *Psidium eustachyum* Proença & L.Conc. in Central and Southern Brazil. Red dots represent herbarium specimens cited in the examined material.

Taxonomic notes: *Psidium eustachyum* belongs to *Psidium* section *Apertiflora* O.Berg (Conceição n.d., unpubl. data). It is only likely to be confused with other glabrous subshrubs such as *Psidium salutare* var. *pohlianum* (O.Berg) Landrum (2003), *P. firmum* O.Berg (1857) and *P. australe* Cambessedes (1832), although these species tend to have larger leaves. All other Central Brazilian *Psidium* species have an indumentum or are trees. A key is presented below to distinguish the species.

Key to glabrous subshruby species of *Psidium* occurring in the Cerrado Biome

1. Trees or shrubs with sparse to very dense indumentum, at least on the hypanthium and new growth. . ***all other species***

1. Subshrubs up to 1m (sometimes appearing herbaceous), glabrous
   2. Rhizomatous subshrubs 5-30cm tall; stems many, sprouting from a horizontal spreading rhizome, if erect then very densely branched; leaves mostly below 4cm long, rarely up to 6cm; locules in the ovary 2(-3); seeds 2-5 per fruit, 3-5mm long ..... ***P. eustachyum***
   2. Cespitose subshrubs to 1 m tall; stems few, wand-like, usually unbranched, arising from single point at the base of the plant; leaves mostly above 4cm to 10.5cm; locules in the ovary 3-5; seeds 6-44 per fruit, either smaller (2-3mm) or larger (6-7mm) than above
      3. Secondary veins not forming a clear marginal vein; three-flowered dichasia usually present; floral buds virtually closed when young, with a small star-shaped aperture, tearing between the lobes as the bud develops; fruit green with a reddish flush when mature; seeds ca. 3-5mm long
         4. Most leaves up to 3 times as long as wide; young leaves inconspicuously puberulous; flowers mostly solitary with some 3-flowered dichasia present ..... ***P. australe***
         4. Most leaves more than to 3 times as long as wide; young leaves glabrous; 3-flowered dichasia common ..... ***P. suffruticosum***
      3. Secondary veins forming a clear marginal vein; three-flowered dichasia absent; floral buds with 5 obvious calyx lobes when young, these merely growing as the bud develops with no tearing between lobes until anthesis; fruit yellow or very pale green; seeds mostly either larger (6-7mm long) or smaller (2-3mm long) than above
         5. Most leaf apices and 5 calyx lobes rounded or obtuse; secondary veins forming a sinuous marginal vein; flowers solitary or in few-flowered auxotelic racemes; fruit 1.5-2mm long, bright canary yellow when mature; seeds up to 20, c. 6-7mm long ..... ***P. salutare var. pohlianum***
         5. Most leaf apices and (4) 5 calyx lobes acute and fine-tipped; secondary veins forming an almost straight marginal vein; flowers solitary or in few-flowered racemes, auxotelic or not; fruit 1-2.7mm long, shiny pale green when mature; seeds up to 50, 2-3mm ..... ***P. firmum***

Acknowledgments

We are grateful to Jair Eustáquio Q. de Faria and Yakov Kilsztajn for collecting specimens, permission to use images, and to Les R. Landrum for sending specimens for targeted DNA sequencing, many interesting discussions, and for reviewing this paper. We also thank Ingrid G. Martins Silva for identifying the syrphid fly. C.E.B.P. is grateful to the Andrew T. Mellon Foundation for a post-doctoral grant to study *Psidium* at Royal Botanic Gardens Kew, and CNPq for Produtividade em Pesquisa PQ2 grant - Taxonomia, Ecologia e Conservação das Myrtaceae do Cerrado e Floresta Atlântica (2017-2020). L.H.S.M.C. is grateful to Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - (CAPES) Brazil - Finance Code 001 (scholarship), PDSE 30/2023 CAPES scholarship that allowed him to develop part of his doctorate at the Royal Botanic Gardens Kew, United Kingdom, and the Amar-Frances and Foster-Jenkins Trust, for financial support for DNA extractions and sequencing and Research Computing at the James Hutton Institute for providing computational resources and technical support for the "UK's Crop Diversity Bioinformatics HPC" (BBSRC grants BB/S019669/1 and BB/X019683/1), all of which have contributed to the results reported within this paper.

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