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Original Paper

Convolvulaceae in the Serra da Canastra National Park, Minas Gerais, Brazil

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Abstract

The present treatment of Convolvulaceae is part of the project "Flora of Serra da Canastra National Park". The Serra da Canastra National Park (PNSC, acronym in Portuguese) is located in the southwestern region of Minas Gerais, where Cerrado vegetation is dominant. A taxonomic treatment and floristic survey of species of Convolvulaceae in PNSC was carried out in order to contribute to the knowledge of the local flora, clarify morphological aspects and assess the distribution of representatives of the family in that area. The occurrence of 23 species in five genera was confirmed: *Bonamia*, *Distimake*, *Evolvulus*, *Ipomoea*, and *Jacquemontia.* The synonymization of one variety of *Evolvulus* and *Ipomoea megalantha* is here proposed. We provide identification keys for genera and species, morphological descriptions, comments for each taxon, illustrations, and photographs of species in the field. In addition, given the importance of pollen characters for the taxonomy of the family, an identification key based on pollen characters is provided. Notes on conservation status of the species are also presented.

Key words: Cerrado, morning glory, rare species, taxonomy, weeds.

Resumo

O presente tratamento de Convolvulaceae é parte do projeto "Flora do Parque Nacional da Serra da Canastra". O Parque Nacional da Serra da Canastra (PNSC) está localizado na região sudoeste do estado de Minas Gerais e está inserido no domínio do Cerrado. Foi feito o estudo taxonômico e florístico das espécies de Convolvulaceae no PNSC com o objetivo de contribuir para o conhecimento da flora local, esclarecendo aspectos morfológicos e de distribuição dos representantes da família nessa área. Foi confirmada a ocorrência de 23 espécies em cinco gêneros: *Bonamia*, *Distimake*, *Evolvulus*, *Ipomoea* e *Jacquemontia*, além de proposta a sinonimização de uma variedade de *Evolvulus* e *Ipomoea megalantha*. São fornecidas chaves de identificação para gêneros e para espécies, descrições morfológicas, comentários para cada táxon, ilustrações e fotografias das espécies no campo. Ademais, dada a importância dos caracteres polínicos para a taxonomia da família, é disponibilizada uma chave de identificação baseada nos caracteres de pólen. São apresentadas, ainda, notas sobre o status de conservação das espécies.

Palavras-chave: Cerrado, jetirana, espécies raras, taxonomia, ruderais.

Introduction

Convolvulaceae is broadly distributed in the tropics, especially in Neotropics, with a few numbers of species in temperate zones (Austin & Cavalcante 1982). In Brazil, it is represented by 22 genera and 415 species, almost half of which are endemic (190 species, c. 45%), occurring in all vegetation formations (Buril-Vital 2009; Simão-Bianchini *et al.* 2023).

The representatives of Convolvulaceae have mainly a climbing habit, but they can also be herbs, subshrubs, shrubs, rarely trees, and holoparasitic

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climbers (*Cuscuta*.). They are usually recognized for their alternate, simple or compound leaves, lacking stipules and tendrils (Simão-Bianchini & Pirani 1997). The sympetalous corollas have five conspicuous midpetaline bands (Austin & Cavalcante 1982; Ooststroom & Hoogland 1953; Staples 2012). Stamens 5, adnate to the tube base or to the corolla throat. The ovary is superior, bicarpellate, rarely tricarpellate (Simão-Bianchini 1991; Silva *et al.* 2018). The fruit is often a dehiscent four-seeded dry loculicidal or septicidal capsule (Simão-Bianchini & Pirani 1997).

The family is considered eurypalynous, due to huge variation in palynological characters (Tellería & Daners 2003), the pollen grain is medium to large, porate or colpate, and exine surface is psilate, perforate, spiculate or echinate (Erdtman 1952; Tellería & Daners 2003). The first broad classification of Convolvulaceae proposed the division of the family into two main informal groups based on pollen characters: "Echinoconieae", which has echinate pollen, and "Psiloconiae", with psilate pollen (Hallier 1893). More recent molecular phylogenetic studies of Convolvulaceae have demonstrated that the Echinoconieae division is monophyletic, today corresponding to tribe Ipomoeeae, although Psiloconieae is paraphyletic, representing the remainder of the family (Stefanovic *et al.* 2002, 2003; Eserman *et al.* 2014; Simões *et al.* 2022). Currently, 6 subfamilies, 11 tribes and 61 genera are recognized in the family, based mainly on style and stigma characters (Stefanovic *et al.* 2003; Staples & Brummitt 2007). There is uncertainty in the delimitation of some tribes and genera, which will still need more work. Studies in tribe Merremieae (Simões *et al.* 2015; Simões & Staples 2017; Pisuttimarn *et al.* 2023) have demonstrated that both molecular phylogenetic and pollen characters, in the light of morphological information, are important for clarification of the taxonomy and systematics of Convolvulaceae. Although the family's higher level classification is not based primarily on pollen characters, these have been very helpful in taxonomic studies at genus level (Welsh *et al.* 2010; Buril-Vital *et al.* 2015; Moreira *et al.* 2019; Simões *et al.* 2019, 2021; De Man & Simões 2021), as well as ecological studies involving pollinators (Romeiro *et al.* 2023) and palaeobotanical studies (Martin 2001), and for this reason it is important to continue to study the palynology of Convolvulaceae.

Minas Gerais is a state in the southeastern region of Brazil with a high representation of Convolvulaceae, in proportion to the entire country, with 20 genera and 230 species found (out of 23 genera and 415 species occurring throughout Brazil). However, it is also one of the regions that has been target of more studies of this family (Simão-Bianchini 1997, 1998, 2005, 2009, 2012). The main vegetation types are Cerrado, Atlantic Rainforest and Caatinga. The landscape is dominated by Cerrado to the south and west; Atlantic Rainforest to the east; rocky fields in the center; and small areas of Caatinga to the north (Rezende *et al.* 2010). Cerrado is the biggest domain of Minas Gerais, covering 57% of its territory. Dry and rainy seasons are well defined, and grasses, shrubs and trees compose the vegetation (IEF 2023).

The Serra da Canastra National Park (PNSC) is an important complex due to its particular phytogeography (Romero & Martins 2002). The Park is inserted in Cerrado, the Brazilian Savanna, the second greatest domain of Brazil, comprising about 23,3% of the territory (IBGE 2019). Most of the PNSC is covered by rocky formations that comprise distinct physiognomic types: "campo limpo", "campo sujo" and "campo rupestre" (Fig. 1a-c). Savanna formations, represented by Cerrado *sensu strictu*, include physiognomic subdivisions of "cerrado denso", "cerrado ralo" and "cerrado rupestre" (Fig. 1d-f). There are forest formations, subdivided into riparian forest, gallery forest, dry forest, hillside forest and "cerradão" (Fig. 1g-k) (MMA / IBAMA 2023; Ribeiro & Walter 2008).

The Park is in a climate transition zone between the tropical hot and temperate mesothermal climates. The winter period is quite dry, marked by a rainfall shortage in July and a drought period between July and mid-September (MMA / IBAMA 2023). Natural fire is an important element in Cerrado and acts on the flora and fauna adaptation mechanisms (Durigan & Ratter 2016). However, as a consequence of fire suppression, Cerrado has been suffering a thickening, the typical savanna-like vegetation being replaced by a dense and uniform tall vegetation, losing biodiversity and suffering a process of ecological changes (Pinheiro & Durigan 2009).

Previous studies have demonstrated the importance of this park, as a Conservation Unit: 768 species of Angiosperms were recorded in Serra da Canastra National Park (PNSC), 45 of them restricted to this area, and 37 were new

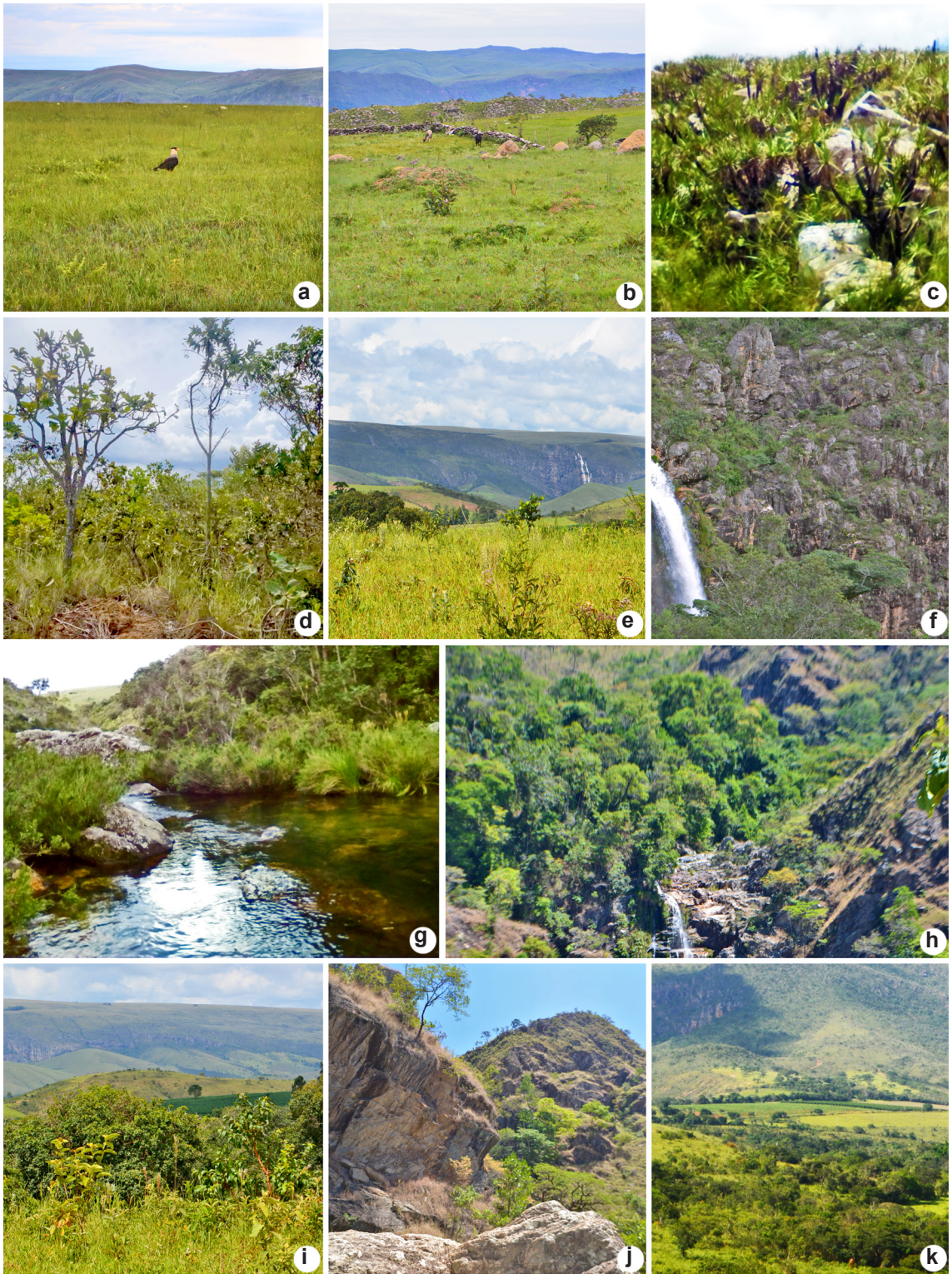

Figure 1 – a-k. Physiognomies in the PNSC – a. “campo limpo”; b. “campo sujo”; c. “campo rupestre”; d. “cerrado denso”; e. “cerrado ralo”; f. “cerrado rupestre”; g. riparian forest; h. gallery forest; i. dry forest; j. hillside forest; k. “cerradão”.

species (Romero & Nakajima 1999). Later, several studies have contributed to the knowledge of the flora of PNSC, such as Annonaceae (Pontes & Mello-Silva 2005), Apocynaceae (Farinaccio & Mello-Silva 2004; Morokawa *et al*. 2013), Asteraceae (Nakajima & Semir 2001), Bignoniaceae (Scudeller 2004; Machado & Romero 2014), Chrysobalanaceae (Hemsing & Romero 2010), Fabaceae (Filardi *et al.* 2007), Malpighiaceae (Volpi 2006), Melastomataceae (Romero & Martins 2002; Silva & Romero 2008), Piperaceae (Carvalho-Silva & Guimarães 2009), Rubiaceae (Silveira 2010), and Vochysiaceae (Gonçalves *et al.* 2013).

In order to continue the floristic studies of the Serra da Canastra, we provide a taxonomic treatment of Convolvulaceae for this area, with descriptions, identification keys of genera and species, and illustrations, aiming to clarify the geographic distribution and morphological characterization of species, and provide accurate floristic data for conservation actions in the Serra da Canastra National Park.

Materials and Methods

Study area

The Serra da Canastra National Park (PNSC) spreads across the municipalities of Capitólio, Delfinópolis, Sacramento, São João Batista do Glória, São Roque de Minas, and Vargem Bonita, in the southwestern region of Minas Gerais state, southeasthern Brazil (20º00'–20º30'S and 46º15'–47º00'W). It occupies an area of about 200,000 ha. (Fig. 2), with an altitude range varying from 800 to 1,200 m, with a maximum of 1,496 m in Serra Brava.

Field collections

This study analysed material from general collections conducted between January 1998 and August 2019, focusing on the Canastra and Babilônia plates, as well as field trips especially dedicated to collect Convolvulaceae, made in January 1998, October 2017 and in February 2018. Specimens were pressed and mounted following traditional methodology for preparation of herbarium specimens (Fidalgo & Bononi 1989) and deposited at the SP herbarium (Instituto de Pesquisas Ambientais, São Paulo, Brazil).

Map preparation

The map showing the study area was made using QGIS 3.10.0 (QGIS Development Team 2023). Geographic information about the park was extracted from MMA/IBAMA (2023) and ICMBio (2023), and base maps were retrieved from IBGE (2023).

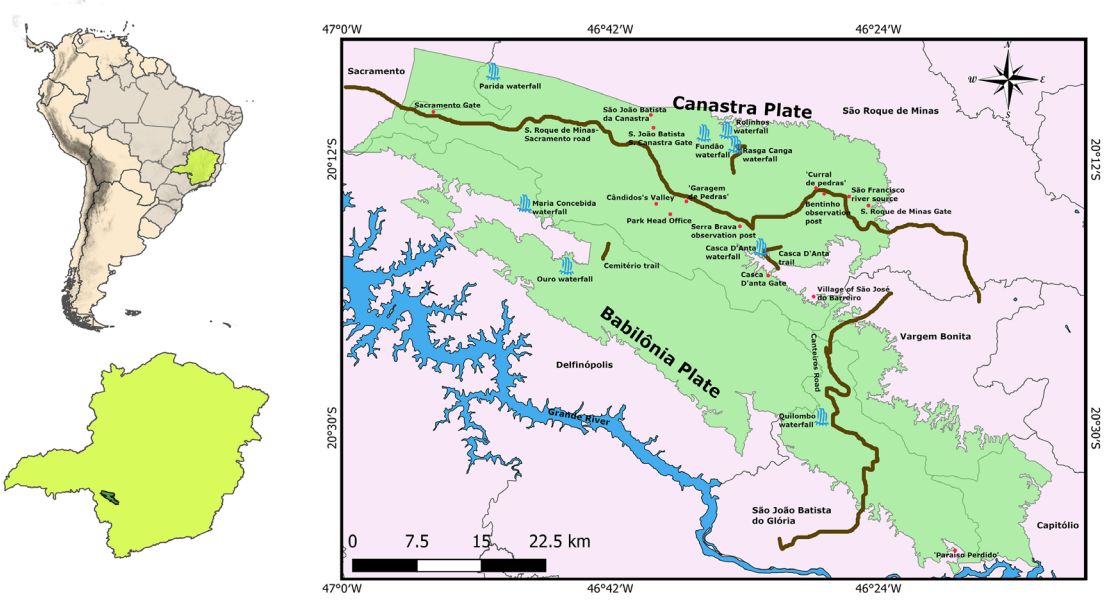

Figure 2 – Map showing the location of the Serra da Canastra National Park, Minas Gerais state, Brazil (highlighting in green): Canastra Plate and Babilônia Plate, with main localities.

Taxonomic treatment

In addition to SP herbarium (Instituto de Pesquisas Ambientais, São Paulo, Brazil), HUFU (Herbarium Uberlandense, Universidade Federal de Uberlândia, Minas Gerais, Brazil) was the principal source consulted for the development of the study, which is home to a huge floristic collection from Serra da Canastra. This was especially important because not all the species from Serra da Canastra were represented in the SP herbarium. Additional herbaria consulted for this study are mentioned in the text (acronym according to *Index Herbariorum* - Thiers, continuously updated). In the case of type specimens which images were consulted online (JSTOR), the barcode of the specimen is indicated. The phenology was inferred from the material examined only from PNSC.

Morphological terminology followed Radford *et al.* (1974) and Harris & Harris (1994). Payne (1978) and Hickey & King (2001) were followed to describe the indumentum. Thus, we defined that trichomes between 0.1–0.4 mm long were considered "short", and 0.5–1.5 mm long were considered "long". Venation terminology was based on Ash *et al.* (1999).

Micromorphological analyses of vegetative characters were conducted under Scanning electron microscopy analyses (SEM). Extrafloral nectaries, trichomes, style, stigma and pollen were sampled from herbarium specimens. The pollen grains were sampled from flower buds. The solution containing the structures was dripped directly onto the stubs, which were then sputter-coated with gold under high vacuum. A PHILIPS XL 20, S/W, version 5.21. Microscope was used, at the Instituto de Pesquisas Ambientais, with the assistance of Dra. Luciana Benatti.

Conservation status

We applied IUCN Red List categories and criteria (IUCN 2012) and used GeoCAT (Bachman *et al.* 2011) to calculate extent of occurrence and area of occupancy. AOO was calculated by summing the areas of grid squares where records of the species occur. Default cell size of 2 km was used (the value recommended by IUCN 2012).

Results

Convolvulaceae is represented in the Serra da Canastra National Park by five genera and 23 species. *Ipomoea* is the most representative genus (12 spp.), followed by *Evolvulus* (6 spp.), *Distimake* (2 spp.), *Jacquemontia* (2 spp.), and *Bonamia* (1 sp.). *Ipomoea pohlii* Choisy (1845: 355) is here presented as a new record to the state of Minas Gerais. *J. sphaerostigma* [26(3): 151] is the only considered a weedy (non-native) species, the rest are characteristic of the Cerrado vegetation type. Fourteen of them have been cited previously in the floristic survey of this domain, conducted by Mendonça *et al.* (2008). In the surroundings areas, considered the buffer zones of the park, we have recorded ten species: *Ipomoea* (5 spp.), *Jacquemontia* (3 spp.), and *Distimake* (2 spp.).

Identification key of Convolvulaceae genera in Serra da Canastra

1. Styles 2, free or united at the base; stems erect, prostrate or repent, never twining.
   2. Corolla infundibuliform, 2.5–3 cm long, midpetaline bands densely sericeous; style with two unequal branches, each with one globose stigma .....1. *Bonamia*
   2'. Corolla hypocrateriform, 0.8–1.8 cm long, midpetaline bands sparsely sericeous; style with two equal branches, each with two linear stigmas ..... 3. *Evolvulus*

1'. Style 1; stems slender, erect or prostrate.
   3. Indumentum of stellate trichomes, 3-several-branched or glandular; white or blue flowers; glabrous midpetaline bands; pollen panto-colpate.
      4. Inflorescences with up to 3 flowers, corolla white; stigma globose; anthers twisted after anthesis; fruit 4-valved capsules .....2. *Distimake*
      4'. Inflorescences with more than 30 flowers, corolla blue; stigma ellipsoid or subglobose; anthers not twisted after anthesis; fruit 8-valved capsules .....5. *Jacquemontia*
   3'. Indumentum of simple or glandular trichomes ; pink or lilac flowers, sericeous midpetaline bands, rarely glabrous, pollen pantoporate..... 4. *Ipomoea*

1. ***Bonamia eustachioi*** A.L.C.Moreira & Kojima, Brittonia 73: 205. Type: BRAZIL. BAHIA: Igaporã, 21.IV.2015, *J.E.Q. Faria & A.R.O. Ribeiro 4444* (Holotype SP476767!; Isotype ALCB142581!; CEN111947!; HUEFS222651!; K!; NY!; RB!; SPF!; UB209342!). Figs. 3a-f; 4a; 5a-f

Erect subshrub, 40–80 cm tall; stem (1.5–) 2–3(–4) mm in diam., young branch verrucose,

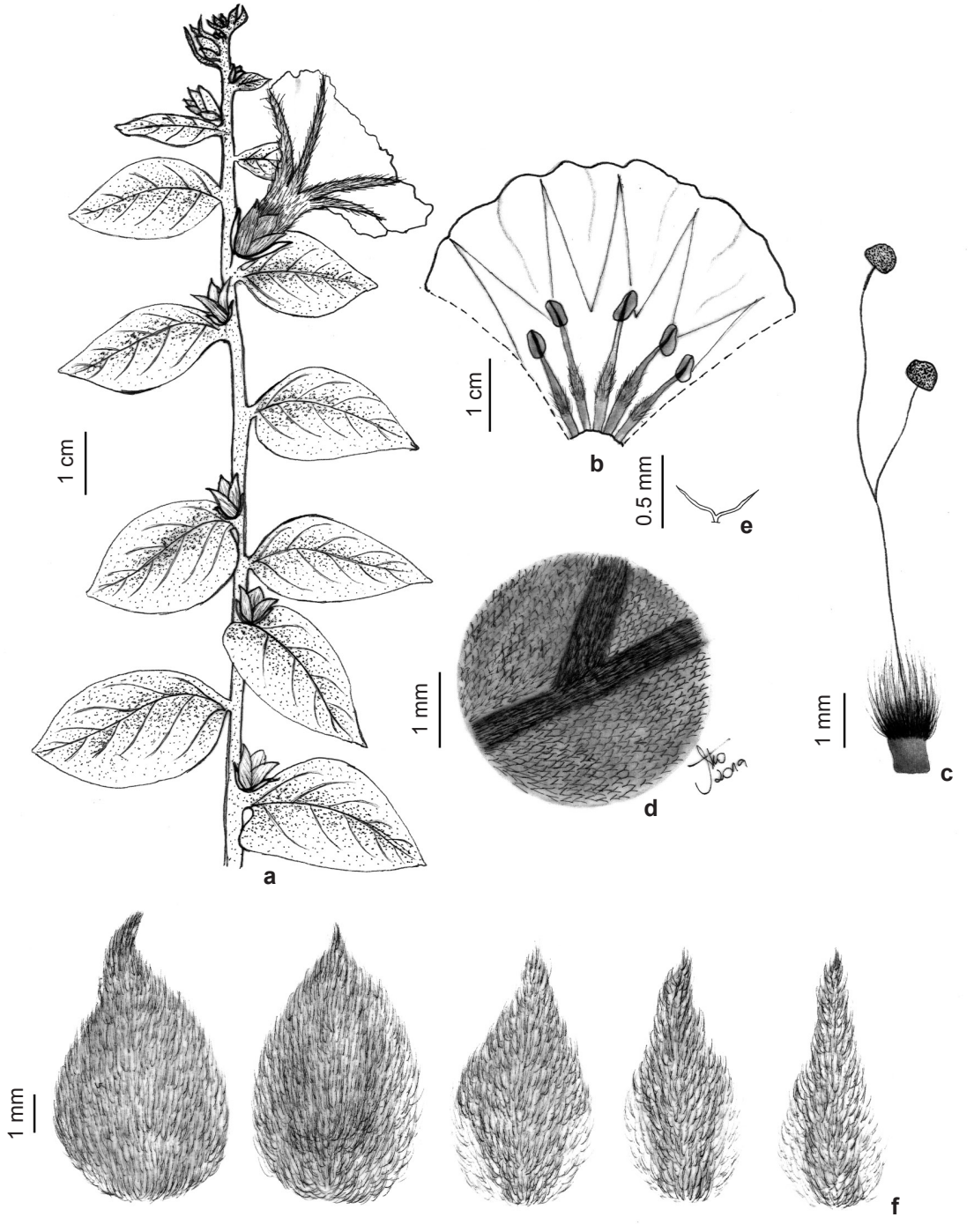

Figure 3 – a-f. *Bonamia eustachioi* – a. habit; b. corolla opened longitudinally showing androecium; c.pistil; d. leaf indumentum; e. forked trichome; f. sepals (*Faria & Ribeiro 4444*; drawing by Stephanie Oliveira).

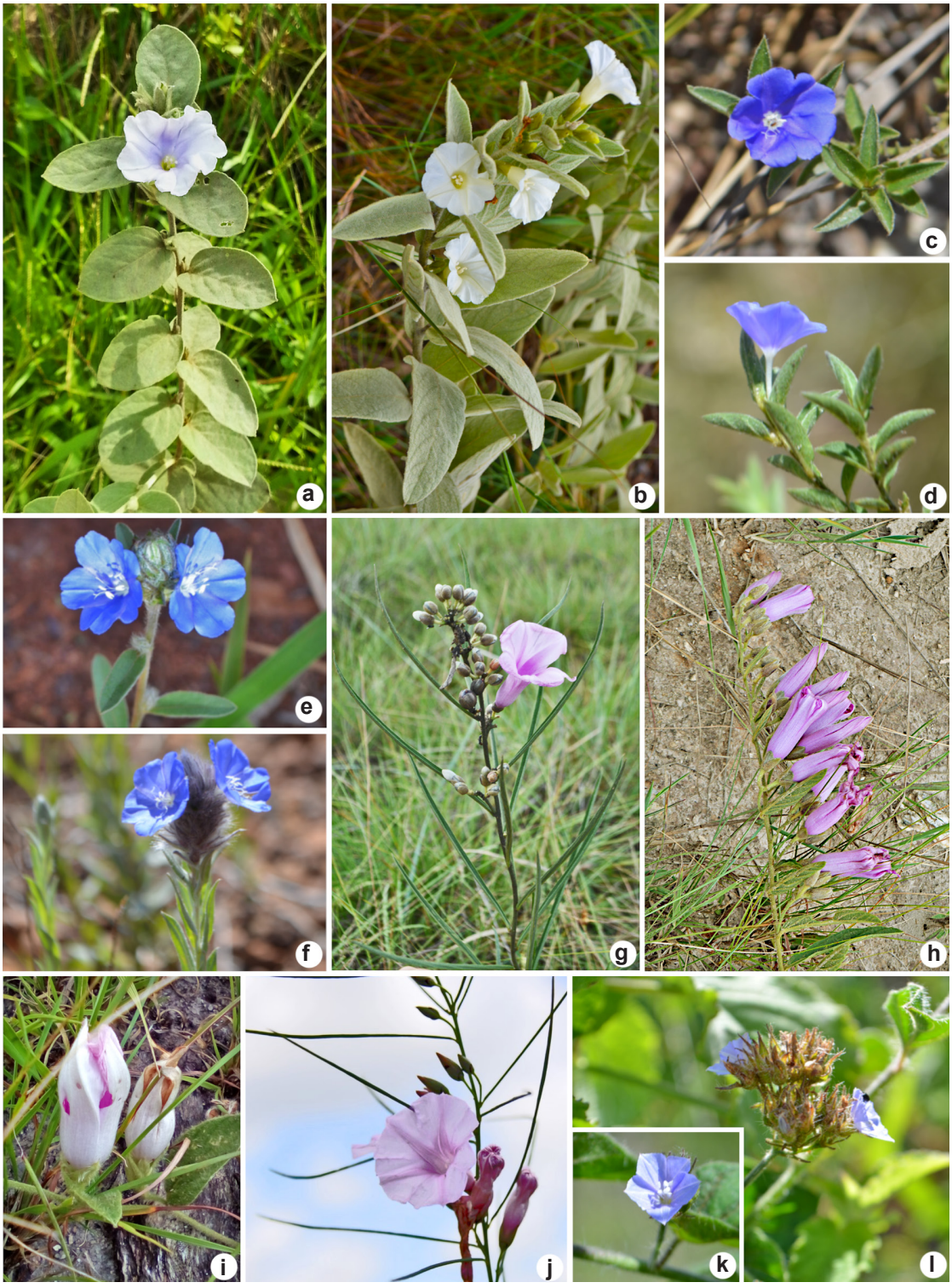

Figure 4 – a. *Bonamia eustachioi* – habit. b. *Distimake tomentosus* – habit. c-d. *Evolvulus cressoides* – c. flower in frontal view; d. flower in lateral view. e. *E. glomeratus* – inflorescence. f. *E. pterygophyllus* – inflorescence. g. *Ipomoea aprica* – habit. h. *I. delphinioides* – habit. i. *I. langsdorffii* – inflorescence. j. *I. pinifolia* – inflorescence. k-l. *Jacquemontia sphaerostigma* – k. flower; l. inflorescence. (Photographs: a. J. Faria; b-h, k-l: R.S. Bianchini; i. R.K. Kojima; j: H. Moreira).

short-pubescent, mature branch tomentose, green to rusty, forked trichomes, with equal or subequal branches; internodes 1–2 cm long. Leaves elliptic or ovate, (2.1–)3.1–4.1(–5) × 1.7–2.1(–3.5) cm, base rounded, apex cuspidate or acute, mucronate, margin entire, tomentose on both surfaces, forked trichomes, golden to ferruginous, brochidodromous, veins sulcate on adaxial surface, protruding on abaxial surface; petiole 2–4 mm long. Inflorescence a 1–3 flowered axillary cyme; peduncle absent; bracteole subulate, apex acute, (2.5–)3.5–6.5 mm long, tomentose; pedicel 1.5–2.5 mm long, tomentose; sepals unequal, ovate, outer 10–11 × 5.5–6 mm, inner 7.5–8 × 3.5–5 mm with hyaline margin, apex acute, tomentose, ciliate, ventral surface glabrous; corolla infundibuliform, lilac or blueish, 2.5–3 cm, tube 1–1.3 cm, limb 1.1–1.2 cm, midpetaline bands densely sericeous; longer stamens 9–10 mm, shorter 5.5–7 mm, villous at the base, anthers basifixed, elliptic, 1.5–2 mm long, styles 2, united until 5 mm from the base, 8–13 mm long in total, longer branch ca. 5.5 mm

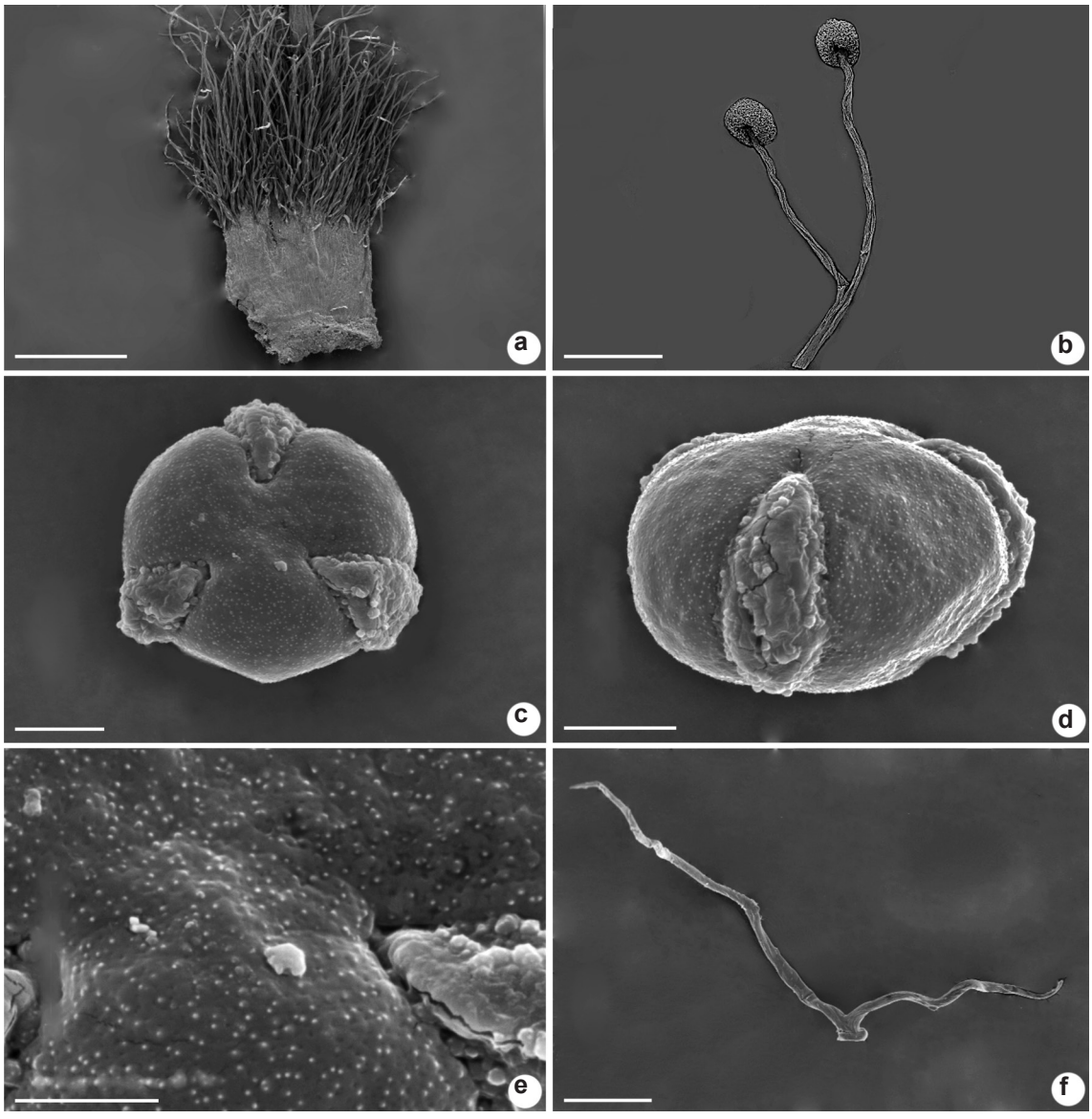

Figure 5 – a-f. Scanning electron micrographs of *Bonamia eustachioi* – a. ovary; b. stigmas; c. pollen grain in polar view; d. pollen grain in equatorial view; e. detail of pollen grain ornamentation; f. forked trichome. (*Romero et al. 6307*). Scales: a, b = 1 µm; c, d = 10 µm; e = 5 µm; f = 100 µm.

long, shorter branch ca. 3.5 mm long, each style with one globose stigma. Capsule globose or ovoid, apiculate, ca. 6 × ca. 4 mm, glabrous, cream-yellow; seed ovoid, glabrous, black.

Specimens examined: Delfinópolis, condomínio de Pedra, 20º20'38"S, 46º51'14"W, 17.V.2003, *R.L. Volpi et al. 696* (HUFU, SP); estrada para "Casinha Branca Trilha Muro de Pedras", 20º20'38"S, 46º51'14"W, 12.III.2003, *R.A. Pacheco et al. 532* (HUFU, SP); estrada para Casa Branca, Fazenda Paraíso, 20º20'38"S, 46º51'14"W, 10.IV.2002, *R. Romero et al. 6307* (HUFU, SP).

Known only from a few records in Brazil, in the states of Bahia and Minas Gerais (Moreira *et al.* 2021).

Native species, characteristic of Cerrado and Caatinga, generally associated to rocky environments. In Serra da Canastra region, there are several records found in the surroundings of the park, in the municipalities of Delfinópolis, at Casinha Branca and Fazenda Paraíso localities, only in "campo rupestre" physiognomy.

Bonamia eustachioi is recognized by its subshrub ascending habit, with a rusty to green color, elliptic to ovate leaves, unequal sepals, blueish to lilac corolla, and densely sericeous midpetaline bands. *Bonamia eustachioi* might be confused with *B. rosiewiseae* J.R.I.Wood, which is distinguished by the leaves with rounded to emarginate apex, whitish to cream indumentum, more congested inflorescences, sepals obovate to elliptic with rounded apex, and larger corollas (3–3.5 cm long).

Flowering from March to May.

2. *Distimake* Raf., Flora Telluriana 4: 82. [1836 publ. mid-1838].

The genus has 49 species (Simões & Staples 2017; Petrongari *et al.* 2018; Pisuttimarn *et al.* 2023; POWO 2023) with concentration in Tropical America and Tropical Africa, and disjunct species in northern Australia and Asia (Simões & Staples 2017; Simões & More 2018). In Brazil, 18 species of *Distimake* are present, nine of them restricted to the country;there are records of this genus in all phytogeographical domains; mostly in the Cerrado, but also in the Caatinga and the Atlantic Rainforest (Simão-Bianchini *et al.* 2023). Based on geographical, molecular, morphological and palynogical evidence, *Distimake* was recently segregated from *Merremia s.l.* (Simões *et al.* 2015, Simões & Staples 2017). Representatives of *Distimake* are recognized for the climbing or prostrate herbaceous habit, rarely erect; the indumentum is frequently composed of stellate trichomes (Figs. 6b; 7d-e); the leaves are five to seven palmately lobed or compound, exceptionally simple and entire (Fig. 6a) or reduced to scales; the sepals are flat (never convex), appressed to the base of the corolla tube, often accrescent in capsule (Fig. 6c); the corolla is frequently white (Fig. 4b) or yellowish, totally glabrous; the anthers are spirally dehiscing when mature, and pollen is most commonly tricolpate (Figs. 6e; 7a-b); the capsule is 4-valved, later the sepals reflexing, and the seeds are glabrous (Simões & Staples 2017; Petrongari *et al.* 2018).

Identification key for *Distimake* species in Serra da Canastra

1. Prostrate herbs with twining apex, few branched; internodes 2.5–5.5 cm long; leaves elliptic to oblong; inflorescence pedunculated ..... 2.1. *Distimake maragniensis*
1'. Erect subshrubs, many branched; internodes 0.7–2 cm long; narrow-elliptic leaves; inflorescence sessile ..... 2.2. *Distimake tomentosus*

2.1. *Distimake maragniensis* (Choisy) Petrongari & Sim.-Bianch., Phytotaxa 340(3): 298. 2018. Type: BRAZIL. MARANHÃO: *In sepibus ad fluv. Itapicuru prov. Maragniensis*, 1819, *C.F.P. von Martius s.n.* (M0184790 image!).

Figs. 6a-e; 7a-c

Prostrate herb with twining apex, few branched; stem 1–2 mm diam., tomentose, stellate trichomes with numerous branches; internodes (2.5–)3.4–5.5 cm long. Leaves simple, entire, elliptic to oblong, (2.5–)5–6.5 × 1.5–1.9 cm, rarely compound with 2–3 leaflets, base acute or rounded, apex obtuse or acute, mucron ca. 0.5 mm, margin entire or irregularly wavy, tomentose on both surfaces, brochidodromous, veins sulcate on adaxial surface, protruding on abaxial surface; petiole (2–)5–9 mm long. Inflorescence of 1–3 flowered axillary dichasium; the primary peduncle (0.3–)1.2–5(–9) cm long, secondary absent; bracteole lanceolate, apex acute, (2.5–)5–6 mm long, tomentose or with sparse trichomes; pedicel 0–3 mm long, tomentose; sepals unequal, outer

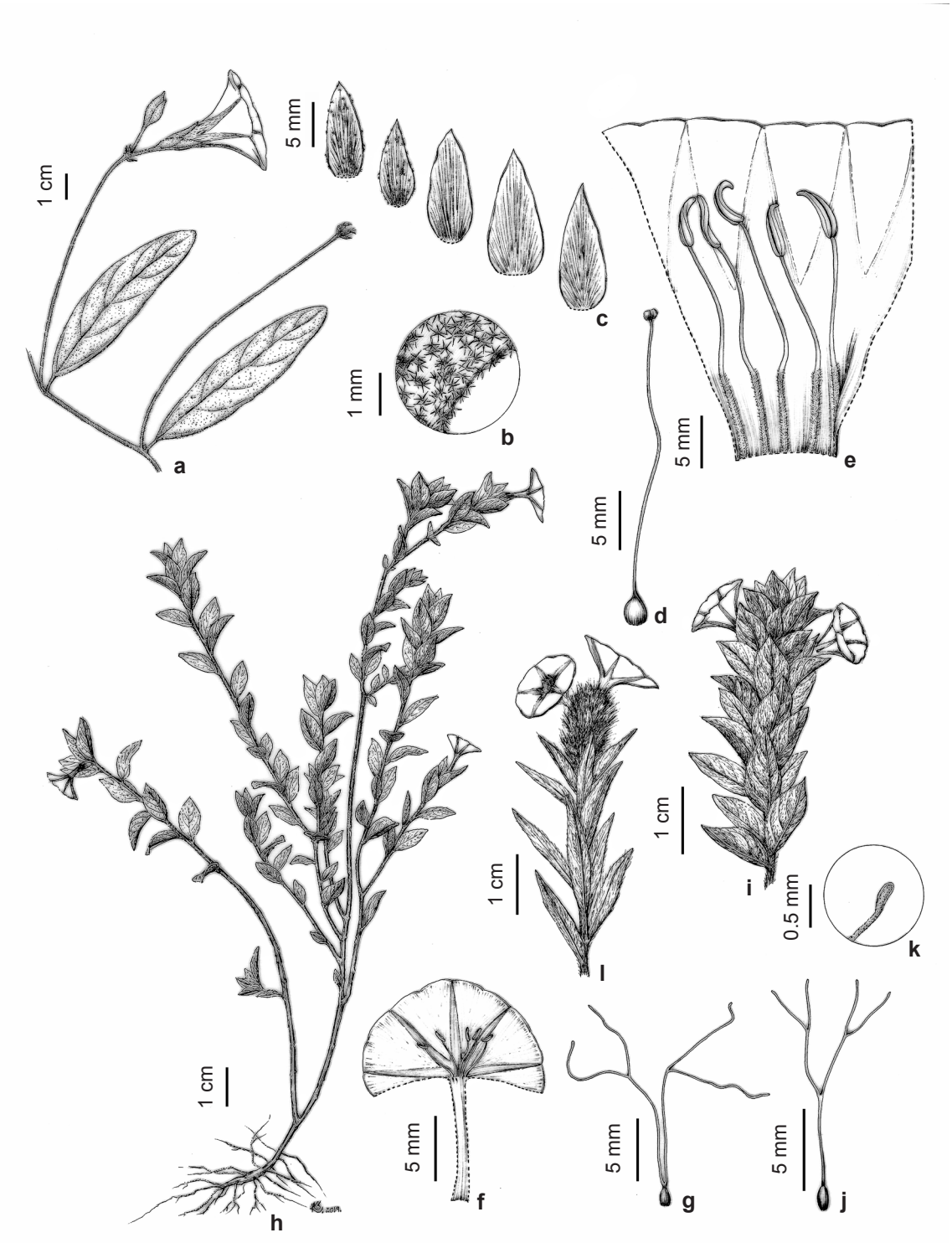

Figure 6 – a-e. *Distimake maragniensis* – a. habit; b. indumentum with stellate trichomes; c. sepals; d. pistil; e. opened corolla showing androecium. f-g. *Evolvulus aurigenius* var. *aurigenius* – f. opened corolla showing androecium; g. pistil. h. *E. cressoides* – habit. i-k. *E. goyazensis* – i. inflorescence; j. pistil; k. detail of stigma. l. *E. pterygophyllus* – inflorescence. (a-e. *Nakajima & Romero 1704*; f-g. *Romero & Nakajima 1432*; h. *Kojima & Bianchini 25*; i. *Romero et al. 4807*; j-k. *Romero et al. 2267*; l. *Kojima & Bianchini 21*; drawing by Klei R. Souza).

5–11 × 3–3.5 mm, sparsely pilose, inner 13–14 × 4–5 mm, glabrous, elliptic or oblong, apex acute, mucronulate, margin hyaline; corolla infundibuliform, white, 2.8–3 cm, tube 1.1–1.5 cm, limb 1.3–1.6 cm, midpetaline bands glabrous; stamens longer 1,8–2 mm, shorter 17–19 mm, base villous, anthers basifixed, twisted after anthesis, elliptic, 5.5–6 mm long; styles 2, ca. 24 mm long, stigmas 2, globose. Capsule ovoid, 1–1.3 × 0.8–1.2 cm, glabrous; seed ovoid, brown, velutinous, white or brown trichomes, 5.5 × 4–4.5 mm.

Specimens examined: Sacramento, estrada São Roque de Minas - Sacramento, próximo ao córrego dos Passageiros, 13.V.1995, fl., *R. Romero et al. 2230* (HUFU, SP). São Roque de Minas, Estrada São Roque de Minas - Sacramento, 60 km, 22.II.1997, fl., *J.N. Nakajima et al. 2254* (HUFU, SP); estrada para a garagem das Pedras, 23.III.1996, fl., *J.N. Nakajima et al. 1704* (HUFU, SP).

The species is native and restricted to Brazil, occurring in broad distribution only in the Cerrado domain; presence confirmed in the states of Distrito Federal, Maranhão, Goiás, Minas Gerais, São Paulo, and Paraná (Simão-Bianchini *et al.* 2023).

In PNSC, it occurs along the forest edges; in fields, sometimes associated to rocky outcrops.

It can be immediately recognized by the dense tomentose indumentum with stellate trichomes, and simple (rarely compound) leaves, with elliptic or ovate leaflets. The number of leaflets can vary, even on the same individual. Most individuals from Serra da Canastra present entire leaves. Only the specimen *Nakajima et al. 2254* has compound leaves with 2–3 leaflets. *Nakajima & Romero 1704* has an unusual supplementary bud in the axils of each branch. These uncommon characters may be related to a mutation, already described in Convolvulaceae by Hunziker & Crovetto (1944). *Distimake maragniensis* resembles *D. tomentosus* (Choisy) Petrongari & Sim.-Bianch. for the tomentose indumentum and elliptical leaves, but differs in being a prostrate herb with twining apex and longer internodes, whereas *D. tomentosus* is an erect subshrub with entire leaves and has shorter internodes.

This taxon was described by Choisy (1845: 351) as *Ipomoea maragniensis* Choisy and faced a long history of identification problems. Austin & Staples (1983) proposed the combination *Merremia digitata* (Spreng.) Hallier f. var. *elongata* (Choisy) D.F.Austin & Staples (1983: 484) based on *Batatas tomentosa* Choisy var.

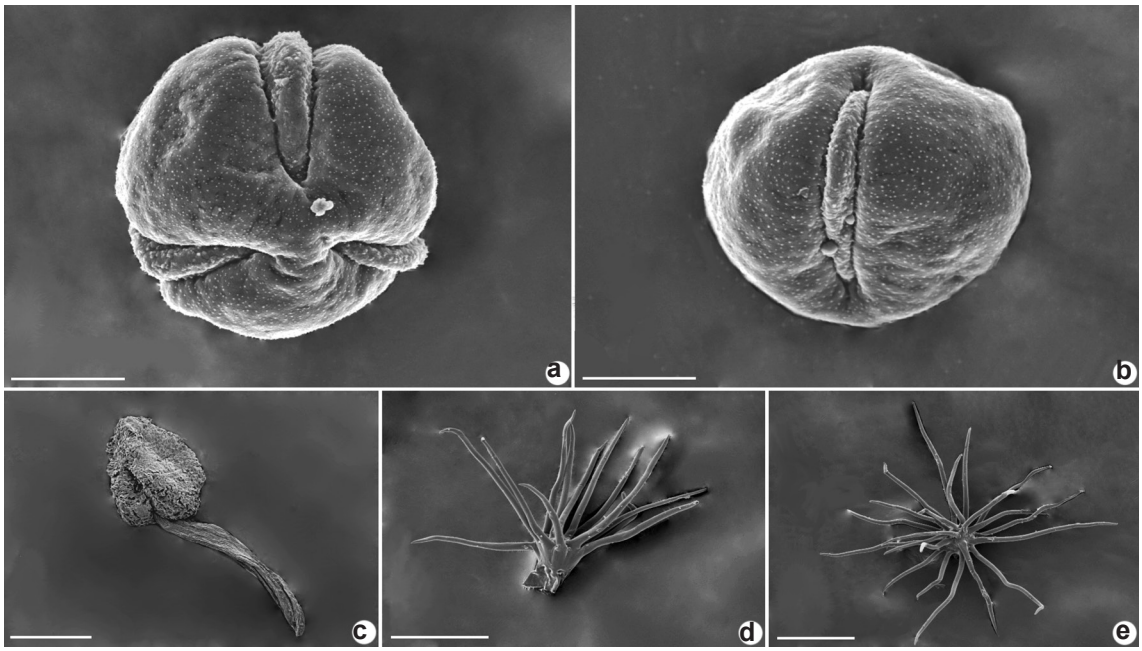

Figure 7 – a-e. Scanning electron micrographs of species of *Distimake* – a-c. *D. maragniensis* – a. pollen grain in polar view; b. pollen grain in equatorial view; c. stigmas; d-e. *D. tomentosus* – d. stellate trichome in lateral view; e. stellate trichome in frontal view. (a-c. *Nakajima et al. 2254*; d-e. *Kojima & Bianchini 23*). Scales: a, b = 20 μm; c = 500 μm; d, e = 200 μm.

elongata Choisy (1845: 337). More recently, after dissolution of the tribe "Merremiae" and split of the genus *Merremia* (Simões & Staples 2017), this taxon was recombined in *Distimake*, under the name *D. maragniensis* (Petrongari *et al.* 2018).

In flower and fruit from January to July.

2.2. *Distimake tomentosus* (Choisy) Petrongari & Sim.-Bianch., Phytotaxa 340(3): 299. 2018. Type: BRAZIL. SÃO PAULO: *Prov. St.-Paul. campis elevatis*, 1835, *P.W. Lund s.n. [766]* (G *pro parte*: only left-hand specimen - G00134821 image!).

Figs. 4b; 7d-e

Erect subshrub, 60–70 cm tall; stem 2.5–3.5 mm diam., branched, tomentose, cinereous, stellate trichomes with numerous branches; internodes 0.7–2 cm long. Leaves simple, entire, narrow-elliptic, 4.5–8.3 × 0.9–3.4 cm, base rounded or attenuate, apex rounded, margin entire, densely tomentose on both surfaces, brochidodromous, veins sulcate in adaxial surface, protrudingprotruding below; petiole 2–5 mm long. Inflorescence axillary 1–4 flowered dichasium; sessile; bracteole ovate or subulate, apex acute, 1.3–2 mm long, tomentose; pedicel 0.3–2 mm long, stellate tomentose; sepals unequal, outer 4–5.5 × 2–3 mm, inner 7–8.5 × 4–5.5 mm, ovate, apex rounded, glabrous or sparse pilose, trichomes more concentrated in margin and apex; corolla campanulate-infundibuliform, white, 2.3 cm, tube 1.3 cm, limb ca. 1 cm, midpetaline bands glabrous, well demarcated; stamens longer 8–9 mm, shorter 7–8 mm, base villous, anthers basifixed, twisted after anthesis, elliptic, 3.5–4 mm long; styles 2, ca. 12 mm long, stigmas 2, globose. Capsule ovoid, 0.5–1.1 × 0.45–0.8 cm, glabrous; seed ellipsoid, brown, velutinous, brown trichomes, ca. 6 × 3.5 mm.

Specimens examined: Delfinópolis, Fazenda Água da Serra, trilha "Escada de Pedras", 10.III.2003, fl., *R.A. Pacheco et al. 486* (HUFU, MBM); Cerrado próximo à entrada do Parque, 26.VII.1993, fl., *R. Simão-Bianchini & S. Bianchini 434* (SP). São Roque de Minas, trilha para cachoeira do Ricardo e do Sonho, 14.II.2018, fl., *R.K. Kojima & R. Simão-Bianchini 23* (SP).

It is native, typical of Cerrado domain and occurs only in Brazil, with broad distribution in Distrito Federal, Tocantins, Bahia, Goiás, Minas Gerais, São Paulo, and Paraná (Simão-Bianchini *et al.* 2023).

In Serra da Canastra it is very well represented and was found in several places inside the park, in the counties of Capitólio, Delfinópolis, and São Roque de Minas, in "campo rupestre", rocky outcrop, "campo sujo seco", rocky soil, forest edge and in groove border physiognomies.

Distimake tomentosus can be easily distinguished from the other Convolvulaceae in the PNSC for being an erect, branched, subshrub, with tomentose indumentum and short internodes; it resembles *D. maragniensis*, as already discussed. It has the habit similar to that of *Ipomoea pohlii* Choisy, but the trichomes are very distinct.

In flower and fruit from February to December. In Serra do Espinhaço range, where there are similar geological and ecological conditions to the PNSC, the species was collected in flowers all year round (Simão-Bianchini & Pirani 1997; Rodrigues-Lima 2017).

3. *Evolvulus* L., Species Plantarum (ed. 2) 1: 391. 1762.

Evolvulus is a genus of about 100 species, predominantly in the American continent. Only two species have cosmopolitan distribution: *Evolvulus alsinoides* (L.) L. (1762: 392) and *E. nummularius* (L.) L. (1762: 391) (Ooststroom 1934). In Brazil, 71 species are recorded, 50 of which are restricted to the country. They occur in all phytogeographical domains, mainly in Cerrado, followed by Caatinga and Atlantic Rainforest. Cerrado and Caatinga are important centers of diversity of *Evolvulus*, due to occurrence of a high number (59) species, several restricted. Minas Gerais is the Brazilian state with the highest species diversity of *Evolvulus*, with 55 species recorded (Simão-Bianchini *et al.* 2023).

The species of this genus are recognized for their herbaceous, subshrub, erect, prostrate or repent habit (Fig. 6h); the trichomes are malpighiaceous or forked, with often unequal branches, rarely equal (Fig. 8a-b); the leaves are simple, entire, ovate, oblong, lanceolate or linear, sessile or short-petiolate (Fig. 4c-d); the axillary inflorescence has few to numerous flowers, the bract is leafy (Fig. 4d-f); the flowers are small (Fig. 6h,i,l), corolla is campanulate, infundibuliform, hypocrateriform or rotate (Figs. 4d-f; 6i,l); the pollen is spheroidal, tricolpate or pantocolpate, exine psilate, tectate or microechinate (Fig. 8c-e); the two styles are free or united at base, each of them with two stigmas, cylindric, elongate or spatulate (Figs. 6g,j-k; 8f); the capsules are 4-valved and glabrous (Ooststroom 1934; Simão-Bianchini 2009; Buril-Vital *et al.* 2008; Silva 2013).

Identification key for *Evolvulus* species in Serra da Canastra

1. Erect subshrubs; tomentose plants, golden trichomes ..... 3.4. *Evolvulus goyazensis*
1'. Erect, prostrate or repent herbs; glabrescent, hirsutulous, dense or sparsely sericeous-villous plants, translucent trichomes.
   2. Terete stem; ovate, broad-ovate, narrow-ovate, elliptic or oblong leaves with non decurrent base; eucamptodromous venation; not winged petiole 0–2 mm long.
      3. Stem branched from the base; conduplicated leaves at branches apex, rounded, cuneate, attenuate or cordate leaves base; dichasium inflorescence.
         4. Erect, prostrate or repent herbs; glabrous to hirsutulous plants ..... 3.1. *Evolvulus aurigenius*
         4'. Cespitose, erect branches with some of them prostrate; dense sericeous-villous or sparse sericeous plants ..... 3.2. *Evolvulus cressoides*
      3'. Stem branched from the middle; leaves not conduplicated, acute leaves base; spiciform to glomerular inflorescence ..... 3.3. *Evolvulus glomeratus*
   2'. Winged stem; narrow-elliptic or lanceolate leaves with decurrent base; hyphodromous venation; winged petiole 2.5–5 mm long.
      5. Upper leaves decreasing in size in comparison with lower ones; seeds ca. 1.5 × 1.5 mm ..... 3.5. *Evolvulus lagopodioides*
      5'. Lower and upper leaves of the same size; seeds ca. 2.5 × 1.5 mm ..... 3.6. *Evolvulus pterygophyllus*

3.1. *Evolvulus aurigenius* Mart., Flora 24(2): 100. 1841. Type: BRAZIL. MINAS GERAIS: *Inter Cattas Altas et Inficionado, C.F.P. von Martius 1290* (M0184332 image!). Figs. 6f-g; 8a

Erect, prostrate or repent herb, branched from the base, 8–19 cm tall; tap root; stem 0.5–1 mm diam., terete, glabrous to hirsutullous, simple trichomes, 0.5–1.5 mm long, and malpighiaceous trichomes, with equal, short branches, ca. 0.25 mm long, or one shorter and another one longer, patent; internodes 0.6–1.6 cm long. Leaves ovate, broad-ovate or elliptic, conduplicate at apex of the branches, generally in young ones, 1.1–2.1 × 0.8–1.2 cm, base rounded or cordate, apex acute or rounded, margin entire, adaxial surface glabrous, sparse pilose or hirsute, abaxial surface hirsutullous or hirsute, denser in primary veins and in leaf base, two layers of indumentum, simple trichomes, 0.5–1(–1.5) mm long, interspersed by malpighiaceous trichomes, eucamptodromous, veins sulcate or inconspicuous in adaxial surface, protruding in abaxial surface; petiole 0–2 mm long. Inflorescence of 1–2 flowered axillary dichasium; peduncle absent; bracteole lanceolate or triangular, apex acute or acuminate, 1–2.5 mm long, sericeous, ciliate; pedicel 0.5–1 mm long, sericeous; sepals subequal, outer 2.5–3.5 × 0.5–1 mm, inner 3.5–4 × 0.5–1 mm, lanceolate, apex acute or acuminate, glabrous, sparse hirsutullous in all surface or only at vein, in 1/3 upper, ciliate; corolla hypocrateriform, blue, 1.5–2.4 cm, tube 0.8–1.4 cm, limb 0.7–1 cm, midpetaline bands sericeous; stamens 4,5–5 mm, base glabrous, anthers basifixed, stamens free at base, inserted ca.12 mm above from the base of corolla, elliptic, 1.5–2 mm long; styles 2, free at base, 11–12 mm, stigmas 2, linear, papillose after bifurcation, ca. 6 mm. Capsule ovoid, ca. 3.5 × ca. 3 cm, glabrous; seed ovoid, granular, brownish or vinaceous, 2–2.5 × 1–1.5 mm.

Specimens examined: *Evolvulus aurigenius* var. *aurigenius*: São Roque de Minas, Guarita de Sacramento, 6.III.1994, fl., *R. Romero & J.N. Nakajima 1432* (HUFU). *Evolvulus aurigenius* var. *macroblepharis* estrada para a Serra da Chapada, 8.I.1998, fl., *R. Romero et al. 4795* (HUFU). *Evolvulus aurigenius* var. *meissnerianus* estrada do Chapadão Diamante, 18.III.1995, fl., *J.N. Nakajima et al. 842* (HUFU).

Restricted to Brazil, extending from Distrito Federal and Goiás (Central Brazil) to Minas Gerais and São Paulo (Southern Brazil), in Cerrado domain (Simão-Bianchini *et al.* 2023).

Identification key to the varieties of *Evolvulus aurigenius* in Serra da Canastra

1. Leaves hirsute ..... 3.1.1. *Evolvulus aurigenius* var. *aurigenius*
1'. Leaves glabrous, hirsutulous or sparse hairy.

2. Leaves adaxial surface glabrous; sepals glabrous, ciliate ..... 3.1.2. *Evolvulus aurigenius* var. *macroblepharis*

2'. Leaves hirsutulous or sparse hairy on both sufaces; sepals sericeous or glabrous only at base ..... 3.1.3. *Evolvulus aurigenius* var. *meissnerianus*

It is a native species in the PNSC, generally associated with rocky soil: in "campo rupestre", "campo limpo", "campo sujo", "campo cerrado", and forest edges. *Evolvulus aurigenius* var. *aurigenius* was collected predominantly in "campo rupestre"; *E. aurigenius* var. *macroblepharis* was collected in "campo rupestre"; *E. aurigenius* var. *meissnerianus* was found in "campo limpo" and "campo rupestre" physiognomies, and in forest edges. This last variety has been recorded only in the state of Minas Gerais. *Evolvulus aurigenius* is a well-represented species in PNSC, occurring in preserved areas.

According to Ooststroom's (1934) revision of *Evolvulus*, there are two varieties of *E. aurigenius* which can be distinguished by the vestiture.While *Evolvulus macroblepharis* Mart. was considered as a distinct species, here the concept of Hassler (1911) is followed.

Evolvulus aurigenius can be recognized for the prostrate, ascending or repent habit, conduplicated leaves, generally in younger ones is easily observed; cordate leaf base, and hirsutullous or glabrous indumentum. It resembles *E. cressoides*, but it differs from *E. aurigenius* for the cespitose habit and sparse-sericeous leaves, or dense indumentum. *E. rariflorus* (Meisn.) Ooststr. (1934: 159) is also similar to *E. aurigenius*, which can be distinguished for the smaller and narrower tomentose leaves.

Evolvulus aurigenius var. *aurigenius* is distinguished for the dense indumentum on both surfaces of the leaves, mainly on the central vein, and sepals with rare, sparse, long trichomes (0.5–1.5 mm); *E. aurigenius* var. *macroblepharis* (Mart.) Hassl. (1911: 197) has glabrous leaves on adaxial surface, and sparse trichomes on the abaxial surface; glabrous, ciliate sepals, it was considered a distinct species by Ooststroom (1934); *E. aurigenius* var. *meissnerianus* Ooststr. (1934: 155) has intermediate indumentum, slightly small trichomes (0.7–1 mm long.), sparse on both leaves surface and sepals base glabrous, apex sericeous. The reproductive parts are similar in all varieties, not being an important criterion to split the taxa. Only *E. aurigenius* var. *macroblepharis* presents repent habit. The morphological plasticity of complex *E. aurigenius* about the habit, that can be prostrate, repent or ascending, sometimes rooting in nodes, less or quite branched from the base, generates confusion in identifications.

Flowering from December to May.

3.2. *Evolvulus cressoides* Mart., Flora 24 (2): 100. 1841. Type: BRAZIL MINAS GERAIS: in high campos near Villa de Campanha, *C.F.P. von Martius s.n.* (M0184321 image!).

Figs. 4c-d; 6h; 8b,f

Cespitose herb, with erect branches and some of them prostrate, branched from the base, 10–20 cm tall; tap root; stem 0.5–1 mm diam., terete, dense sericeous-villous to sparse sericeous, long simple trichomes, 1–1.5 mm long, interspersed by short malpighiaceous trichomes, branches ca. 0.25 mm long; internodes 0.3–1 cm long. Leaves ovate or narrow-ovate, conduplicate at apex of the branches when young, 0.9–1.6 × 0.3–0.8 cm, base rounded, cuneate or subcordate, apex acute or attenuate, margin entire, ciliated, adaxial surface glabrous, sparse pilose or hirsute, abaxial surface hirsutullous or hirsute, denser in primary veins and in leaf base, two layers of indumentum, simple trichomes, 0.5–1(–1.5) mm long, interspersed by malpighiaceous trichomes, eucamptodromous, veins sulcate or inconspicuous in adaxial surface, protruding in abaxial surface; petiole 0–1.5 mm long. Inflorescence of 1–2 flowered axillary dichasium; peduncle absent; bracteole lanceolate, apex acute, 0.5–1.5 mm long, glabrous or sericeous, ciliate; pedicel 0-1 mm long, glabrous or sericeous; sepals unequal, outer 2–3 × 0.5–0.8 mm, inner 3–3.2 × 0.5–0.7 mm, ovate or lanceolate, apex acute or acuminate, sericeous or dense sericeous, ciliate, glabrous ventrally; corolla hypocrateriform, blue, 1.1–1.7 cm, tube 0.5–0.9 cm, limb 0.6–0.8 cm, midpetaline bands sericeous, white trichomes; stamens 3,3–4 mm, base glabrous, anthers basifixed, stamens free at base, inserted ca. 8.2–9 mm above from the base of corolla, elliptic, ca. 1mm long; styles 2, free at base, 8–10 mm, stigmas 2, linear, papillose after bifurcation, 2.5–3 mm. Capsule ovoid, 3–3.5 x 3–3.5 mm, glabrous; seed ovoid or ellipsoid, granular, yellowish with brownish granules, 1.5–2 × 0.8–1 mm.

Specimens examined: Capitólio, 17.II.2018, fl. and fr., *R.K. Kojima & R. Simão-Bianchini 25* (SP). São Roque de Minas, estrada São Roque de Minas - Sacramento, cerca de 32 km da sede administrativa, 9.XII.1994, fl., *J.N. Nakajima & R. Romero 744* (HUFU); torre de observação, estrada Sacramento-São Roque de Minas, 11.I.1998, fl., *R. Romero et al. 5008* (HUFU); 11.I.1998, fl., *R. Romero et al. 5010* (HUFU); 23 km da sede, 19.IV.1994, fl., *J.N. Nakajima et al. 307* (HUFU).

It is native and restricted to Brazil, occurring from Distrito Federal and Goiás to Minas Gerais and São Paulo, on Cerrado domain (Simão-Bianchini *et al.* 2023).

Evolvulus cressoides was found in "campo limpo", "campo sujo", and rocky outcrop physiognomies, after burning. The specimens were collected always in high altitudes.

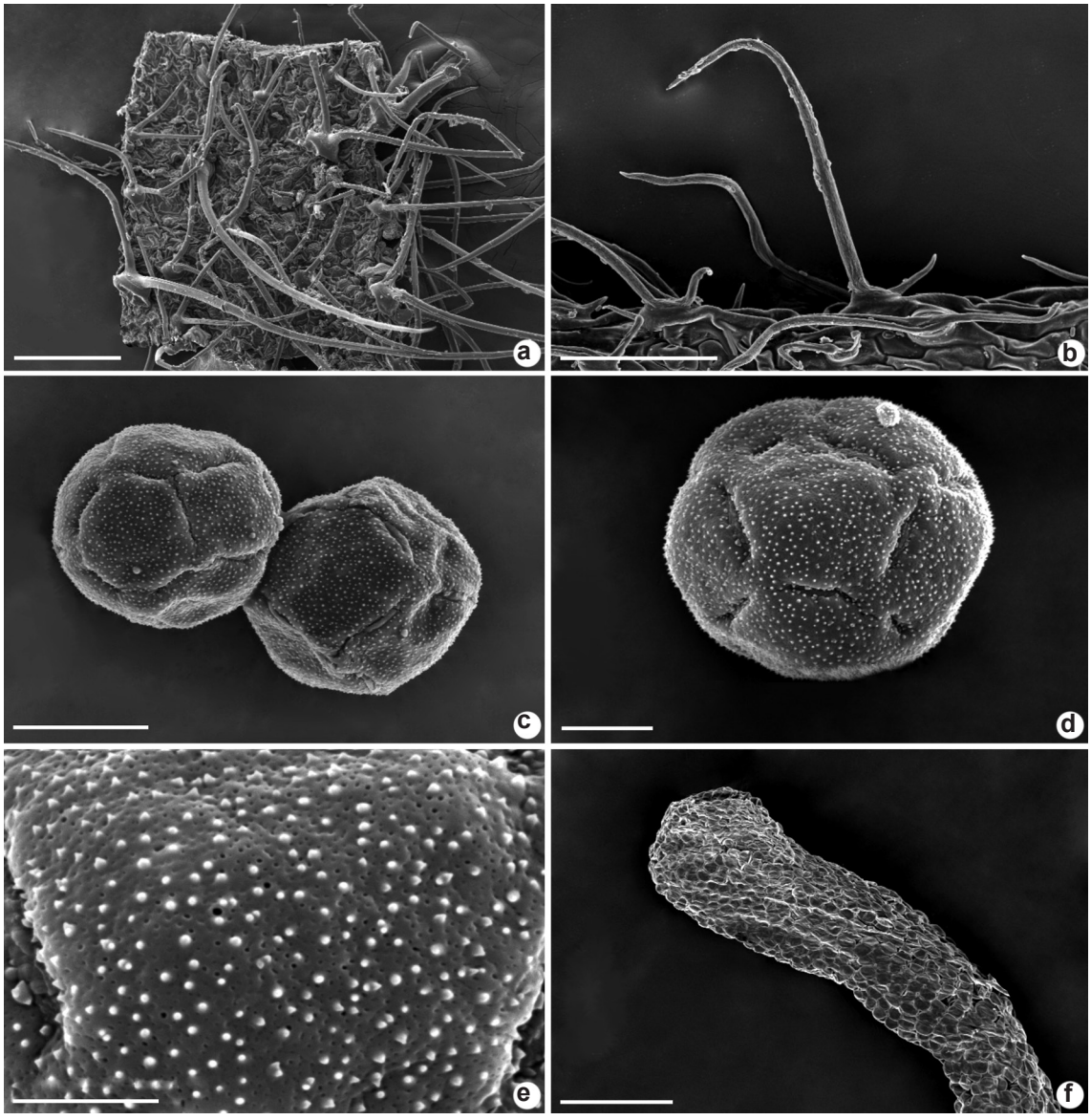

Figure 8 – a-f. Scanning electron micrographs of species of *Evolvulus* – a. *E. aurigenius* – indumentum with malpighiaceous trichomes; b, f. *E. cressoides* – b. detail of malpighiaceous tricome in lateral view; f. stigma; c-e. *E. lagopodioides* – c. pollen grains; d. pollen grain in general view; e. detail of pollen grain ornamentation. (a. *Romero et al. 1613*; b,f. *Kojima & Bianchini* 25; c-e. *Romero et al. 2175*). Scales: a = 200 μm; b, f = 100 μm; c = 20 μm; d = 10 μm; e = 5 μm.

Evolvulus cressoides is distinguished by its erect cespitose habit, with some lateral prostrate branches, dense or sparse sericeous-villous indumentum with long (1.5–2 mm long.) or short trichomes (ca. 1 mm long.), ovate to narrow-ovate leaves, conduplicated when young. The material *R.K. Kojima & R.S. Bianchini 25* has smaller narrow-ovate leaves (0.9–1.3 cm long.) with sparse trichomes on both leaf surfaces. *Evolvulus cressoides* quite resembles *E. aurigenius* in form and measurements of leaves and sepals, but the first might be distinguished by cespitose habit, with many erect branches and dense sericeous-villous to sparse sericeous indumentum, whereas *E. aurigenius* has erect, prostrate or repent habit, not cespitose, and glabrous to hirsutulous leaves.

The species was found reproductive in January, February and April. In the remainder of its distribution, it flowers over the months of January to April.

3.3. *Evolvulus glomeratus* Nees & Mart., Nova Acta Phys.-Med. Acad. Caes. Leop.-Carol. Nat. Cur. 11(1): 81. 1823. Type: BRAZIL. BAHIA: Circa Tamburil et Valos, *Prince zu Wied-Neuwied s.n.* (BR0000006588540 image!; MEL2353843 image!). Fig. 4e

Erect or prostrate herb, 15–30 cm tall; tap root; stem 1–2 mm diam., terete, sericeous, simple trichomes, ca. 3 mm long; internodes 0.6–1.2 cm long. Leaves elliptic or oblong, 1.4–2.2 × 0.3–0.7 cm, base acute, apex acute or obtuse, margin entire, sericeous in both surfaces, denser in abaxial surface, eucamptodromous, veins sulcate in adaxial surface, protruding in abaxial surface; petiole 0.5–2 mm long. Inflorescence of 1–4 flowered terminal congested spiciform, globose; peduncle absent; bracteole narrow-elliptic, apex acute, 8–10 mm long, sericeous; flowers sessile; sepals equal, 5–6.5 × 0.5–1 mm, narrow-triangular or lanceolate, apex acuminate, sericeous; corolla hypocrateriform, blue or purple, tube white, ca. 1.5 cm, tube ca. 0.8 cm, limb ca. 0.5 cm, midpetaline bands sericeous; stamens 5.5–6 mm, base glabrous, anthers basifixed, stamens free at base, inserted ca. 8.2–9 mm above from the base of corolla, elliptic, ca. 2.5 mm long; styles 2, united to 2.5–5.5 mm from base, 5.6–7 mm total long, stigmas 2, linear, papillose after bifurcation, ca. 3.5 mm. Capsule ovoid, 2.5–3 × 2.5–3 mm, glabrous; seed ellipsoid, brownish, granular, 1.5–2 × 1.5–2 mm.

Specimens examined: Sacramento, estrada São Roque de Minas - Sacramento, próximo à torre de observação, 11.XII.1994, fl., *J.N. Nakajima & R. Romero 764* (HUFU, SP); guarita de Sacramento, 18.XI.1995, fl., *R. Romero et al. 3048* (HUFU); 6.XII.1994, fl., *R. Romero & J.N. Nakajima 1441* (HUFU).

It is a heliophilous species that occurs in sandy soils, native of Brazil and broadly distributed in South America (Simão-Bianchini 2009). It occurs in all phytogeographical domains in Brazil, except in Pantanal. It is only not referred to the states of Amapá and Tocantins (Simão-Bianchini *et al.* 2023). This species is widely cultivated and so there is a selection of plants with larger and more numerous flowers.

In Serra da Canastra, *E. glomeratus* was found in "campo rupestre" and "campo limpo" associated to rocky outcrop physiognomies, frequently on the roadside.

Evolvulus glomeratus is easily recognized by the presence of undeveloped lateral gems in the leaf axils, forming a very short branch with congested undeveloped leaves, and by inflorescences enveloped in leafy bracts, with internodes reduced and sessile flowers. It resembles *E. echioides* Moric. (1838: 55), which differs in the erect habit, little branched, absence of development of short branches with congested leaves and scarious margin in sepals. Ooststroom (1934) recognized several subspecies, varieties and forms, and all specimens found in PNSC belongs to *E. glomeratus* subsp. *eu-glomeratus* Ooststr. (1934: 225).

The material *R. Romero et al. 3048* has an unusual three styles, partially united at the base and one locule of ovary has three ovules, rather than two. The material refering to *R. Romero & J.N. Nakajima 1441* has anthers with epidermal vesicles, another character not common in this species. Both materials were collected in Guarita de Sacramento, São Roque de Minas County. These anomalies support the occurrence of mutations in this species, as known in some species of *Cuscuta* (Hunziker & Crovetto 1944). The event might occur in cultivated species as *E. glomeratus* which is commercialized as ornamental. It is also known as "mimo-do-céu" or "vassourinha-rasteira" (Simão-Bianchini & Pirani 1997).

It was collected reproductive from November to February. In other regions, it blooms throughout the year (Junqueira & Simão-Bianchini 2006; Simão-Bianchini 2009).

3.4. *Evolvulus goyazensis* Dammer, Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie 23(57): 37. 1897. Type: BRAZIL. GOIÁS: *Barra Du Rio Torto avec le Rio Paranana*, 14.II.1895, *A.F.M. Glaziou 21802* (BR0000006974503 image!; C10009651 image!; F0054799F image!; K000613176!; MPU012079 image!; NY00319023!; P03546835!; P03546832!; R000012196!; RB00538238!; S04-1923 image!; US00111215 image!).
= *Evolvulus goyazensis* Dammer var. *penicillatus* Ooststr., Meded. Bot. Mus. Herb. Rijks Univ. Utrecht 14: 217. 1934. (Syn. nov.). Type: BRAZIL. GOIÁS: *Barra Du Rio Torto avec le Rio Paranana*, *A.F.M. Glaziou 21802* (S12-527 image!).

Fig. 6i-k

Erect subshrub, caducous leaves at basal portion, 20–50 cm tall; tap root; stem 1–2.5 mm diam., terete, tomentose, golden trichomes, ca. 2.5 mm long; internodes 0.6–2 cm long. Leaves ovate-oblong, broad-ovate toward apex, clustered in a terminal spike at apex, 1.5–2.8 × 0.4–1.4 cm, base rounded, apex acute, margin entire, tomentose in both surface, bifurcate trichomes, one branch longer, 1.5–2 mm long and another shorter, ca. 0.5 mm long, eucamptodromous, veins slightly sulcate in adaxial surface, slightly protruding in abaxial surface; petiole 0.5–1 mm long. Inflorescence of 1–3 flowered axillary congested spiciform dichasium; peduncle absent; bracteole lanceolate, apex acute, 2–4.5 mm long, tomentose; flowers sessile; sepals equal or subequal, 2–5 × 2.5–3 mm, lanceolate, apex acute or acuminate, sericeous; corolla hypocrateriform, lilac or bluish, 0.8–1.8 cm, tube 0.3–1 cm, limb 0.5–1 cm, midpetaline bands sericeous; stamens 3–3.8 mm, base glabrous, anthers basifixed, stamens free at base, inserted ca. 8–9 mm above from the base of corolla, elliptic, ca. 1.2 mm long; styles 2, united to 5–5.5 mm from the base, 8.5–9 mm total long, stigmas 2, linear, papillose at upper 2/3, 3–3.5 mm. Capsule ovoid, ca. 3 × ca. 2.5 mm, glabrous; seed ellipsoid, granular, yellowish, ca. 2.5 × 1.5 mm.

Specimens examined: Sacramento, estrada para o Retiro das Pedras, 14.V.1995, fl., *R. Romero et al. 2267* (HUFU, SP). São Roque de Minas, estrada para o retiro das Pedras, 21.III.1996, fl., *J.N. Nakajima & R. Romero 1676* (HUFU); estrada para a Cachoeira dos Rolinhos, 9.I.1998, fl., *R. Romero et al. 4870* (HUFU); estrada para a Serra da Chapada, 8.I.1998, fl., *R. Romero et al. 4807* (HUFU); estrada para o Retiro das Pedras, 18.IV.1997, fl., *J.N. Nakajima et al. 2385* (HUFU, SP); próximo à divisa do parque, 23.II.1997, fl., *R. Romero et al. 3954* (HUFU); 20.IV.1994, fl., *R. Romero et al. 993* (HUFU).

It is native and restricted to Brazil, occurs only in Cerrado domain, in the states of Goiás and Minas Gerais (Simão-Bianchini *et al.* 2023).

In Serra da Canastra, *E. goyazensis* was collected in physiognomies of "campo limpo", rocky outcrop, "campo cerrado", "campo sujo", "campo rupestre", and in hydromorphic field.

Evolvulus goyazensis is easily recognized by erect branches with densely tomentose indumentum with golden trichomes, terminally congested, spike-like, inflorescences with sessile flowers. Ooststroom (1934) recognized *E. goyazensis* var. *penicillatus* Ooststr. (1934: 217) based only on the not-so-dense inflorescence as the typical form, citing the same collection of Glaziou under both varieties (*Glaziou 21802*), and the holotype of *E. goyazensis* var. *penicillatus* is one of the materials of S herbarium (S12-527). We propose the synonymization of the varieties based on this fact, and mainly due to the variation observed in the specimens studied from Serra da Canastra, in which the inflorescence may vary between more dense and less dense in the same population or even in the same sample.

The species resembles *E. chapadensis* Glaz. *ex* Ooststr. (1934: 218), though it forms a dense clump at base, it is more branched and with broader sepals. *Evolvulus tomentosus* (Meisn.) Ooststr. (1934: 219) is also quite similar to *E. goyazensis*, which is distinguished by the solitary flowers and flower-bearing leaves not forming a dense cylindric spike, longer internode and broader sepals. In some herbaria, there is confusion in identifications between *E. goyazensis* and *E. tomentosus*.

The species was found in flower and fruit from December to May. In the remainder of its distribution, it flowers from January to March (Siva 2013).

3.5. *Evolvulus lagopodioides* Meisn., in *Flora brasiliensis* 7: 333. 1869. Types: BRAZIL. GOIÁS: Chapada de S. Marcos, *Riedel 2515* (K000613167!; NY00319029!; NY00319030!). MINAS GERAIS: Lagoa Santa, *Lund s.n.* (BR0000005792658 image!). Fig. 8c-e

Erect herb, 30–40 cm tall; tap root; stem simple or with few branches, 1–2 mm diam., winged, glabrescent or sparse sericeous; internodes 0.6–2 cm long. Leaves narrow-elliptic or lanceolate, 1.1–2(–2.7) × 0.15–0.25 cm, base decurrent on petiole, apex acute, margin entire, adaxial surface glabrous, abaxial surface sericeous or glabrescent, hyphodromous, veins sulcate in adaxial surface,

protrudingprotruding in abaxial surface; petiole winged, 3–5 mm long. Inflorescence multiflorous terminal glomeruliform, globose or elongated; peduncle absent; bracteole subulate or linear, apex acuminate, 4–7 mm long, dense villous; flowers sessile; sepals equal, 3.5–5 × 0.25–0.5 mm, narrow-triangular or subulate, apex acuminate, dense villous; corolla hypocrateriform, blue, 1–1.2 cm, tube 0.5–0.7 cm, limb 0.4–0.5 cm, midpetaline bands sericeous; stamens ca. 4.3 mm, base glabrous, anther basifixed, stamens free at base, inserted ca. 2–3 mm above from the base of corolla, elliptic, 1.5–1.7 mm long; styles 2, free at base, united ca. 2 mm from base, ca. 7 mm total long, stigmas 2, linear, papillose at upper 2/3, ca. 4.5 mm. Capsule globose or ovoid, apiculate, 2–3.5 × 1.75–2 mm, glabrous; seed ellipsoid, brownish, granular, ca. 1.5 × 1.5 mm.

Specimens examined: Sacramento, Chapadão do Diamante, 11.V.1995, fl., *R. Romero et al. 2175* (HUFU, SP). São Roque de Minas, trilha do córrego da Fazenda, 20.III.1996, fl., *R. Romero & J.N. Nakajima 3369* (HUFU); Chapadão do Diamante, 18.IV.1997, fl., *J.N. Nakajima et al. 2323* (HUFU).

The occurrencence of this species is restricted to Brazil, typical of Cerrado domain. It comprises the Distrito Federal and the states of Goiás and Minas Gerais (Simão-Bianchini *et al.* 2023).

In Serra da Canastra, it was found in "campo limpo" frequently associated with rocky outcrop, "campo rupestre", sandy soil and hydromorphic field, sometimes after fire, encompassing Córrego da fazenda trail, Chapadão do Diamante, road to Retiro das Pedras and road of Rio Morto, in county of São Roque de Minas.

Evolvulus lagopodioides is distinguished for being an erect herb, few branched, glabrous or sericeous-glabrescent, decurrent leaf-bases, having a glomeruliform, globose or elongated, and congested terminal inflorescence. The species resembles very closely *E. pterygophyllus* Mart. (1841: 96). According to Ooststroom (1934) they can only be distinguished from each other for the bracts length, which are longer than sepals in *E. pterygophyllus*, and by upper leaves length, which decrease in size in comparison with lower ones in *E. lagopodioides*. The criterion we used to distinguish the species of Serra da Canastra was the length of upper leaves. In the examined material, bracts longer and shorter than the sepals were found in the same inflorescence, so it was not an appropriate character to distinguish these species. *Evolvulus lagopodioides* is also similar to *E. pterocaulon* Moric. (1844: 140) and *E. lagopus* Mart. (1841: 96), the second differing in longer and broader leaves, with villous or lanuginose indumentum; the last have lanate or dense villous indumentum, and leaf base slightly rounded, not distinctly decurrent. All these species belong to the same section *Lagopodini* Meisn. (Ooststroom 1934).

In PNSC, it was collected reproductive from February to July.

3.6. *Evolvulus pterygophyllus* Mart., Flora 24 (Beibl 2): 96. 1841. Type: BRAZIL. GOIÁS, 1839, *Pohl s.n.* (BR0000006973162 image!; BR0000006973490 image!; BR0000005949229 image!; M0184583 image!). Figs. 4f; 6l

Erect herb, little branched above the median portion, 16–30 cm tall; tap root, gemmiferous; stem 1–2 mm diam., winged, glabrescent or appressed-lanate, cinereous, simple trichomes; internodes 0.5–2.2 cm long. Leaves narrow-elliptic or lanceolate, (1.3–)2–3.1 × 0.2–0.4 cm, base decurrent on petiole, apex acute or acuminate, margin entire, glabrescent or appressed-lanate in both surfaces, more densely in adaxial surface, hyphodromous, veins sulcate in adaxial surface, protruding in abaxial surface; petiole winged, 2.5–4 mm long. Inflorescence multiflorous terminal glomeruliform, globose or elongated; peduncle absent; bracteole subulate or linear, apex acuminate, 3–5.6(–10) mm long, dense villous; flowers sessile; sepals equal, 4–4.5(–5.8) × 0.25–0.5 mm, narrow-triangular or subulate, apex acuminate, dense villous; corolla hypocrateriform, blue, ca. 1cm, tube 2–4.5 mm, limb 4–7 mm, midpetaline bands sericeous; stamens ca. 6.6–7 mm, base glabrous, anthers basifixed, stamens free at base, inserted ca. 4.5 mm above from the base of corolla, elliptic, 1.3–1.5 mm long; styles 2, free at base, 7–8 mm, stigmas 2, linear, papillose at upper 2/3, 2.5–3 mm. Capsule ovoid, ca. 3 × ca. 2.5 mm, glabrous; seed ovoid, granular, black, ca. 2.5 × 1.5 mm.

Specimens examined: *Evolvulus pterygophyllus* var. *pterygphyllus*. BRAZIL. MINAS GERAIS: São Roque de Minas, estrada para Cachoeira dos Rolinhos, 14.V.1995, fl., *R. Romero et al. 2288* (HUFU). *Evolvulus pterygophyllus* Mart. var. *puberulus* Meisn. PARNA Serra da Canastra, 14.II.2018, fl., *R.K. Kojima & R.Simão-Bianchini 21* (SP).

Species native and restricted to Brazil. It occurs in Caatinga and Cerrado domain, comprising Distrito Federal and Tocantins, Bahia, Goiás, Mato Grosso, Mato Grosso do Sul, Minas Gerais, and rarely São Paulo (Simão-Bianchini *et al.* 2023).

Identification key for the varieties *Evolvulus pterygophyllus* in Serra da Canastra

1. Leaves coriaceous, green, glabrous or sparsely pubescent ..... 3.6.1. *Evolvulus pterygophyllus* var. *pterygophyllus*
1'. Leaves chartaceous, cinereous, glabrescent or appressed-lanate ..... 3.6.2. *Evolvulus pterygophyllus* var. *puberulus*

In Serra da Canastra, the species was collected only in "campo limpo" physiognomy. In PNSC, both varieties were recorded. There is just one material collected in PNSC of *Evolvulus pterygophyllus* var. *pterygophyllus* while *E. pterygophyllus* var. *puberulus* Meisn. (1869: 333) is more frequent.

Evolvulus pterygophyllus can be recognized by decurrent leaf-base, winged petiole and a spicate, dense, congested terminal inflorescence with densely villous sepals. It is similar to *E. pterocaulon*, that can be distinguished by having longer and wider leaves; and *E. lagopus*, which differs by the villose or lanate leaves and the leaves not distinctly decurrent on the petiole. *Evolvulus pterygophyllus* also resembles *E. lagopodioides*, the differences haveing been discussed earlier in the *E. lagopodioides* comments.

It was collected from December to February and May.

4. *Ipomoea* L., Species Plantarum 1: 159. 1753.

The genus *Ipomoea* is the most diverse of Convolvulaceae, comprising about 650 species, being widely distributed in the tropics, subtropics and temperate regions. The genus has a high ecological and economic importance. The sweet-potato - *I. batatas* (L.) Lam. (1793: 465) - is cultivated in more than 100 countries, the most popular tuber consumed all over the world (Austin & Huáman 1996; Austin 1997; Simão-Bianchini 1998; POWO 2023). In Brazil, the genus is the broader one, represented by 146 species, of which 53 are endemic. Representatives of *Ipomoea* occur mainly in Cerrado domain. The state Minas Gerais has 85 species, the state in Brazil with the highest number of species, of which 70 occur in Cerrado (Simão-Bianchini *et al.* 2023).

Its members are subshrubs, voluble or prostrate herbs, rarely trees (Figs. 4g-h; 9e); the indumentum is glabrous or pilose, with simple, malpighiaceous or glandular trichomes, rare stellate (Fig. 10a,e), with variable density; the leaves are entire, cordiform, ovate, oblong, reniform, lobate or palmately compound, sessile or petiole, pseudo-stipule can be present; the inflorescence is dichasium or reduced to just one flower; the corolla is infundibuliform, campanulate, hypocrateriform or tubular, with limb entire or slightly lobate (Figs. 4g,i-j; 9a,e); the stamens might be unequal, with two usually distinctly longer than the other three, inserted near the base of the tube, usually included, or equal, and exserted, the filaments are usually hairy at base, and glabrous above; the pollen is spheroidal, pantoporate, echinate (Fig. 10c-d); the stigma is capitate or globose (Fig. 10f), 1–3 lobes (Silva *et al.* 2018); the capsule is 4-valved (Fig. 9c), seed glabrous or pilose (Fig. 9d) (Austin & Huáman 1996; Simão-Bianchini 1998, 2009).

Identification key for *Ipomoea* species in Serra da Canastra

1. Erect subshrubs.
    2. Stem lanuginose; compound leaves, 6–8 linear-filiform leaflets ..... 4.6. *Ipomoea fiebrigii*
    2'. Stem glabrous, sericeous, lanate or tomentose; entire leaves (linear, linear-filiform, oblong, narrow-ovate or ovate).
        3. Concave sepals, rounded apex.
            4. Stem tomentose to dense sericeous; oblong leaves; crooked trichomes, golden in adaxial surface and silver in abaxial surface; midpetaline bands glabrous ..... 4.3. *Ipomoea argentea*
            4'. Stem glabrescent or sparse sericeous; linear or narrow-ovate leaves; strigose trichomes on both surfaces; midpetaline bands sericeous ..... 4.2. *Ipomoea aprica*
        3'. Flat sepals, acute apex.

5. Glabrous plants, stem striated; linear-filiform leaves, sessile; corolla 3.1–3.5 cm long.; midpetaline bands glabrous.....4.8. *Ipomoea pinifolia*
5'. Lanate or tomentose plants, stem not striated; oblong to ovate leaves, petiolate; corolla 4–6.9 cm long.; midpetaline bands sericeous.
6. Stem tomentose; ovate or oblong leaves, 6–10.7 × (2–)3.1–5.2 cm; ovate sepals; corolla pinkish or purplish, tube inner darker ..... 4.12. *Ipomoea verbasciformis*
6'. Stem lanate; ovate leaves, 4.2–6.5 × 2–2.8 cm; narrow-triangular sepals; corolla pinkish, tube in the same color ..... 4.9. *Ipomoea pohlii*

1'. Prostrate or voluble herbs.
7. Glabrous leaves, trichome sparse in the vein on *I. campestris*; midpetaline bands glabrous or with few trichomes at the apex.
8. Narrow-ovate or lanceolate leaves; short petiolate (1–4 mm) .....4.4. *Ipomoea campestris*
8'. Linear, narrow-elliptic or ovate leaves; long petiolate (4–15 mm).
9. Linear or narrow-elliptic leaves with attenuate base; rugose sepals ....4.10. *Ipomoea procumbens*
9'. Ovate leaves with cordate or oblique base, slightly asymmetric; verrucose sepals..... .....4.11. *Ipomoea procurrens*
7'. Sericeous, hirsute or villous leaves, rare glabrescent; midpetaline bands sericeous.
10. Leaves, bracteoles and sepals hirsute.....4.1. *Ipomoea acutisepala*
10'. Leaves, bracteoles and sepals villous or sericeous.
11. Narrow-ovate, entire or slightly trilobate leaves; ovate sepals with cuneate or acute apex, 7–9.1 mm long.; corolla pink, tube in the same color.....4.5. *Ipomoea delphinioides*
11'. Ovate or elliptic leaves; subulate sepals with acute or acuminate apex, 11–15 mm long.; corolla light pink, tube inner dark pink.....4.7. *Ipomoea langsdorffii*

4.1. *Ipomoea acutisepala* O'Donell, Lilloa 23: 478, t. 8. 1950. Type: ARGENTINA. MISIONES, Dep. San Ignacio, Santo Pipó, 3.XI.1947, *G.J. Schwarz 5098* (LIL001225 image!, P00622213 image!).
= *Ipomoea megalantha* J.R.I. Wood & Scotland, Kew Bull. 72(9): 18. 2017 (Syn. Nov.). Type: PARAGUAY, *in viciniis Caaguazú*, *E. Hassler 9114* (BM image!; GH01105057 image!; K!; MO; NY02065509!; P03536446 image!; S image!; SI image!; US2055375 image!).

Prostrate herb, latex present; root not seen; stem 1.5–2.5 mm diam., up to 100 cm long., hirsute, simple trichomes, golden, ca. 3 mm; internodes 3–4.8 cm long. Leaves elliptic, 6–7 × 3.5–4 cm, base rounded or cuneate, apex acute or obtuse, mucronate, margin entire, smooth, hirsute in both surfaces, trichomes 0.5–1.5 cm long, brochidodromous, veins inconspicuous in adaxial surface, protruding in abaxial surface; petiole 0.4–0.8 cm long. Inflorescence of 1–3 flowered axillary dichasium; peduncle primary 5–13.5 cm long, secondary absent; bracteole lanceolate, apex acuminate, caducous, 4–10 mm long, hirsute; pedicel 0.8–1.5 cm long., pubescent; sepals unequal, outer 12–17 × 2–3 mm, ovate-lanceolate, inner 10–13 × 3–4 mm, ovate, apex acute or acuminate, dorsally hirsute, denser at base and apex, ventrally glabrous or sericeous at central portion, margin hyaline; corolla infundibuliform, purple, lilac or pinkish, (4.5–)6–8 cm, tube (1.5–)2–2.5 cm, limb 3.5–4 cm, midpetaline bands sericeous; stamens longer 14–16 mm, shorter 1–12 mm, base villous, anthers basifixed, elliptic, 4–6 mm long; style 2–25 mm long, stigmas 2, globose. Capsule not seen.

Specimens examined: São Roque de Minas, torre de observação, estrada Sacramento - São Roque de Minas, 11.I.1998, fl., *R. Romero et al. 5001* (HUFU); estrada para garagem de Pedras, 9.XII.1994, fl., *J.N. Nakajima & R. Romero 738* (HUFU, SP).

It occurs in Argentina, Brazil, and Paraguay (O'Donell 1950b; Ferreira & Miotto 2009). In Brazil, *I. acutisepala* is a native species, occurring in Cerrado and Pampa domain, encompassing Mato Grosso do Sul, Minas Gerais, São Paulo, Paraná, Rio Grande do Sul, and Santa Catarina (Simão-Bianchini *et al.* 2023).

In Serra da Canastra, it was collected only at two places in São Roque de Minas County (Torre de observação and Garagem de Pedras), physiognomies of "campo sujo" and "campo limpo", sometimes after burning.

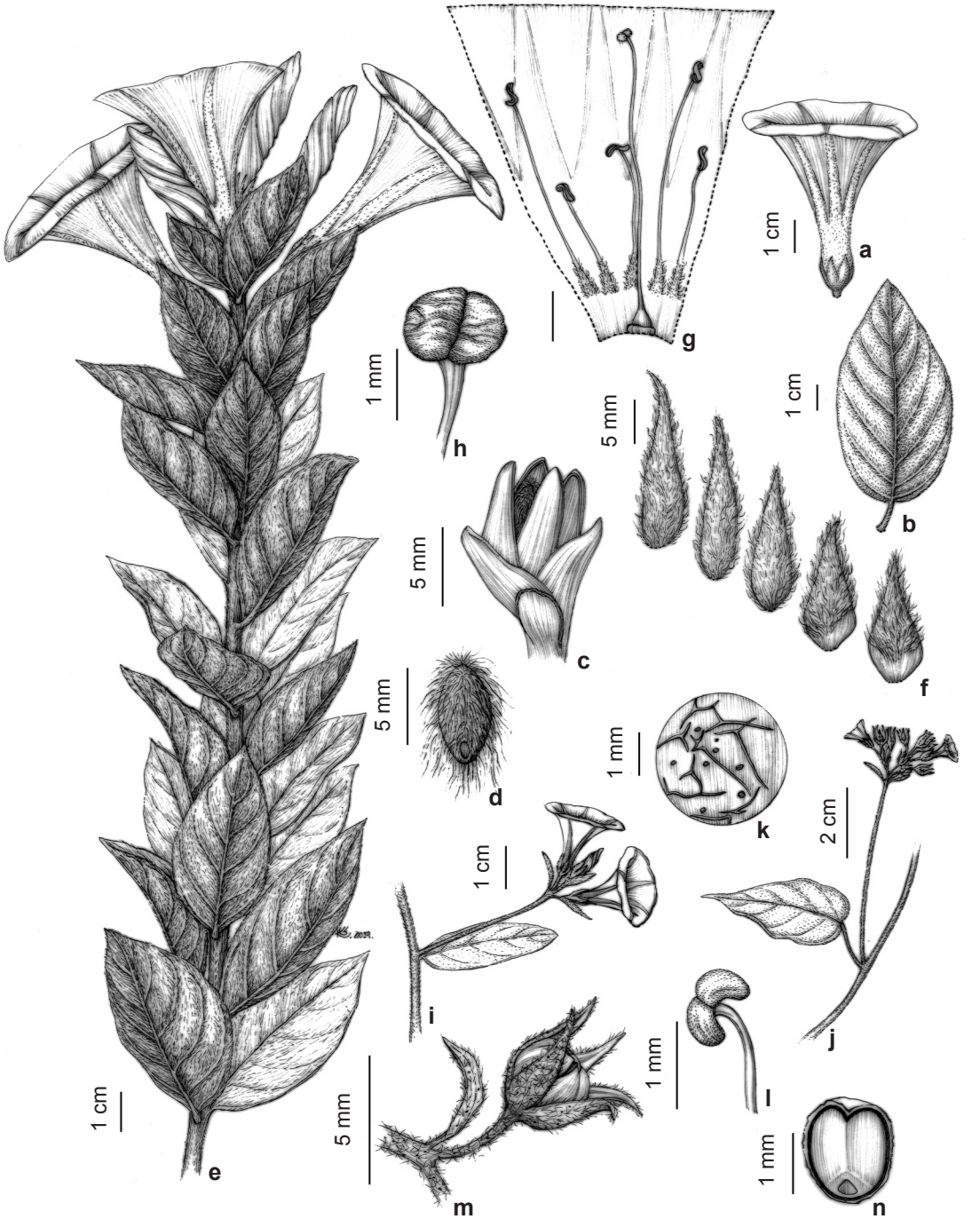

Figure 9 – a-b. *Ipomoea langsdorffii* – a. flower; b. leaf. c-d. *I. pinifolia* – c. capsule; d. seed. e-h. *I. pohlii* – e. habit; f. sepals; g. opened flower showing androecium and pistil; h. detail of stigmas. i. *Jacquemontia prostrata* – inflorescence. j-n. *J. sphaerostigma* – j. inflorescence; k. indumentum with glandular, forked and 3-branched trichomes; l. stigmas; m. capsule; n. seed. (a-b. *Kojima & Bianchini 19*; c-d. *Nakajima et al. 3225*; e-i. *Duarte 167, Duarte 163, Pacheco et al. 452*; i. *Romero et al. 1756*; j-n. *Kojima & Bianchini 24*; drawing by Klei R. Souza).

Ipomoea acutisepala is recognized by prostrate habit, hirsute indumentum and sepals with acute or acuminate apex. Leaves can vary from entire or 3–5 lobate (O'Donell 1950b). In PNSC, all specimens collected have only entire leaves.

The species belongs to a complex that have very close morphological characters with broad variation and formation of intermediates, rarely forming fruits. These factors suggest hybrid origin (Simão-Bianchini 1998). When proposing *Ipomoea megalantha* J.R.I. Wood & Scotland as endemic to Paraguay, the authors distinguished it from *I. acutisepala* by having short stems, inflorescence with only one flower, longer corolla (ca. 9 cm), and caducous bracteoles. After examining several materials from across the distribution, here is considered as synonym.

Ipomoea acutisepala resembles *I. hirsutissima* Gardner (1842: 471), which differs by the erect habit, and always entire leaves, whereas *I. acutisepala* may have entire and trilobate leaves also in the same individuals. *Ipomoea delphinioides* Choisy (1838: 53) can be confused with *I. acutisepala*, but differs from it by the short villous indumentum. In PNSC all specimens observed have entire leaves.

It was collected with flowers in December and January.

4.2. *Ipomoea aprica* House, Annals of the New York Academy of Sciences 18: 243. 1908. Type: BRAZIL. 1829, *Pohl s.n.* (M0184918 image!; BR0000006972868 image!). Fig. 4g

Erect subshrub, latex absent, 40–150 cm tall; root tuberous; stem 1.5–2.5 mm diam., sparse sericeous or glabrescent, strigose trichomes; internodes 1–2.2 cm long. Leaves linear or narrow-ovate, 5.3–13.7 × 0.3–0.5 cm, base cuneate, base of abaxial surface with a couple of extrafloral nectaries, not observed in all leaves, apex acute or acuminate, margin entire, sericeous or glabrescent in both surfaces, strigose and glandular trichomes, brochidodromous, veins inconspicuous in adaxial surface, protruding in abaxial surface; petiole 1–2 mm long. Inflorescence of 2–24 flowered axillary racemiform dichasium,; peduncle primary 0.5–2 cm long, secondary 0.1–0.2 cm long; bracteole ovate or lanceolate, apex acute, 2.5–3 mm long, sericeous; pedicel 0.3–1 cm long, sericeous; sepals subequal, outer 5.6–6.2 × 4.3–4.5 mm, inner 5.3–7.3 × 3.5–4.5 mm, ovate, concave, apex rounded, rarely acute, strigose, extrafloral nectaries 5, alternating to outer sepals, margin vinaceous; corolla campanulate-infundibuliform, pinkish, 4–5 cm, tube 1.5–2 cm, limb 2.5–3 cm, midpetaline bands sericeous; stamens longer 19–2 mm, shorter 13–15 mm, base villous, anthers basifixed, elliptic, 4.1–5.2 mm long; style 2–23 mm long, stigmas 2, globose. Capsule ovoid, 8–9 × 7–8 mm, sericeous; seed ellipsoid, brown, lanuginose at sides, trichomes simple, long, golden, ca. 3 mm long., 4.8–5.2 × 2.1–2.3 mm. **Specimens examined**: São Roque de Minas, PARNA Serra da Canastra, 11.II.2018, fl. and fr., *R.K. Kojima & R. Simão-Bianchini 10* (SP); 12.II.2018, fl., *R.Simão-Bianchini & R.K. Kojima 2272* (SP).

Native in Brazil and characteristic of Cerrado species, rarely occurs in Paraguay and Bolivia (Wood *et al.* 2015).

In Brazil, it was recorded in Distrito Federal, Tocantins, Goiás, Mato Grosso, Minas Gerais, and São Paulo. In Serra da Canastra, *I. aprica* was collected at Serra da Babilônia and upside and trail to upside of Casca D'Anta waterfall and road to Serra da Chapada, in "campo limpo" physiognomy, sometimes associated to sandy soil and rocky outcrop.

Ipomoea aprica may have erect or rare prostrate habit, reaching 1.5 m tall (Simão Bianchini 1998), in PNSC it was observed only erect individuals. *Ipomoea aprica* differs from *I. campestris* Meisn. (1869: 254) by narrow-oblong to linear leaves and ovate sepals with round apex, while the last species has ovate, narrow-ovate or lanceolate leaves, sometimes trilobate, and bigger sepals with acute apex. It can also be confused to *I. procumbens* Mart. ex Choisy (1845: 351), that differs by the voluble habit, glabrous leaves, verrucose stem and unequal sepals. *Ipomoea aprica* is also similar to *I. pinifolia* Meisn. (1869: 250) by the linear leaves, but it distinguishes by the caducous and glabrous leaves, and unequal sepals.

In PNSC *I. aprica* was collected reproductive in January, February and April. In the southeastern Region of Brazil, it blooms over the months of December to April (Simão-Bianchini 1998). In Serra do Ouro Branco, flowers were collected in January and fruits in September (Rodrigues-Lima 2017).

4.3. *Ipomoea argentea* Meisn., in Martius, *Flora brasiliensis* 7: 247. 1869. Types: BRAZIL. *Prov. Piauhy et Goyaz*, 1844, *Gardner 3356* (BR0000005837519 image!; K000612798 image!);

VENEZUELA. Prope Maypures, ad flumen Orenoco, *R. Spruce 3605* (BR0000005796137 image!; K000612882 image!; NY00319143 image!; P03560661 image!). Fig. 10a

Erect subshrub, latex not seen, ca. 90 cm tall; root not seen; stem 2–7 mm diam., dense sericeous to tomentose, long, simple, crooked, and golden trichomes; internodes 1.2–2.6 cm long. Leaves oblong, 5.5–7.5(–9.5) × 2.5–3.5(–5.5) cm, base acute or slightly asymmetric, apex attenuate or obtuse, mucro 0.5–1 mm, margin entire or irregularly wavy, discolor, dense sericeous in adaxial surface with golden trichomes, dense tomentose in abaxial surface with silver trichomes, golden trichomes in veins region, brochidodromous, veins sulcate in adaxial surface, protruding in abaxial surface; petiole 2–5 mm long. Inflorescence of 1–5 flowered axillary dichasium; peduncle primary 0.2–2.3 cm long, secondary 0–0.05 cm long; bracteole lanceolate or subulate, apex acute or acuminate,

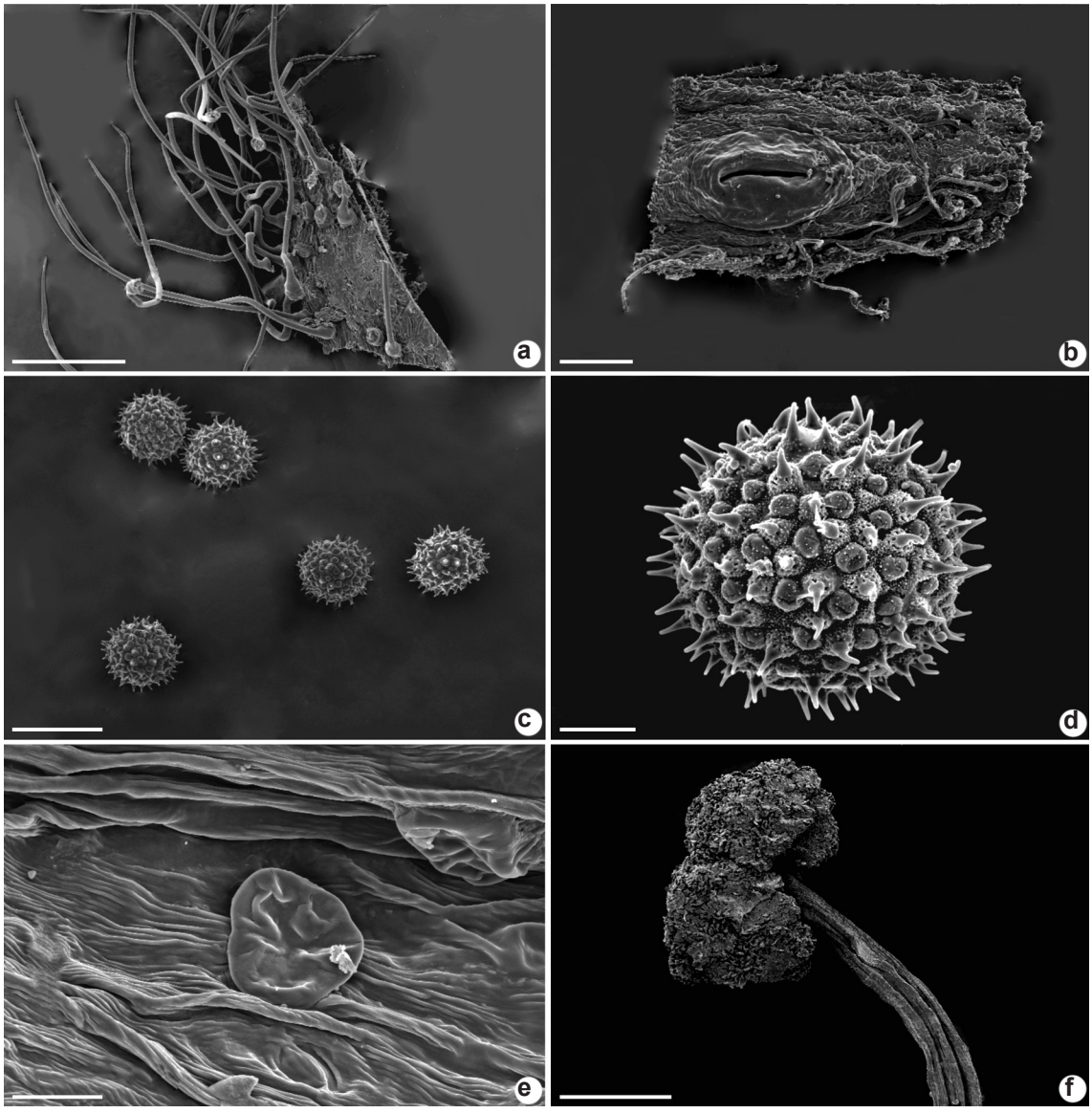

Figure 10 – a.f. Scanning electron micrographs of species of *Ipomoea* – a. *I. argentea* – indumentum; b. *I. fiebrigii* – extrafloral nectary; c-d. *I. pohlii* – c. pollen grains; d. pollen grain in general view; e. *I. procurrens* – glandular trichome; f. *I. verbasciformis* – stigmas. (a. *Mota 137*; b. *Romero et al. 4796*; c-d. *Romero et al. 452*; e. *Kojima & Bianchini 14*; f. *Romero et al. 1917*). Scales: a, f = 500 µm; b = 200 µm; c = 100 µm; d, e = 20 µm.

(5–)7–14 mm long, tomentose; pedicel 1–10 mm long, tomentose; sepals subequal, outer 7–10 × 4–6 mm, inner 10–11 × 3–5 mm, ovate, concave, apex rounded, coriaceous, bright, inner sepals glabrous, outer sepals tomentose at least in base, glabrous ventrally; corolla infundibuliform, lilac or pinkish, outer of tube darker, 5–6(–7.2) cm, tube 2–2.5(–3) cm, limb 2.5–3.5(–4) cm, midpetaline bands glabrous; stamens longer 15–16 mm, shorter 2–22 mm, base villous, anthers basifixed, elliptic, 5–6 mm long; style 21–23 mm long, stigmas 2, globose. Capsule ovoid or ellipsoid, 6–7 × 5–6 mm, glabrous; seed ellipsoid, black, trichomes long, golden, concentrated at apex and sides, ca. 5 mm long., 3.5–4.5 × 3.5–4.5 mm.

Specimens examined: São Roque de Minas, 16.II.2000, fl., *R.C. Mota 137* (BHCB, SP); 12.I.1995, fl., *R. Romero et al. 1772* (HUFU).

Ipomoea argentea is a very characteristic species of Cerrado and is native Brazil, extending to Paraguay, Venezuela, and Colombia (Wood *et al.* 2015). In Brazil, it was recorded in Mato Grosso, Mato Grosso do Sul, Goiás, Distrito Federal, Minas Gerais, São Paulo and Paraná (Simão-Bianchini *et al.* 2023).

In Serra da Canastra, it was found in "campo limpo" and "campo sujo" physiognomies, locality of Garagem das Pedras, São Roque de Minas county.

Ipomoea argentea is characterized in being a perennial subshrub, having oblong leaves with densely sericeous-tomentose indumentum, golden trichomes and coriaceous, shiny sepals, the external ones tomentose in the base. Wood *et al.* (2015) recognized two forms of this species, sericeous and tomentose forms, citing to Brazil only tomentose form. In materials analyzed in Serra da Canastra we observed that the indumentum in adaxial surface is sericeous-tomentose and in abaxial surface is tomentose. *Ipomoea marabaensis* D.F. Austin & Secco (1988: 188) is a morphologically similar species, differing in having herbaceous and climbing habit and flowers arranged in lateral of branches. In Serra da Canastra, *I. argentea* resembles *I. verbasciformis* (Meisn.) O'Donell (1950: 502), which differs in its ovate to oblong leaves, generally longer peduncles (3.5–6.5 cm long), external sepals slightly bigger than inner ones, acute apex.

In PNSC, it was collected in flower in January and February. In the remainder of its distribution, it flowers over the months of October and November, occasionally may flower at other times (Wood *et al.* 2015).

4.4. *Ipomoea campestris* Meisn., in Martius, *Flora brasiliensis* 7: 254. 1869. Types: BRAZIL. MINAS GERAIS: Lagoa Santa, *J.E.B. Warming s.n.* (NY00319164 image!).

Prostrate herb, latex not seen, ca. 15 cm long; root not seen; stem 1–1.5 cm diam., sparse trichomes, verrucose; internodes 1.1–3.4 cm long. Leaves narrow-ovate or lanceolate, entire or slightly lobate, 3.5–4.7 × 9–1.1 cm, base rounded or obtuse, apex acute, margin entire or irregularly wavy, glabrous in both surfaces, with just a few trichomes in veins region, brochidodromous, veins more protruding in abaxial surface than in adaxial surface; petiole 1–4 mm long. Inflorescence of 1–2 flowered axillary dichasium; peduncle primary 1.1–2.3 cm long, secondary absent; bracteole narrow-triangular or lanceolate, apex acute or acuminate, 3.5–6 mm long, glabrous or sparse pilose; pedicel 5–6 mm long, sparse trichomes; sepals unequal, outer 8–9 × 3–4.5 mm, inner 9–11 × 3–6 mm, ovate, apex acute, glabrous or sparse sericeous in center, margin hyaline; corolla infundibuliform, pinkish, 4.5–6.7 cm, tube 2–3.2 cm, limb 2.5–3.2 cm, midpetaline bands glabrous or with few trichomes at the apex; stamens longer 17–18 mm, shorter 11–12 mm, base villous, anthers basifixed, elliptic, 4.5–5 mm long; style 17–18 mm long, stigmas 2, globose. Capsule not seen.

Specimens examined: São Roque de Minas, morro após o córrego dos Passageiros, I.1998, fl., *R. Romero et al. 4956* (HUFU); Parque Nacional da Serra da Canastra, estrada São Roque de Minas - Sacramento, I.1995, fl., *R. Romero et al. 1738* (HUFU).

It is native, occurs only in Brazil and is characteristic of Cerrado domain. It encompasses Distrito Federal, Tocantins, Goiás, Mato Grosso, Mato Grosso do Sul, Minas Gerais, São Paulo, and Paraná (Simão-Bianchini *et al.* 2023).

In Serra da Canstra, it was found in "campo rupestre" physiognomy, after burning, in São Roque de Minas County.

Ipomoea campestris can be distinguished by erect or prostrate habit, long corolla, reaching 6.7 cm, and pubescent to sparse pubescent indumentum. It is close to *I. procumbens* that differs by having glabrous, verrucose stem and unequal sepals. It is also related to *I. aprica*, which has erect habit and smaller, ovate, concave sepals. *Ipomoea attenuata* J.R.I. Wood & Scotland (2017: 5) and *I. ensiformis* J.R.I.Wood & Scotland (2017: 16) may be also confused to *I. campestris*. Although they have similar leaves, *I. attenuata* has longer sepals with long attenuate apex and racemiform inflorescence,

while *I. campestris* has shorter sepals with acute apex and shorter inflorescence; *I. ensiformis* is a glabrescent plant and with leaves apex obtuse; in *I. campestris*, the indumentum is sparse pubescent and leaves apex is acute. *Ipomoea queirozii* J.R.I. Wood & L.V. Vasconc. (2017: 13) is also related to *I. campestris*, but is immediately distinguished by glabrous corolla and sepals.

Ipomoea campestris had *I. hirsutissima* as synonym by Austin *et al.* (2015), but differs in having long spreading and rough trichomes covering vegetative parts and midpetaline bands, and in very acute to acuminate apex of sepals.

In Serra da Canastra, *Ipomoea campestris* was collected in flower in January. In Serra do Cipó (Minas Gerais) it flowers over the months of December and February (Simão-Bianchini & Pirani 1997).

4.5. *Ipomoea delphinioides* Choisy, Mémoires de la Société de Physique et d'Histoire Naturelle de Genève 8(1): 53. 1838. Type: BRAZIL. SÃO PAULO: Taubaté, 1835, *Lund 771* (G00135575 image!). Fig. 4h

Prostrate herb, latex absent, ca. 100 cm long; root tuberous; stem 2–2.5 mm diam., villous, long, simple trichomes; internodes 1.5–3.5(–4) cm long. Leaves narrow-ovate or slightly trilobate, 5.5–9.5 × 1.1–2.2 cm, base attenuate or rounded, apex obtuse or rounded, mucro 0.5–1 mm, margin entire, glabrescent or sericeous in both surfaces, brochidodromous, veins protruding in abaxial surface; petiole (3–)5–10 mm long. Inflorescence of 1–3 flowered axillary dichasium; peduncle primary 1.1–3.2 cm long, secondary 0–0.1 cm long; bracteole lanceolate or subulate, apex acute or acuminate, (1.5–)4–8(–16) mm long, villous; pedicel 3–5 mm long, villous; sepals equal or slightly unequal, outer 7–9.1 × 4–4.7 mm, inner 8–8.5 × 3.8–4 mm, ovate, apex cuneate or acute, villous, inner sepals with silver trichomes, extrafloral nectaries 4–5, alternating to outer sepals; corolla campanulate-infundibuliform, pinkish, 3.5–5 cm, tube 2–2.5 cm, limb 2–3 cm, midpetaline bands sericeous; stamens longer 19–21 mm, shorter 1–12 mm, base villous, anthers basifixed, elliptic, 2–3 mm long.; style 12–13 mm long., stigmas 2, globose. Capsule globose, ca. 9 × 10–11 mm, glabrous; seed ellipsoid, brownish, velutinous, trichomes short, golden, 0.5–1 mm long., ca. 4 × 3 mm.

Specimens examined: Delfinópolis, PARNA Serra da Canastra, 13.II.2018, fl., *R.K. Kojima & R.Simão-Bianchini 17* (SP).

Additional specimens examined: BRAZIL. SÃO PAULO: Franco da Rocha, Parque Estadual do Juquery, campo limpo após queimada, 24.X.2002, fl., *J.B. Baitello 1241* (SPSF).

Native species that occurs in Paraguay and Brazil, in Goiás, Minas Gerais, São Paulo, Paraná, Santa Catarina and Rio Grande do Sul, in Cerrado and Atlantic Rainforest (Ferreira & Miotto 2009; Simão-Bianchini *et al.* 2023).

In Serra da Canastra, it was collected in "campo rupestre" physiognomy, locality of Serra da Babilônia, in county of Delfinópolis. The species is considered rare in PNSC due to just one record. Visitation in these high altitudes places is very difficult.

The species is recognized by prostrate habit, entire, trilobate to 5-lobate leaves (Simão-Bianchini 1998), villous indumentum, persistent sepals and bracteoles persistent in capsule. In PNSC, the specimen found has narrow-ovate, entire leaves and slightly trilobate leaves. It resembles *I. acutisepala*, which differs by having hirsute indumentum. Also, it can be confused to *I. malvaeoides* Meisn. (1869: 251), that has erect habit, narrower leaves and dense indumentum, and to *I. uruguayensis* Meisn. (1869: 272), which distinguishes by tomentose indumentum and always entire leaves. *Ipomoea delphinioides* is also similar to *I. campestris*, which differs by sparse trichomes in whole plant, whereas *I. delphinioides* is villous. The similarity of studied species and *I. campestris* was appointed by Simão-Bianchini (1998), citing that these species might be hybrids.

In PNSC, *I. delphinioides* was observed in flower in February. In southeastern Region of Brazil, the species flowers over the months of September to June, with peak of flowering and fruiting among November to January (Simão-Bianchini 1998). In Serra do Ouro Branco, it was collected in January, April and September (Rodrigues-Lima 2017).

4.6. *Ipomoea fiebrigii* Hassl. *ex* O'Donell, Lilloa 14: 169. 1948. Type: PARAGUAY. ALTO PARANA: *In regione fluminis Parana*, 1909/10, *K. Fiebrig 5675* (LIL001244 image!; SI001299 image!; US00111391 image!). Fig. 10b

Erect subshrub, latex not seen, ca. 40 cm tall; root not seen; stem 2–2.5 mm diam., lanuginose; internodes 1–2.1 cm long. Leaves compound, 6–8 leaflets linear-filiform, leaflets 2.7–3.4 × 0.05–0.1 cm, base acute, apex acute or spatulate, margin entire, glabrous in adaxial surface, sparse

pilose in abaxial surface, glandular trichomes, hyphodromous, veins inconspicuous in both surfaces; petiole 2.5–5 mm long. Inflorescence of 1–3 flowered axillary dichasium; peduncle absent; bracteole lanceolate, apex acute or acuminate, ca. 1.5 mm long, sparse trichomes; pedicel 2–3.5 m long, pubescent; sepals unequal, outer 7–8 × 3.5–4 mm, inner 9–10 × 4.5–5.5 mm, ovate, apex acute, mucronulate, sparse pubscent, hyaline margin, extrafloral nectaries 4–6, alternating to outer sepals; corolla infundibuliform, purple or magenta, 4–6.3 cm, tube 1.8–3 cm, limb 2.2–4.5 cm, midpetaline bands sericeous; stamens longer 21–22 mm, shorter 18–19 mm, base villous, anthers basifixed, elliptic, ca. 5 mm long; style ca. 2.7 cm long, stigmas 2, globose. Capsule globose, 5–7 × 5–6 mm, glabrous; seed ellipsoid, brownish, sericeous, trichomes long at sides, golden, ca. 1.5 mm long., 3–4 × 2–3 mm.

Specimens examined: São Roque de Minas, 21.XI.1998, fl., *M.A. Farinaccio 183* (HRCB); estrada São Roque - Sacramento, próximo à nascente do Rio das Velhas, 22.XI.1996, fl., *R. Romero & J.N. Nakajima 3817* (HUFU); estrada para a Serra da Chapada, 8.I.1998, fl., *R. Romero et al. 4796* (HUFU).

Additional specimens examined: BRAZIL. GOIÁS: Alto Paraiso de Goiás, 3.II.1979, fl., *Gates & Estabrook 106* (CEN, NY, SP); 15.VII.1987, fl., *C.B. Toledo et al. 121* (SP, SPF); estrada para Colinas, 900 m alt., 7.II.1987, fl., *J.R. Pirani et al. 1765* (K, SP, SPF).

A characteristic species of Cerrado. Occurs in Paraguay (O'Donell 1948, Wood & Scotland 2017), and Brazil, comprising Distrito Federal, Mato Grosso do Sul, Goiás, and Minas Gerais (Simão-Bianchini *et al.* 2023).

In Serra da Canastra, the species was collected in "campo limpo" physiognomy, in São Roque de Minas County.

Ipomoea fiebrigii is recognized in being an erect subshrub, with lanuginose indumentum, compound leaves furnished with linear leaflets. It differs from *I. angustissima* J.R.I. Wood & Scotland (2017: 13) by the lanuginose indumentum, ovate sepals with mucronulate apex (7–10 mm long.) and axillary inflorescence formed of 1–3 flowers. In contrast, *I. angustissima* has sericeous indumentum, widely ovate sepals (5–8 mm long.) and terminal or subterminal inflorescence formed by up to 20 flowers (following the original description). *Ipomoa fiebrigii* also resembles *I. itapuaensis* J.R.I. Wood & R. Degen (2016: 2), that is readily distinguished by the longer peduncles, which not exceed 5 mm length in *I. fiebrigii*, and by glabrous to thinly pubescent indumentum.

Wood & Scotland (2017) cited that *I. fiebrigii* is restricted to Paraguay, it has only ever been found in Alto Paraná Department in Paraguay (*Fiebrig 5675*; *Fiebrig 6706*; *Itaipú Binacional 1081*). They state that materials of Brazil were mistakenly identified as *I. fiebrigii.* and so, they proposed a new species to Brazil, *I. angustissima*, with occurrence only in Goiás, in Chapada dos Veadeiros and Minas Gerais, in Serra da Canastra (*R. Romero et al. 4796*), at altitudes between 1000 and 1,600 m. However, with careful analysis of the material, we concluded that species referenced to Serra da Canastra actually is *I. fiebrigii*, as here we referred.

In PNSC *I. fiebrigii* was observed in flower in January and November.

4.7. *Ipomoea langsdorffii* Choisy, in De Candolle, Prodromus 9: 368. 1845. Type: BRAZIL. RIO DE JANEIRO: 1821, *Langsdorff s.n.* (P03560903 image!). Figs. 4i; 9a-b

Prostrate herb, latex absent, ca. 100 cm long; root not seen; stem 1–2 mm diam., villous, long, simple trichomes; internodes (2.7–)3.3–5(–10.7) cm long. Leaves ovate or elliptic, 5.3–8.5 × 2.2–4.2 cm, base rounded, apex obtuse or rounded, margin entire, villous in both surfaces, denser in abaxial surface, glandular trichomes, eucamptodromous, veins sulcate in adaxial surface, protruding in abaxial surface; petiole 0.5–2.2 cm long. Inflorescence of 1–4 flowered axillary dichasium; peduncle primary 1–3.7(–4.5) cm, secondary 0–0.4 cm; bracteole subulate or linear, apex acute or acuminate, 0.9–2.2 cm long, villous; pedicel 3–7 mm long., villous; sepals equal or subequal, outer 12–15 × 3–5 mm, inner 11–12 × 3–4 mm, subulate, apex acute or acuminate, villous; corolla campanulate-infundibuliform, pinkish, inner of tube darker, (3–)3.5–4.3(–5) cm, tube 1.5–2 cm, limb (1.5–)2–2.5 cm, midpetaline bands sericeous; stamens longer 15–16 mm, shorter 12–14 mm, base villous, anthers basifixed, oblong, 4–4.8 mm long; style 0.8–1.1 cm long, stigmas 2, globose. Capsule ovoid, 7–8 × 7–8 mm, glabrous; seed ellipsoid, black, with sparse trichomes only at apex, ca. 15 mm long, 4–5 × 2 mm.

Specimens examined: Delfinópolis, PARNA Serra da Canastra, 13.II.2018, fl., *R.K. Kojima & R. Simão-Bianchini 19* (SP).

Additional specimens examined: São Roque de Minas, 16.II.2000, fl., *R.C. Mota 151* (BHCB); 19III1996, fl., *R. Romero & J.N. Nakajima 3326* (HUFU).

The species is native and restricted to Brazil. It was recorded in Cerrado of Central Brazil

with confirmed records only from Minas Gerais. Wood & Scotland (2017) considered that location recorded at holotype material, Rio de Janeiro, as unlikely.

In Serra da Canastra, *I. langsdorffii* is of very rare occurrence with only two records in not yet regularized area. It was collected in "campo limpo" and "campo rupestre" physiognomies, locality of Serra da Babilônia, in São Roque de Minas County.

Ipomoea langsdorffii distinguishes in being prostrate or climbing villous herb, leaves distinctly petiolate, and persistent subulate to linear bracteole. It resembles *I. burchellii* Meisn. (1869: 271) by subulate sepals with similar size and sericeous midpetaline bands, which can be distinguished by the most conspicuous leaves venation and leafy thyrse inflorescence (Simão-Bianchini 1998).

The name *Ipomoea langsdorffii* Choisy was discussed was related to a long nomenclatural problems history involving *I. patula* Choisy (1845: 368) and *I. monticola* (Meisn.) O'Donell (1953: 371) (Wood & Scotland 2017). The type material that was designated for *I. patula* ("Brasilia" [almost certainly Africa], sin. data [lectotype P00434156]) is actually a species from Africa, *I. crassipes* Hook (1844: 4068). This species has dimorphic, lanceolate leaves, about 2 cm long, lanceolate bracteoles and corolla measuring about 3 cm long, and this name was used to some materials collected in Brazil (Meissner 1869).

Using one of the varieties proposed by Meissner (1869) to *I. patula* which was based on the Martius collection (Brazil, Minas Gerais, Vila Rica, *Martiu's obs. 788* - holotype M0185028), this new name was proposed for *I. elegans* Meisn. (1869: 244) (O'Donell1953). The original description of *I. monticola* and *I. langsdorfii* shows that both species have similar leaves, longer than 2 cm long., corolla longer than 3 cm long. and bracteoles linear, constituting a synonym of *I. langsdorffii* (Wood & Scotland 2017).

Ipomoea langsdorffii was collected with flower in February.

4.8. *Ipomoea pinifolia* Meisn., in *Flora brasiliensis* 7: 250. 1869. Type: BRAZIL. 1867, *Burchell 6700-7* (BR0000005837731 image!). Figs. 4j; 9c-d

Erect subshrub, latex absent, 30–150 cm tall; root not seen; stem 1–2 mm diam., glabrous, verrucose, sparse simple trichomes, glandular trichomes; internodes (0.3–)0.6–1.2 cm long. Leaves linear-filiform, 1.5–7.6 × 0.05–0.1 cm, base truncate, apex acuminate, margin revolute, glabrous in both surfaces, striate, with glandular trichomes, hyphodromous, veins inconspicuous; petiole sessile. Inflorescence of 1–3 flowered axillary dichasium; peduncle primary 0–10 mm long, secondary absent; bracteole triangular or narrow-triangular, apex acute, caducous, 1–2 mm long, glabrous; flowers sessile; sepals unequal, outer 3.5–5 × 2–2.5 mm, inner 5.5–7 × 3 mm, ovate, flat, apex acute, glabrous, coriaceous, striate, verruculose, apex vinaceous; corolla campanulate-infundibuliform, pinkish, 3.1–3.5 cm, tube 1.2–1.5 cm, limb 1.6–1.9 cm, midpetaline bands glabrous; stamens longer 13–14 mm, shorter 11–12 mm, base villous, anthers basifixed, elliptic, 2–2.5 mm long; style ca. 1.5 cm long., stigmas 2, globose. Capsule globose, 7–12 × 8–10 mm, verruculose; seed ellipsoid, brown, lanuginose, 3.5–4 mm long., ca. 8 × 5 mm.

Specimens examined: Delfinópolis, Chapadão da Babilônia, 26.VI.1997, fl., *J.N. Nakajima et al. 2590* (HUFU, SP); Parque Nacional da Serra da Canastra, trilha do Zé Carlinho, subida para Serra do Cemitério, 9.X.2002, fl., *J.N. Nakajima et al. 3225* (HUFU, UB); Condomínio de Pedras, 28.XI.2003, fl., *R. Romero et al. 7019* (HUFU).

It is native and has common occurrence in Brazil, comprising Distrito Federal, Tocantins, Mato Grosso, Mato Grosso do Sul, Goiás, and Minas Gerais (Simão-Bianchini *et al.* 2023 em construção). It was recorded also in Bolivia (Wood *et al.* 2015).

In PNSC, it was collected in "Trilha do Zé Carlinho", "Trilha da Escada de Pedras", "Condimínio de Pedras", these localities in Delfinópolis county, and near to Santo Antônio river valley, in São Roque de Minas County. The species was found only in physiognomy of "campo rupestre".

Ipomoea pinifolia may be recognized for being a climbing herb or erect subshrub, wiry perennial of Cerrado, occasionally leafless, and outstanding pink corolla (Wood *et al.* 2015). The species is similar to *I. squamisepala* O'Donell (1950: 453), which differs by having only erect subshrub habit, linear-oblong, oblong-elliptic or oblanceolate leaves, while in *I. pinifolia* the individuals are climbing or erect, leaves are always filiform-linear, with larger pink corolla and larger inner sepals. *Ipomoea schomburgkii* Choisy (1845: 354) (= *I. graminiformis* Meisn.) (1869: 250) resembled *I. pinifolia*, but distinguishes in being always an erect subshrub. The species also resembled *I. aprica*, the differences between them

was discussed in *I. aprica* comments. *Jacquemontia densifolia* (Chodat & Hassl.) Hassl. (1911: 159) was considered as *I. graminiformis* Choisy var. *densifolia* Chodat & Hassl. (1905: 690) Although visual similarity to *I. pinifolia*, *J. densifolia* has outer sepals longer than inner ones.

O'Donell (1950a) noticed that, in *I. squamisepala,* the apical portion of the outer sepals is caducous, and the basal portion presents rounded or truncate form. Simão-Bianchini (1998) cited this pattern, *i.e.* distal third portion of outer sepals caducous, also in *I. pinifolia*, suggesting that both species may have a common ancestor.

In PNSC, *I. pinifolia* was observed in flower in June and in fruit in October and November. In Bolivia, it was collected with flower in May (Wood *et al.* 2015).

4.9. *Ipomoea pohlii* Choisy, Prodromus Systematis Naturalis Regni Vegetabilis 9: 355. 1845. Type: BRAZIL. BAHIA: *Serra Urubú*, 1839, *Pohl s.n*. (Holotype BR0000005307708 image!; Isotype BR0000005307050 image!; B† image!; F0BN013815!; SP!; M0184991 image!).

Figs. 9e-h; 10c-d

Erect subshrub, latex not seen, 30–50 (–150) cm tall; root not seen; stem 3–5 mm diam., lanate; internodes 0.8–3.5 cm long. Leaves ovate, 4.2–6.5 × 2–2.8 cm, base rounded or cordate, apex acute or acuminate, margin entire, lanate on both surfaces, discolor, abaxial surface cinereous, eucamptodromous, veins inconspicuous in adaxial surface, protruding in abaxial surface; petiole 0–5 mm long. Inflorescence of solitary flowers terminal and axillary dichasium; peduncle absent; bracteole lanceolate, apex acute or acuminate, 1.6–2.3 cm long, lanate; pedicel 1–2 mm long, lanate; sepals unequal, inner 14–15 × 4–7 mm, narrow-triangular, flat, apex acute, outer 15–18 × 4–6 mm, lanate, flat, the most inner ones sometimes glabrous at the base; corolla infundibuliform, pinkish or purplish, 4–6.9 cm, tube 1.6–3.5 cm, limb 2.2–3.2 cm, midpetaline bands sericeous; stamens longer ca. 29–3 mm, shorter 2–22 mm, base villous, anthers basifixed, twisted after anthesis, elliptic, 4–4.5 mm long; style 2.1–2.2 cm long, stigmas 2, globose. Capsule not seen.

Specimens examined: São Roque de Minas, próximo à Cachoeira dos Rolinhos, 21.XI.2002, fl., *P.C. Duarte et al. 163* (HUFU, SP); 21.XI.2002, fl., *R. Romero et al. 6633* (HUFU, SP); 21.XI.2002, fl., *P.C. Duarte et al. 167* (HUFU, SP); 21.XI.2002, fl., *R.A. Pacheco et al. 452* (HUFU, SP).

It is native, characteristic of Cerrado and restricted to Brazil, with records in Bahia and Goiás (Simão-Bianchini *et al.* 2023). *Ipomoea pohlii* is rare, with just a few records known, and is, here, the first time cited to Minas Gerais.

The specimens were collected in only one locality at the park, near Rolinhos waterfall, in São Roque de Minas County, growing in "campo limpo" physiognomy.

Ipomoea pohlii is recognized for the erect subshrub habit, lanate indumentum in whole plant, ovate leaves with acute to acuminate apex, narrow-triangular sepals, outer ones slightly longer than inner ones, solitary sessile flowers, concentrating in distal portion of branches. In specimens of Serra da Canastra, anthers might be spiraling, not observed in all flowers. It is an unusual character in *Ipomoea* but very common in *Distimake*. It resembles *I. haenkeana* Choisy (1845: 358) by the erect habit, dense indumentum and discolor leaves, it is distributed in the Midwest of Brazil and in Minas Gerais, also in Bolivia (Simão-Bianchini *et al.* 2023; Wood *et al.* 2015). It differs from Serra da Canastra species in oblong-obovate leaves, inflorescence in dense cymes, pedicellate flowers and oblong-ovate sepals. In PNSC, *I. pohlii* is similar to two species also characteristics of Cerrado, *I. verbasciformis*, which distinguishes by ovate to oblong leaves, acute, not acuminate apex, longer internodes (1.5–4 cm long.), ovate sepals and dichasium inflorescence (1–8 flowers); and *I. argentea*, that differs from *I. pohlii* in oblong longer leaves (5.5–9.5 cm long.), attenuate to obtuse, mucronulate apex, ovate, concave, unequal sepals and dichasium inflorescence with 1–5 flowers.

The locality of holotype specimen in not clear while Pohl did not indicate it, only citing *Serra Uruba*. Meissner (1869) cited this species to *Serra de Urubú*, Bahia. Probably they were referring to the same place, but this exact region is uncertain, while actually "Serra do Urubu" is in the state of Pernambuco, not in Bahia. So, considering these facts and few records of this species, we realize that Pohl's collect might be in our study area, in a possible reencounter to *I. pohlii* in Serra da Canastra.

Although is noted by *Duarte et al. 167* that the corolla could be yellow with red midpetaline bands, here it will be considered an error, it is a rare colour to *Ipomoea* flowers, and all the other collectors referred pinkish or purplish flowers.

The species was found flowering in Serra da Canastra in January and November. Along

the distribution, the flowers were collected from February to May and November.

4.10. *Ipomoea procumbens* Mart. *ex* Choisy, in DC. Prodromus Systematis Naturalis Regni Vegetabilis 9: 351. 1845. Type: BRAZIL. MINAS GERAIS: *Martius 964* (M0184989 image!).

Prostrate or voluble herb, latex absent, ca. 100 cm long; root tuberous, with viscous latex; stem 1–2 mm diam., glabrous, rugose; internodes (1.0–)2–7 cm long. Leaves narrow-elliptic or linear, 3.5–6 × 0.3–1.5 cm, base attenuate, apex acute or slightly rounded, mucronulate or not, margin irregularly wavy, glabrous in both surfaces, rugose, brochidodromous, veins protruding in abaxial surface; petiole 4–13 cm long, 1–2 pairs of extrafloral nectaries at apex. Inflorescence of 1–3 flowered dichasium; peduncle primary 1–5.5 cm long, secondary 0.1–2.3 cm long; bracteole lanceolate or triangular, apex acute or acuminate, caducous, 1.5–3 mm long, rugose; pedicel 0.2–1.5 cm long, rugose near to insertion of bracteole; sepals unequal, outer 6–8 × 4 mm, inner 1–13 × 4–7 mm, ovate, apex acute or rounded, membranous, rugose, hyaline margin, extrafloral nectaries 3–5, alternating to outer sepals, not observed in all flowers; corolla campanulate-infundibuliform, pinkish or lilac, internally darker, 5.8–6.6 cm, tube 2.5–3.3 cm, limb 2.5–3.5 cm, midpetaline bands glabrous, well demarcated; stamens longer 17–19 mm, shorter 13–15 mm, base villous, anthers basifixed, elliptic, 5.6–6 mm long; style ca. 2.5 cm long, stigmas 2, globose. Capsule ovoid, ca. 11–13 × 6–10 mm, glabrous; seed ellipsoid, brown, 5–6 × 2–3 mm.

Specimens examined: Delfinópolis, 13.II.2018, fl., *R.K. Kojima & R. Simão-Bianchini 18* (SP). São Roque de Minas, 11.II.2018, fl., *R.K. Kojima & R. Simão-Bianchini 9* (SP); estrada de terra para vilarejo do São João Batista do Glória, 12.II.2018, fl., *R.K. Kojima & R. Simão-Bianchini 11* (SP); estrada para Sacramento, após o Curral de Pedras, 18.III.1995, fl., *J.N. Nakajima et al. 869* (HUFU); mata próxima à cachoeira Casca d'Anta., 12.XII.1996, fl., *L.S. Kinoshita & J.L.A. Moreira 96150* (UEC); morro próximo a sede administrativa, 7.XII.1994, fl., *J.N. Nakajima & R. Romero 631* (HUFU).

Ipomoea procumbens is native and occurs only in Brazil, encompassing Distrito Federal, Bahia, Goiás, Minas Gerais, São Paulo, and Paraná, in Caatinga and Cerrado domains (Simão-Bianchini *et al.* 2023). Considering varieties of species, *I. procumbens* var. *elliptica* Chodat & Hassl. (1905: 692) and *I. procumbens* var. *longepedunculata* Chodat & Hassl. (1905: 692), the species also occurs in Argentina and known a single collection of Paraguay (Wood *et al.* 2015). These taxa are still considered as dubious, lacking more study about these. However, this fact suggests that the distribution of species might be broader.

In Serra da Canastra it is very common, being well collected. *Ipomoea procumbens* was found in several localities within the park in counties of Delfinópolis and São Roque de Minas, in physiognomies of "campo limpo" and "campo ruprestre".

Ipomoea procumbens may be distinguished in narrow-elliptic to linear leaves, rugose indumentum, unequal and membranous sepals. *Ipomoea procumbens* is resembled *I. granulosa* Chodat & Hassl. 1905: 687) and *I. rupestris* Sim.-Bianch. & Pirani (2005: 296). The last species differs by ovate to oblong leaves and smaller sepals than in *I. procumbens*; *I. granulosa* can be distinguished by erect habit and verrucose indumentum. In Serra da Canastra, *I. procumbens* might easily be confused with *I. procurrens* Meisn. (1869: 254), which differs in ovate leaves and outstanding verrucose sepals, whereas in *I. procumbens* the leaves are narrow-elliptic to linear and rugose sepals.

Ipomoea kunthiana Meisn (1869: 253). may be confused to *I. procumbens* in habit and by unequal sepals, namely bigger inner sepals than outer ones, being possible distinguish them only by ovate sepals with acute or rounded apex in the first mentioned species and ovate to ovate-elliptic sepals with rounded to mucronate apex in second one. O'Donnell (1959) thought that these two species might better been united, but more accurate and in-depth studies are needed to formally synonymize them.

In PNSC, the species flower among December to May. In southeastern region of Brazil, it flowers over the months of October to May, with peak between January to March (Simão-Bianchini 1998). In Serra do Ouro Branco, flowers were collected among January to April (Rodrigues-Lima 2017).

4.11. *Ipomoea procurrens* Meisn., *Fl. bras.* 7: 254. 1869. Type: BRAZIL. MINAS GERAIS: 1845, *Widgren 302* (BR0000005307715 image!).

Fig. 10e

Prostrate herb, latex absent, ca. 100 cm long; root tuberous; stem 1–2 mm diam., sparse pubescent or glabrescent, rugose, glandular and strigose trichomes; internodes (3.5–)6–11 cm long. Leaves ovate, 4.2–7.4 × 2.5–4.3 cm, base cordate

or oblique, slightly asymmetric, apex rounded or slightly emarginate, mucronulate, margin irregularly wavy, glabrous or sparse trichomes in both surfaces, rugose, brochidodromous, veins sulcate in adaxial surface, protruding in abaxial surface; petiole 6–15 cm long., 1 pair of extrafloral nectaries at apex or domicile, not observed in all leaves. Inflorescence of 1–4 flowered axillary dichasium; peduncle primary 0.7–6.2(–9) cm long, secondary 0.2–1 cm long; bracteole triangular or subulate, apex acute or acuminate, 2–4.5 mm long, rugose; pedicel 0.5–1 cm long, rugose; sepals unequal, outer 7–12 × 4–5 mm, inner 14–17 × 3–7 mm, ovate, apex acute or rounded, coriaceous, dorsally verrucose, extrafloral nectaries 4–5, alternating to outer sepals, at pedicel base, not observed in all flowers; corolla campanulate-infundibuliform, pinkish or lilac, internally darker, 5–7 cm, tube 2.5–3 cm, limb 2–4 cm, midpetaline bands glabrous, well demarcated; stamens longer 19–2 mm, shorter 13–14 mm, base villous, anthers basifixed, elliptic, 4.5–5 mm long; style ca. 2.4 cm long, stigmas 2, globose. Capsule ovoid, 13–15 × 8–10 mm, glabrous; seed ellipsoid, brown, granular, ca. 7 × 5 mm.

Specimens examined: Sacramento, estrada São Roque de Minas - Sacramento, próximo ao Córrego dos Passageiros, 13.V.1995, fl., *R. Romero et al. 2224* (HUFU). São Roque de Minas, estrada para Sacramento, 12.II.2018, fl., *R.K. Kojima & R. Simão-Bianchini 14* (SP); 14.II.2018, fl., *R.K. Kojima & R. Simão-Bianchini 22* (SP); estrada para o vilarejo de São João Batista, 12.II.2018, fl., *R.Simão-Bianchini & R.K. Kojima 2191* (SP).

Ipomoea procurrens is a native characteristic Cerrado species, occurring in Bolivia, Paraguay and Central Brazil, comprising Tocantins, Goiás, Distrito Federal, Mato Grosso, Mato Grosso do Sul, Minas Gerais, São Paulo and Rio de Janeiro (Simão-Bianchini *et al.* 2023).

In Serra da Canastra, it was collected in road Sacramento - São Roque de Minas, in Guarita de Sacramento and near to Córrego dos Passageiros, all these localities in portion of PNSC in São Roque de Minas county. The physiognomies in which *I. procurrens* was collected are "campo limpo" and "campo sujo".

Ipomoea procurrens is readily recognized mainly by prominent rugose sepals, added to short petiolate, oblong to ovate leaves. Chodat & Hassler (1905) recognized *I. procurens* var. *pilosula* Chodat & Hassl. (1905: 692), distinguishing it from typical form only by leaves sparse pubescent. Here we treated the specimens studied as species level considering the slight difference between the varieties.

The species resembles *I. rupestris* which differs in not verrucose sepals and smaller leaves. Other similar species is *I. kunthiana*, which has narrower leaves, longer sepals with acute apex. This species is more common in North of Argentina and in south of Brazil (Simão-Bianchini 2009). *Ipomoea procurrens* is also very close to *I. procumbens*, both sympatric species. We discussed the differences between them in *I. procumbens* comments.

In PNSC, *Ipomoea procurrens* was collected with flower in December, January and May. In Serra do Cipó, Minas Gerais, it flowers over the months of November to April, concentrating the bloom among January to March (Simão-Bianchini & Pirani 1997). In Bolivia, the species flowers from November to May, during the summer rainy season (Wood *et al.* 2015).

4.12. *Ipomoea verbasciformis* (Meisn.) O'Donell, Lilloa 23: 502. 1950. Type: BRAZIL. MINAS GERAIS: 1845, *Widgren 304* (BR0000005305742 image!). Fig. 10f

Erect subshrub, latex present, 40–150 cm tall; root not seen; stem 0,4–9 cm diam., tomentose or dense tomentose, trichomes 1.5–2 mm long; internodes 1.5–4 cm long. Leaves ovate or oblong, 6–10.7 × (2–)3.1–5.2 cm, base rounded, apex acute, margin entire or irregularly wavy, pubescent or tomentose in both surfaces, brochidodromous, veins sulcate in adaxial surface, protruding in abaxial surface; petiole 1.5–6 mm long. Inflorescence of 1–8 flowered axillary dichasium; peduncle primary (0–)3.5–6.5 cm long, secondary absent; bracteole lanceolate, apex acute or acuminate, 6–15 mm long, tomentose; pedicel 2–5 mm long, tomentose; sepals equal or subequal, outer 1–11 × 6 mm, inner 9–10 × 5–6 mm, this ones with margin hyaline, ovate, apex acute, tomentose, striate, ventrally glabrous, corolla campanulate-infundibuliform, pinkish, inner of tube darker, 5.6–7 cm, tube 3.2–3.5 cm, limb 3–3.5 cm, midpetaline bands sericeous; stamens longer 25–26 mm, shorter 14–15 mm, base villous, anthers basifixed, elliptic, 4.5–5.5 mm long; style 2.3–2.4 cm long, stigmas 2, globose. Capsule ovoid, 10–11 × 5–6 mm, glabrous; seed ellipsoid, black, trichomes long, golden, concentrated at apex and sides, ca. 3 mm long., 4–5 × 1.5–2.5 mm.

Specimens examined: São Roque de Minas, estrada São Roque de Minas - Sacramento, morro após a nascente do Rio São Francisco, 18.III.1995, fl., *J.N. Nakajima et al. 806* (HUFU).

This species is native, and its distribution is restricted to Brazil, in Goiás and Minas Gerais, in Cerrado domain (Simão-Bianchini *et al.* 2023).

In Serra da Canastra it was collected in São Roque de Minas County, in localities denominated trail to Sítio São Domingos, Córrego dos Peixes hill, road to Fazenda do Fundão, valley of the São Francisco River source, hill after valley of São Francisco river and road to Sacramento, in physiognomies of "campo rupestre" and rocky outcrop. The species is relatively well represented in the park.

Ipomoea verbasciformis is distinguished by erect subshrub habit, tomentose indumentum in whole plant, ovate to oblong leaves with rounded base, acute apex and ovate sepals, the outer ones slightly bigger than inner ones. Wood *et al.* (2017) cited the similarity between *I. verbasciformis* and *I. dasycarpa* J.R.I.Wood & Scotland (2017: 12), which the last one distinguishes by larger dimension of sepals and strong mucronate leaves and by acuminate, submucronate sepals apex. In Serra da Canastra, *I. verbasciformis* resembles *I. argentea*, the differences between them are in *I. argentea* comments.

The species was found flowering over the months January to April.

5. *Jacquemontia* Choisy, Mémoires de la Société de Physique et d'Histoire Naturelle de Genève 6(2): 476. 1834.

The genus is relatively big and comprise about 120 species and most of them are distributed in Neotropical zone with few species occurring in Africa, Asia and Oceania (Staples *et al.* 2008; Staples 2012). In Brazil occurs 66 species, which 43 of them are endemic. Cerrado holds the greater number of species, followed by Caatinga, Atlantic Rainforest and Amazônia. Majority of species (41) occur in the state of Minas Gerais (Simão-Bianchini *et al.* 2023).

The representatives are recognized by subshrubs or herbs, climbing (Figs. 4k-l; 9i-j), scandent rarely erect habit; the indumentum generally has trichomes 3–8 branched (Figs. 9k; 11a-b,d-f), equal or unequal, rarely malpighiaceous or glandular; the leaves are simple, entire, rare lobate, linear, lanceolate, ovate or elliptic, usually petiolate with entire repand or wavy margin (Fig. 9i-j); the inflorescence is axillary dichasium, lax, dense (Figs. 4l; 9i-j) or reduced to one flower; the sepals are persistent in fruit (Fig. 9m); the corolla is bluish to purplish with midpetaline bands glabrous (Figs. 4k; 9i-j); the pollen is spheroidal or prolate-spheroidal, tricolpate or pantocolpate, microechinate (Fig. 11g-h) (Tellería & Daners 2003), the lobes of stigma are ellipsoid or subglobose, dorsoventrally flat (Figs. 9l; 11g-h); the capsules are 8-valved (Fig. 9m), the seeds are glabrous, verrucose or striate, with margin slightly winged (Fig. 9n) (Simão-Bianchini & Pirani 1997; Simão-Bianchini 2009; Pastore & Simão-Bianchini 2017).

Identification key of *Jacquemontia* in Serra da Canastra

1. Prostrate subshrubs, rusty trichomes; tomentose indumentum; elliptic leaves, rounded or cuneate base ..... 5.1. *Jacquemontia prostrata*
1'. Climbing herbs, translucent trichomes; hirsutullous and glandular indumentum; ovate leaves, cordate base ..... 5.2. *Jacquemontia sphaerostigma*

5.1. *Jacquemontia prostrata* Choisy, Prodromus Systematis Naturalis Regni Vegetabilis 9: 399. 1845. Type: BRAZIL. MINAS GERAIS: *Martius 881* (M0184704 image!). Figs. 9i; 11a,d,g

Prostrate subshrub, ca. 50 cm long.; root not seen; stem 2–2.5 mm diam., tomentose, 3-branched trichomes, rusty; internodes 1.5–4.6 cm long. Leaves ellipic, 3.2–5.2 × 1.6–2.4 cm, base cuneate or rounded, apex rounded, mucronate, margin entire or irregularly wavy, tomentose in both surfaces, brochidodromous, veins sulcate in adaxial surface, protruding in abaxial surface; petiole 2–7 mm long. Inflorescence of 3–7 flowered axillary capituliform cyme; peduncle primary (2.5–)3.2–6.2 cm long, secondary absent; bracteole lanceolate, apex acute or acuminate, 0.8–1.1 cm long, tomentose; pedicel 0–2 mm long, tomentose; sepals unequal, outer 7–9 × 2–4 mm, lanceolate or oblong, inner 6–8 × 0.5–3 mm, lanceolate, apex acute or acuminate, tomentose, ventrally glabrous; corolla infundibuliform, blue, ca. 1.6 cm, tube ca. 0.5 cm, limb ca. 1.1 cm, midpetaline bands glabrous, well demarcated; stamens longer 10–11 mm, shorter 8–9 mm, base papillose, anthers

dorsifixed, elliptic, ca. 9 mm long; style ca. 2.5 mm long, stigmas 2, ellipsoid. Capsule globose, 4–5 × 4–6 mm, glabrous; seed trigonous, two flat surfaces and one convex, glandular, brownish, ca. 2.5 × 3.5 mm, ala inconspicuous and not continuous, ca. 1 mm long. at sides.

Specimens examined: São Roque de Minas, estrada São Roque de Minas - Sacramento, morro após o córrego dos Louros, 12.I.1995, fl., *R. Romero et al. 1756* (HUFU, SP).

It is a typical of Cerrado domain species, native and restricted to Brazil, recorded in Minas Gerais and Rio de Janeiro. It was first described to Goiás and Minas Gerais (Meisner 1869; Simão-Bianchini *et al.* 2023).

In Serra da Canastra, *J. prostrata* is rare, having only one record in hill beyond Córregos dos Morros locality, in São Roque de Minas County, in "campo cerrado" physiognomy.

Jacquemontia prostrata is recognized in prostrate or climbing habit and in having tomentose and rusty indumentum in whole plant, blue midpetaline bands in the same tone of corolla, always well demarcated, bracteoles and sepals persistent in capsules. In Serra da Canastra, it was found only prostrate individuals.

Jacquemontia prostrata is similar to *J. linarioides* Meisn. (1869: 308), which differs in linear leaves, sparse trichomes and pauciflorous inflorescence; and also to *J. lasioclados* (Choisy) O'Donell (1950: 425), that is readily distinguished by having erect habit, broad-ovate to oblong leaves, cinereous indumentum in older leaves and rusty indumentum only in younger ones. *J. sphaerocephala* Meisn. (1869: 306), other Cerrado characteristic species, resembles *J. prostrata* in dense, rusty indumentum, elliptic leaves and dense

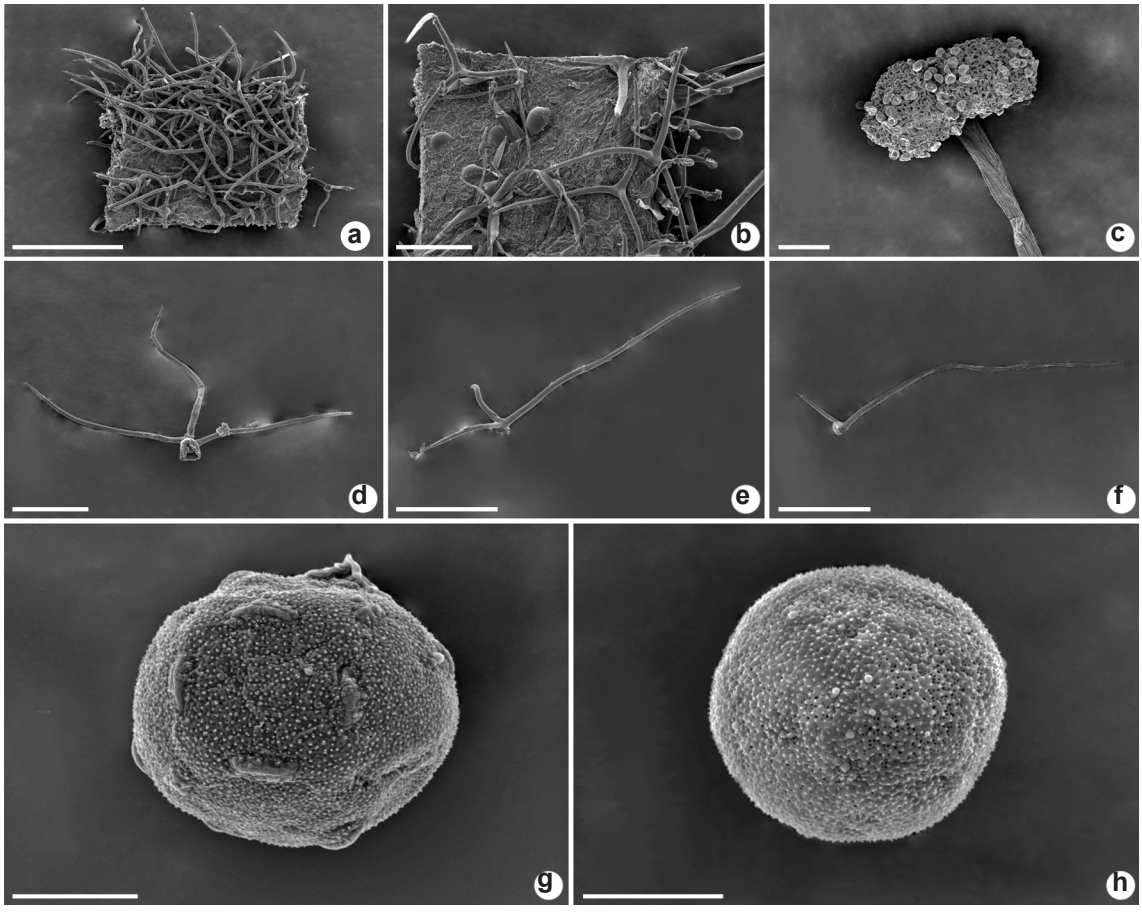

Figure 12 – a-h. Scanning electron micrographs of species of *Jacquemontia* – a, d, g. *J. prostrata* – a. indumentum; d. 3-branched trichome; g. pollen grain in general view; b-c, e-f, h. *J. sphaerostigma* – b. indumentum; c. stigmas; e. 3-branched trichome; f. forked trichome; h. pollen grain in general view. (a, d, g. *Romero et al. 1756*; b-c, e-f, h. *Kojima & Bianchini 24*). Scales: a, e, f = 500 μm; b, c, d = 200 μm; g,h = 20 μm.

inflorescence, but differs in longer leaves (4.4–6.2 cm long.) and shorter peduncles (1.3–4.5 cm long.) in *J. sphaerocephala*, while *J. prostrata* has shorter leaves (3.2–5.2 cm long.) and longer peduncles (2.5–6.2 cm long.).

In PNSC, it was found with flower in January. In Serra do Ouro Branco and in Serra do Cipó National Parks, in the state of Minas Gerais, it flowers all year long (Simão-Bianchini & Pirani 1997; Rodrigues-Lima 2017).

5.2. *Jacquemontia sphaerostigma* (Cav.) Rusby, Bulletin of the Torrey Botanical Club 26(3): 151. 1899. Type: MEXICO. *Née s.n*. (MA222550 image!). Figs. 4k-l; 9j-n; 11b-c,e-f,h

Climbing herb, viscous; root not seen; stem 1–2 mm diam., hirsutullous and glandular, forked, glandular and 3-branched trichomes, translucent; internodes (1.7)2–6 cm long. Leaves elliptic or ovate, (1.9–)2.4–4.5 × 1.1–2.7 cm, base cordate, apex acuminate or long acuminate, margin repand, both surfaces villous-stellate, denser in abaxial surface, forked trichomes, three-branched trichomes with two shorter branches and one longer (twice or more than twice the shorter ones), interspersed by glandular trichomes, brochidodromous, veins sulcate in adaxial surface, protruding in abaxial surface; petiole 3–17(–27) mm long. Inflorescence of 1–32 flowered axillary congested umbeliform cyme; peduncle primary (0.5–)1.2–7 cm long, secondary 0–10 mm long; bracteole lanceolate, apex acute or acuminate, 0.3–1 cm long, hirsutullous and glandular; pedicel 0–4.5 mm long, hirsutullous and glandular; sepals subequal, outer 4–6.5 × 1–1.5 mm, inner 5–7 × 0.5–1 mm, this ones glabrous at the base and with margin hyaline, ovate or lanceolate, apex acute or acuminate, hirsutullous, glandular, ciliate; corolla infundibuliform, bluish or purplish, 5–9 mm, tube 1–2 mm, limb 6–7 mm, midpetaline bands glabrous, well demarcated; stamens longer 4.3–5 mm, shorter 3.5–4 mm, base papillose, anthers dorsifixed, elliptic, 1–3 mm long; style 4.5–5 mm long, stigmas 2, subglobose. Capsule globose or ovoid, 3–5 × 3–4 mm, glabrous; seed trigonous, two flat surfaces and one convex, glabrous, rugose, yellowish, 1.8–1.9 × 1.1–1.4 mm, ala inconspicuous.

Specimens examined: Capitólio, 17.II.2018, fl. and fr., *R.K. Kojima & R. Simão-Bianchini 24* (SP).

It is a native species, not restricted to Brazil, it has a broad distribution in Tropical America, comprising Mexico, whole Central America, Peru, Bolivia and Venezuela (O'Donell 1960; Robertson 1971). In Brazil, the species has confirmed record in all country, not occurring only in Roraima, Acre, Rondônia, Tocantins, Rio de Janeiro and south region. It occurs in Amazon, Caatinga, Cerrado and Atlantic Rainforest domains (Simão-Bianchini *et al.* 2023). It is very common, being considered even as weed plant in anthropized areas (Rodrigues-Lima 2017; Moreira *et al.* 2018).

In Serra da Canastra, it was recorded just in Capitólio county, at roadside, in rocky soil.

Jacquemontia sphaerostigma may have a huge variation in measurement of leaves, petiole, peduncle and pedicel, not being so easy to recognize this species (Robertson 1971; Simão-Bianchini & Pirani 1997). Despite this, it can be recognized by climbing or ascending habit, with noticeable viscosity provided by glandular indumentum in whole plant and persistent bracteoles and sepals.

Jacquemontia evolvuloides (Moric.) Meisn. (1869: 307) is the most similar species to *J. sphaerostigma*, being distinguished by having only stellate trichomes and inflorescence in lax monochasium (1–3 flowers), with peduncles reaching 7 cm long. This species is broadly distributed in Tropical America and in Brazil occurs in Caatinga and Cerrado domains (Pastore & Simão-Bianchini 2017). *J. sphaerostigma* also resembles to *J. pentanthos* (Jacq.) G.Don, (1837: 283) which differs in longer leaves and peduncles, unequal, bigger sepals and lacking glandular trichomes.

In PNSC it was collected with flower in February. In Serra do Ouro Branco, *J. sphaerostigma* flowers all over the year, and mainly among September to February in Serra do Cipó (Rodrigues-Lima 2017; Simão-Bianchini & Pirani 1997).

Pollen morphology

Identification key of pollen grains of Convolvulaceae genera in Serra da Canastra

1. "Echinoconieae": pollen with large, well-developed spines..... *Ipomoea*
1'. "Psiloconiae": pollen bearing micro-spines, gemma, granula or other ornamentation, never with large spines.

2. Large pollen grain (50–60 µm diam.) ..... *Distimake*
2'. Medium or small pollen grain (30–40 µm diam.).
    3. Oblate, exine with slightly irregular relief with perforations and granula regularly scattered ..... *Bonamia*
    3'. Suboblate or spheroidal, exine microechnate or granulate.
        4. Pollen grain ca. 30 µm diam., spheroidal, exine microechinate ..... *Evolvulus*
        4'. Pollen grain 35–40 µm diam., suboblate or spheroidal, exine echinulate ..... *Jacquemontia*

The studied genera are classified according to two groups of Convolvulaceae proposed according to pollen morphology (Hallier 1893): "Echinoconieae" (*Ipomoea*) and "Psiloconiae" (*Bonamia*, *Distimake*, *Evolvulus*, *Jacquemontia*).

Bonamia s.l. is an euripalynous taxon mainly in what concerns polarity and aperture type. The pollen grains are monads, of medium or large size, prolate or oblate, subprolate or spheroidal. The genus has two major distinct pollen types: isopolar, 3-colpate, and apolar, 12–32 pantocolpate. The ornamentation of the exine is verrucate, microechinate, granulate, reticulate or microreticulate (Tellería & Daners 2003; Moreira *et al*. 2019; Vasconcelos *et al.* 2019). In the studied species the pollen is medium to large (35–40 µm), oblate, 3-colpate, perforate, and the surface has slightly irregular relief with perforations and granula regularly scattered (Fig. 4c-d).

Distimake has large pollen, subprolate, prolate-spheroidal or oblate-spheroidal, monad, isopolar, 3–6 colpate, 4–6-zonocolpate or 6-pantocolpate, with exine microechinate or granulate (Leite *et al.* 2005; Buril-Vital *et al.* 2008; Vasconcelos *et al.* 2015). Three different groups were recognised according to pollen morphology: *D.* sect. *Schizips*, *D.* sect. *Xanthips* and *D.* sect. *Cissoides*, suggesting that the genus is euripalynous (Leite *et al.* 2005). In the species analysed, the pollen grains are large (50–60 µm diam.), oblate-spheroidal, and 3-colpate, with exine granulate (Fig. 6a-b).

Evolvulus is a stenopalynous genus, with homogenous pollen grains. It is small, medium or large size, such as in *E. glomeratus*, spheroidal, monad, apolar, 3–5 colpate or 8–16 pantocolpate, exine psilate, tectate or microechinate (Hallier 1893; Buril-Vital *et al.* 2008; Silva 2013; Vasconcelos *et al.* 2019). In study species pollen grains are small (ca. 30 µm diam), pantocolpate, and microechinate (Fig. 7c-e).

Represents of *Ipomoea* have large pollen (60–80 µm diam), spheroidal, monad, apolar, pantoporate, echinate with pointed spine and bulbous base (Buril-Vital *et al.* 2008; Vasconcelos *et al.* 2015) such as in specimens analyzed here (Fig. 9c-d). The species also might be subdivided into subtypes according to the form, the arrangement and number of spines, and the exine ornamentation (Tellería & Daners 2003).

In *Jacquemontia*, the pollen is medium or large, monad, apolar or isopolar, suboblate, subprolate, prolate-spheroidal or spheroidal, 3-colpate, 6–30 pantocolpate or zonocolpate, the exine is tectate granulate, microechinate, perforate (Tellería & Daners 2003; Buril-Vital *et al.* 2015; Vasconcelos *et al.* 2019). This genus is euripalynous in concern to aperture type and exine ornamentation, (Vasconcelos *et al*. 2019) and was recognized three types according to aperture (Buril-Vital *et al.* 2015). The specimens analyzed have medium pollen grains (35–40 µm diam.), suboblate or spheroidal, 15–30 pantocolpate and exine echinulate (Fig. 11g-h).

Discussion

Among the species of few records and/or of rare distribution, according to criteria adopted by IUCN (2012): *Bonamia eustachioi* falls within the endangered (EN) (Moreira *et al*. 2021). Due to relevant restricted range, this taxon is under immediate threat. There are records of *B. eustachioi* in protected and non-protected areas. Two environmental conserved areas are Serra da Canastra National Park and Serra do Cipó National Park, both in the state of Minas Gerais. *Evolvulus aurigenius* is considered as least concern (LC) category (CNC Flora 2023). *Evolvulus cressoides* is considered as near threatened (NT) (CNC Flora 2023). *Ipomoea acutisepala* is considered as least concern (LC) (CNC Flora 2023). Although the few records of *Ipomoea langsdorffi* in PNSC, without further studies it only can be classified as Data Deficient (DD). *Ipomoea pohlii*. is considered as least concern (LC) for Extent of occurrence - EOO and as endangered (EN) about Area of Occupancy - AOO: 28.000 km² (GeoCAT 2023).

In comparison with other studies carried out in Minas Gerais about Convolvulaceae, Forzza *et al.* (2013) compiled six species in Ibitipoca State Park, which three of them are common to PNSC: *E. aurigenius* Mart, *I. delphinioides* Choisy and *I. procumbens* Mart. & Choisy, In Cangas do Quadrilátero Ferrífero, Simão-Bianchini (2012) listed out 19 taxa, of which five are similar to those found in PNSC: *E. aurigenius* var. *aurigenius* Mart., *E. aurigenius* var. *meissnerianus* Ooststr., *I. delphinioides*, *I. procumbens* and *J. prostrata* Choisy. In Serra do Cipó National Park, Simão-Bianchini & Pirani (1997) found 23 species, where eight species were common on both areas: *D. tomentosus* (Choisy) Petrongari & Sim.-Bianch., *E. aurigenius*, *E. glomeratus* Nees & Mart., *I. aprica* House, *I campestris* Meisn., *I. procurrens* Meisn., *J. prostrata* and *J. sphaerostigma*. In Serra do Ouro Branco State Park, Rodrigues-Lima (2017) listed 25 species, which eight were common to PNSC: *D. tomentosus*, *E. aurigenius*, *I. aprica*, *I. delphinioides*, *I. langsdorffii* Choisy, *I. procumbens*, *J. prostrata* and *J. sphaerostigma*. These two last cited areas have most similarities of species in comparison to Serra da Canastra National Park. The resemblance in composition of species in these localities of Minas Gerais is probably associated to similarity of physiognomies, due to formation of Espinhaço Range which they are all continuous or disjunct part of it.

The surroundings areas have been suffering the impacts of farming, agriculture and tourism which might causes fragmentation and destruction of habitats with probable loss of species. To comply with the standards of "Sistema Nacional de Unidades de Conservação da Natureza" (MMA/SNUC 2000), there are buffer zones that subject the human activities to specific rules and restrictions in order to minimize negative impacts in surroundings of PNSC. In these areas occurs 10 species, which five of them were found growing at weed environment, one was found in riparian forest and four are typical of *Cerrado* (Tab. 1).

Only one record of weed species was found inside the park (*J. sphaerostigma*) near to the car traffic. This region has strong tourism activities due to visit at famous canyons and several waterfalls at Rio Grande in Capitólio count. It is situated at PNSC boundary far from all official access to this Conservation Unit, so there is not any orientation or environmental education to visitors as usually occurs in all access entries to Park.

The Serra da Canastra National Park is a well-preserved area. We concluded that human impacts in this protected area are low to studied group of plants, although the tourism explored in the region. It is strongly important the action of the environmental education promoting by ICMBio with volunteers. To maintain the diversity of species and in order to preserve the environment, it is also important to regularize the Babilônia plate, area legally belonging to the park.

Based on personal preliminary survey it was expected 23 species of Covolvulaceae in PNSC. After studying all the material collected there, we found that the number of species was correct, but some of them were re-identified: *Bonamia eustachioi* was initially identified as *B.* aff. *sericea*; *E. goyazensis* was initially considered as *E. tomentosus*; *Merremia digitata* Spreng. was reidentified and updated to *Distimake maragniensis* (Choisy) Petrongari & Sim.-Bianch. and *M. tomentosa* (Choisy) Hallier f. was just updated to *D. tomentosus* (Choisy) Petrongari & Sim.-Bianch.

The material identified as *I. delphinioides* was recognized as *I. campestris*; and after this event we collected *I. delphinioides* in PNSC, as a new record of occurrence. *Jacquemontia sphaerostigma* was collected after this preliminary checklist and was concluded the new record to PNSC. *Ipomoea langsdorffii* was included in species list after analyzing the material borrowed from another herbarium and was constated its occurrence in studied area. *Ipomoea sidifolia* Schrad. (1821: 719) and *Jacquemontia sphaerocephala* does not occur in the park, only in surroundings areas. The first one was found in riparian forest and the last one is a species typical of Cerrado. The non-weed species found in surroundings of Serra da Canastra National Park (*I. rupestris*, *I. sidifolia*, J. *blanchetii* Moric. (1838: 41), *J. cataractae* Krapov. (2009: 59), *J. sphaerocephala*) might be found in the park in the future. The protected area might suffer the risk of invasion of the weed species of the surroundings [*D. cissoides* (Lam.) A.R. Simões & Staples (2017: 573), *D. macrocalyx* (Ruiz & Pav.) A.R. Simões & Staples (2017: 574), *I. nil* (L.) Roth (1797: 36), *I. cairica* (L.) Sweet (1826: 287), *I. triloba* L. (1753: 161)] in the case of the lack of supervision of agriculture and farmer by the responsible institution, the uncontrolled tourism and the environmental miss awareness.

Table 1 – Species of surroundings areas of PNSC, not included in the taxonomic treatment.

* *Distimake cissoides* (Lam.) A.R. Simões & Staples
* *Distimake macrocalyx* (Ruiz & Pav.) Simões & Staples
* *Ipomoea cairica* (L.) Sweet
* *Ipomoea nil* (L.) Roth
** *Ipomoea rupestris* Sim.-Bianch. & Pirani
*** *Ipomoea sidifolia* Schrad.
* *Ipomoea triloba* L.
** *Jacquemontia blanchetii* Moric.
** *Jacquemontia cataractae* Krapov.
** *Jacquemontia sphaerocephala* Meisn.

* = Weed species; ** = Typical of Cerrado; *** = Found in riparian forest.

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Data availability statement

In accordance with Open Science communication practices, the authors inform that manuscript files are avaiable at Figshare repository.

References

Ash AW, Ellis B, Hickey LJ, Johnson KR, Wilf P & Wing SL (1999) Manual of leaf architecture: morphological description and categorization of dicotyledonous and net-veined monocotyledonous angiosperms. Smithsonian Institution, Washington. 67p.

Austin DF (1997) Convolvulaceae (Morning Glory Family). Available at <https://cals.arizona.edu/herbarium/content/convolvulaceae>. Access on 9 May 2023.

Austin DF & Cavalcante PB (1982) Convolvuláceas da Amazônia. Boletim do Museu Paraense Emílio Goeldi 36: 1-134.

Austin DF & Staples GW (1983) Notes on *Merremia*, *Operculina* and *Turbina*. Journal of the Arnold Arboretum 64: 483-489.

Austin DF & Secco RS (1988) *Ipomoea marabaensis*, nova Convolvulaceae da Serra dos Carajás (PA). Boletim do Museu Paraense Emílio Goeldi, Série Botânica 4: 187-194.

Austin DF & Huáman Z (1996) A synopsis of *Ipomoea* (Convolvulaceae) in the Americas. Taxon 45: 3-38.

Austin DF, Staples GW & Simão-Bianchini R (2015) A synopsis of *Ipomoea* (Convolvulaceae) in the Americas: further corrections, changes, and additions. Taxon 64: 625-633.

Bachman S, Moat J, Hill A, Torre J & Scott B (2011) Supporting Red List threat assessments with GeoCAT: Geospatial Conservation Assessment Tool. Available at <https://zookeys.pensoft.net/articles.php?id=3037>. Access on 28 November 2023. DOI: 10.3897/zookeys.150.2109

Buril-Vital MTA, Santos FAR & Alves M (2008) Diversidade palinológica das Convolvulaceae do Parque Nacional do Catimbau, Buíque, PE, Brasil. Acta Botanica Brasilica. Available at <http://www.scielo.br/scielo.php?pid=S0102-33062008000400027&script=sci_arttext>. Access on 9 July 2023. DOI: 10.1590/S0102-33062008000400027

Buril-Vital MTA (2009) Convolvulaceae. *In*: Alves J, Araújo MF, Maciel JR & Martins S (eds.) Flora de Mirandiba. Associação de Plantas do Nordeste, Recife. Pp. 121-134.

Buril-Vital MTA, Oliveira PP, Rodrigues R, Santos FAR & Alves M (2015) Pollen morphology and taxonomic implications in *Jacquemontia* Choisy (Convolvulaceae). Grana. Available at <https://www.tandfonline.com/doi/abs/10.1080/00173134.2014.946961>. Access on 11 March 2023. DOI: 10.1080/00173134.2014.946961

Carvalho-Silva M & Guimarães EF (2009) Piperaceae do Parque Nacional da Serra da Canastra, Minas Gerais, Brasil. Boletim de Botânica da Universidade de São Paulo. Available at <http://www.periodicos.usp.br/bolbot/article/view/11768/13544>. Access on 5 August 2023. DOI: 10.11606/issn.2316-9052.v27i2p235-245

Chodat B & Hassler E (1905) Convolvulaceae. *In*: Boissier H (ed.) Plantae Hasslerianae. Bulletin Herbarium Boissier ser. 2, 5: 681-699.

Choisy JDMJD (1834) Mémoires de la Société de Physique et d'Histoire Naturelle de Genève 6: 381-498.

Choisy JDMJD (1845) Convolvulaceae. *In*: De Candolle A (ed.) Prodromus systematics naturalis regni vegetabilis. Sumptibus Sociorum Treuttel et Würtz, Parisii 9: 323-465.

CNC Flora (2023) Centro Nacional de Conservação da Flora. Available at <http://cncflora.jbrj.gov.br>. Access on 27 June 2023.

Dammer CLU (1897) Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie 23: 37.

De Man I & Simões AGS (2021) Pollen diversity of *Xenostegia* D.F.Austin et Staples (Convolvulaceae). Grana. Available at <https://www.tandfonline.com/doi/abs/10.1080/00173134.2021.1990398>. Access on 14 November 2023. DOI: 10.1080/00173134.2021.1990398

Don G (1837) A general history of the dichlamydeous plants, comprising complete descriptions of the different orders. Vol. 4. Gilbert & Rivington Printers, London. Pp. 252-306.

Durigan G & Ratter JA **(**2016) The need for a consistent fire policy for *Cerrado* conservation. Journal of Applied Ecology. Available at <https://besjournals.onlinelibrary.wiley.com/doi/epdf/10.1111/1365-2664.12559>. Access on 20 May 2023. DOI: 10.1111/1365-2664.12559

Erdtman G (1952) Pollen morphology and plant taxonomy. Angiosperms. Almqvist and Wiksell. Stockholm. 553p.

Eserman LA, Tiley GP, Jarret RL, Leebens-Mack JH & Miller RE (2014) Phylogenetics and diversification of morning glories (tribe Ipomoeeae, Convolvulaceae) based on whole plastome sequences. American Journal of Botany. Available at <https://bsapubs.onlinelibrary.wiley.com/doi/10.3732/ajb.1300207>. Access on 14 November 2023. DOI: 10.3732/ajb.1300207

Farinaccio MA & Mello-Silva R (2004) Asclepiadoideae (Apocynaceae) do Parque Nacional da Serra da Canastra, Minas Gerais, Brasil. Boletim de Botânica da Universidade de São Paulo. Available at <https://www.revistas.usp.br/bolbot/article/view/62232/65057>. Access on 25 July 2023. DOI: 10.11606/issn.2316-9052.v22i1p53-92

Ferreira PPA & Miotto STS (2009) Sinopse das espécies de *Ipomoea* L. (Convolvulaceae) ocorrentes no Rio Grande do Sul, Brasil. Revista Brasileira de Biociências. Available at <https://www.lume.ufrgs.br/bitstream/handle/10183/27855/000738504.pdf?sequence=1&isAllowed=y>. Access on 15 May 2023.

Fidalgo O & Bononi VLR (1989) Técnicas de coleta, preservação e herborização de material botânico. Instituto de Botânica, São Paulo. 62p.

Filardi FLR, Garcia FCP, Dutra VF & São-Thiago PS (2007) Papilionoideae (Leguminosae) do Parque Nacional da Serra da Canastra, Minas Gerais, Brasil. Hoehnea. Availabe at <http://www.scielo.br/pdf/hoehnea/v34n3/v34n3a08.pdf>. Access on 13 June 2023. DOI: 10.1590/S2236-89062007000300008

Forzza RC, Menini Neto L, Salimena FRG & Zappi D (2013) Fanerógamas do Parque Estadual do Ibitipoca e suas relações florísticas com outras áreas com campo rupestre de Minas Gerais. *In*: Forzza RC, Menini Neto L, Salimena FRG & Zappi D (eds.) Flora do Parque Estadual do Ibitipoca e seu entorno. Editora UFJF, Juiz de Fora. Pp. 154-291.

Gardner G (1842) *Icones Plantarum*. ed. 1, 2 vols. Impensis Laurentii Salvii, Holmiae, Stockholm 1: 159-161.

GeoCAT (2023) Geospatial Conservation Assessment Tool. Royal Botanic Gardens, Kew. Available at <http://geocat.kew.org/>. Access on 10 May 2023.

Gonçalves DJP, Romero R & Yamamoto K (2013) Vochysiaceae no Parque Nacional da Serra da Canastra, Minas Gerais, Brasil. Rodriguésia 64: 863-875. DOI: 10.1590/S2175-78602013000400014

Hallier HJG (1893) Versuch einer naturlichen Gliederung der Convolvulaceae. Botanical Journal Arboretum 16: 479-591.

Harris JG & Harris MW (1994) Plant identification terminology: an illustraded glossary. Spring Lake Publishing, Utah. 198p.

Hassler E (1911) Repertorium Specierum Novarum Regni Vegetabilis. Centralblatt für Sammlung und Veroffentlichung von Einzeldiagnosen neuer Pflanzen 9: 197.

Hemsing PKB & Romero R (2010) Chrysobalanaceae do Parque Nacional da Serra da Canastra, Minas Gerais, Brasil. Rodriguésia 61: 281-288.

Hickey M & King C (2001) The Cambridge illustrated glossary of botanical terms. Cambridge University Press, Cambridge. 221p.

Hooker WJ (1844) *Ipomoea crassipes*. Botanical Magazine 70: t. 4068.

Hunziker AT & Crovetto MR (1944) Anormalidades florales en el género *Cuscuta*. Revista Argentina de Agronomía 11: 58-65.

IBGE - Instituto Brasileiro de Geografia e Estatística (2019) Biomas e sistema costeiro-marinho do Brasil: compatível com a escala 1:250.000. Relatórios metodológicos, v. 45. Coordenação de Recursos Naturais e Estudos Ambientais, Rio de Janeiro. 168p.

IBGE - Instituto Brasileiro de Geografia e Estatística (2023) Portal de mapas. Available at <https://portaldemapas.ibge.gov.br/portal.php#mapa792>. Access on 26 March 2023.

ICMBio - Instituto Chico Mendes de Conservação da Biodiversidade (2023) Parque Nacional da Serra da Canastra. Available at <https://www.gov.br/icmbio/pt-br/assuntos/biodiversidade/unidade-de-conservacao/unidades-de-biomas/cerrado/lista-de-ucs/parna-da-serra-da-canastra>. Access on 13 March 2023.

IEF - Instituto Estadual de Florestas (2023) Parque Estadual. Available at <http://www.ief.mg.gov.br/parque-estadual>. Access on 13 March 2023.

IUCN (2012) IUCN Red List categories and criteria. V. 3.1. 2nd ed. Prepared by the IUCN Species Survival Commission. IUCN, Gland, Cambridge. 32p.

Junqueira MER & Simão-Bianchini R (2006) O gênero *Evolvulus* L. (Convolvulaceae) no município de Morro do Chapéu, BA, Brasil. Acta Botanica Brasilica. Available at <https://doi.org/10.1590/S0102-33062006000100015>. Access on 15 April 2023. DOI: 10.1590/S0102-33062006000100015

Krapovickas A (2009) Novedades en Convolvuláceas argentinas. Bonplandia (Corrientes) 18: 59-61.

Lamarck JBAPM (1793) Tableau Encyclopedique et Methodique. Botanique, tome 1, 2: 465.

Leite KRB, Simão-Bianchini R & Santos FAR (2005) Morfologia polínica do gênero *Merremia* Dennst. (Convolvulaceae) ocorrentes no estado da Bahia, Brasil. Acta Botanica Brasilica. Available at <https://doi.org/10.1590/S0102-33062005000200014>. Access on 11 April 2023.

Linnaeus C (1753) *Species Plantarum.* Ed. 1. 2 vols. Impensis Laurentii Salvii, Holmiae, Stockholm. Pp. 159-161.

Linnaeus C (1762) *Species Plantarum*. Ed. 2. 2 vols. Impensis Laurentii Salvii, Holmiae, Stockholm. Pp. 391-392.

Machado AIMR & Romero R (2014) Bignoniaceae das serras dos municípios de Capitólio e Delfinópolis, Minas Gerais. Rodriguésia 65: 1003-1021. DOI: 10.1590/2175-7860201465411

Martin HA (2001) The family Convolvulaceae in the Tertiary of Australia: evidence from pollen. Australian Journal of Botany 49: 221-234.

Martius CFP (1841) Flora, oder allgemeine botanische Zeitung. Vol. 24. Königliche Botanische Gesellschaft, Regensburg.

Meissner CDF (1869) Convolvulaceae. *In*: Martius CFP & Eichler AG (eds.) *Flora brasiliensis*. Frid. Fleischer, Lipsiae. Vol. 7, pp. 199-730, tab. 72-124.

Mendonça RC, Felfili JM, Walter BMT, Silva Júnior MC, Rezende AV, Filgueiras TS & Nogueira PE (2008) Flora vascular do Cerrado. *In*: Sano SM, Almeida SP & Ribeiro JF (eds.) Cerrado: ecologia e flora. Vol. 2. Embrapa Informação Tecnológica, Brasília. Pp. 1-1279.

MMA/IBAMA (2005) Plano de Manejo - Parque Nacional da Serra da Canastra. Instituto Terra Brasilis de Desenvolvimento Socioambiental, Brasília. 250p.

MMA/SNUC - Sistema Nacional de Unidades de Conservação (2000) Lei 9.985/2000. Brasília. Available at <http://www.planalto.gov.br/ccivil_03/leis/l9985.htm>. Access on 14 July 2023.

Moreira ALC Simão-Bianchini R & Cavalcanti TB (2018) Sinopse do gênero *Jacquemontia* Choisy (Convolvulaceae) nos estados de Goiás e Tocantins, Brasil. Hoehnea. Available at <http://www.scielo.br/pdf/hoehnea/v45n2/2236-8906-hoehnea-45-02-0192.pdf>. Access on 15 July 2023. DOI: 10.1590/2236-8906-16/2017

Moreira ALC, Mezzonato-Pires AC, Santos FAR & Cavalcanti TB (2019) Pollen morphology in the genus *Bonamia* Thouars (Convolvulaceae) and its taxonomic significance. Review of Palaeobotany and Palynology. Available at <https://www.sciencedirect.com/science/article/pii/S0034666718302185>. Access on 14 May 2023. DOI: 10.1016/j.revpalbo.2019.02.008.

Moreira ALC, Kojima RK, Simão-Bianchini R & Cavalcanti TB (2021) *Bonamia eustachioi* (Convolvulaceae), a new species from from the Brazilian *Cerrado* and *Caatinga*. Brittonia. Available at <https://link.springer.com/article/10.1007/s12228-021-09662-z>. Access on 29 November 2023. DOI: 10.1007/s12228-021-09662-z

Moricand MES (1838) Plantes Nouvelles d'Amérique. Jules G-me Fick, Geneve 55, t. 37, 41, t. 27.

Moricand MES (1844) Plantes Nouvelles d'Amérique. Jules G-me Fick, Geneve 140, t.84.

Morokawa R, Simões AO & Kinoshita LS (2013) Apocynaceae *s. str.* do Parque Nacional da Serra da Canastra, Minas Gerais, Brasil. Rodriguésia 64: 179-199. Available at <http://www.scielo.br/pdf/rod/v64n1/15.pdf>. Access on 20 April 2023. DOI: 10.1590/S2175-78602013000100015

Nakajima JN & Semir J (2001) Asteraceae do Parque Estadual da Serra da Canastra, Minas Gerais, Brasil. Revista Brasileira de Botânica. Available at <http://www.scielo.br/pdf/rbb/v24n4/8754.pdf>. Access on 16 July 2023. DOI: 10.1590/S0100-84042001000400013

Nees VECGD, Martius CGD & Carl FP (1823) Novorum Actorum Academiae Caesareae Leopoldinae-Carolinae Naturae Curiosorum 11: 81.

O'Donell CA (1948) Convolvuláceas argentinas o paraguayas nuevas o críticas. Lilloa 14: 169-192.

O'Donell CA (1950a) Convolvuláceas americanas nuevas o críticas I. Lilloa 23: 421-456.

O'Donell CA (1950b) Convolvuláceas americanas nuevas o críticas II. Lilloa 23: 457-508.

O'Donell CA (1953) Convolvuláceas americanas nuevas o críticas IV. Lilloa 26: 353-400.

O'Donell CA (1959) Convolvuláceas Argentinas. Lilloa 29: 87-348.

O'Donell CA (1960) Las especies de Jacquemontia de Perú. Lilloa 30: 71-89.

Ooststroom SJ Van (1934) A monograph of the genus *Evolvulus*. Mededelingen van het Botanisch Museum en Herbarium van de Rijksuniversiteit te Utrecht 14: 1-267.

Ooststroom SJ Van & Hoogland RD (1953) Convolvulaceae. *In*: Van Steenis CGGJ (ed.) Flora Malesiana. Vol. 4. Noordhoff-Kolff N.V., Jakarta. Pp. 388-512.

Pastore M & Simão-Bianchini R (2017) Sinopse do gênero *Jacquemontia* Choisy (Convolvulaceae) no estado de São Paulo, Brasil: notas nomenclaturais, taxonômicas e geográficas. Hoehnea. Available at <http://www.scielo.br/pdf/hoehnea/v44n4/2236-8906-hoehnea-44-04-0611.pdf>. Access on 22 May 2023. DOI: 10.1590/2236-8906-77/2017

Payne WW (1978) A glossary of plant hair terminology. Brittonia 30: 239-255.

Petrongari FS, Simões AR & Simão-Bianchini R (2018) New combinations and lectotypifications in *Distimake* Raf. (Convolvulaceae). Phytotaxa. Available at <https://www.biotaxa.org/Phytotaxa/article/download/phytotaxa.340.3.12/31817>. Access on 16 August 2023. DOI: 10.11646/phytotaxa.340.3.12

Pinheiro ES & Durigan G (2009) Dinâmica espaço-temporal (1962-2006) das fitofisionomias em unidade de conservação do Cerrado no sudeste do Brasil. Revista Brasileira de Botânica. Available at <http://www.scielo.br/pdf/rbb/v32n3/a05v32n3>. Access on 27 June 2023.

Pisuttimarn P, Simões ARG, Petrongari FS, Simão-Bianchini R, Barbosa JCJ, De Man I, Fonseca LHM, Janssens SB, Patil SB, Shimpale VB, Pornpongrungrueng P, Leliaert F & Chatrou LW (2023) *Distimake vitifolius* (Convolvulaceae): reclassification of a widespread species in view of phylogenetics and convergent pollen evolution. Botanical Journal of the Linnean Society. DOI: 10.1093/botlinnean/boac077

Pontes AF & Mello-Silva R (2005) Annonaceae do Parque Nacional da Serra da Canastra, Minas Gerais, Brasil. Boletim de Botânica da Universidade de São Paulo. Available at <https://www.revistas.usp.br/bolbot/article/view/58324/61326>. Access on 14 August 2023. DOI: 10.11606/issn.2316-9052.v23i1p71-84

POWO (2023) Plants of the World Online. Facilitated by the Royal Botanic Gardens, Kew. Available at <http://www.plantsoftheworldonline.org/>. Access on 14 July 2023.

QGIS Development Team (2023) QGIS Geographic Information System: open source geospatial foundation project. Available at <https://www.qgis.org>. Access on 10 May 2023.

Radford AE, Dickison WC, Massey JR & Bell CR (1974) Vascular plant systematics. Harper & Row, New York. 416p.

Rafinesque CS (1838) [title page 1836]. Convolvulaceae. Flora Telluriana 4: 69-87.

Rezende JLP, Alves RG, Borges LAC, Fontes MAL & Alves LWR (2010) Avaliação da gestão das UC do Sistema Estadual de Áreas Protegidas de Minas Gerais. Geografias 6: 87-106.

Ribeiro JF & Walter BMT (2008) As Principais fitofisionomias do Bioma Cerrado. *In*: Sano SM, Almeida SP & Ribeiro JF (eds.) Cerrado: ecologia e flora. Vol. 1. Embrapa Informação Tecnológica, Brasília. Pp. 151-212.

Robertson KR (1971) A revision of the genus *Jacquemontia* (Convolvulaceae) in North and Central America and the West Indies. Ph. D. Thesis. Washington University, St Louis. 285p.

Rodrigues-Lima A (2017) Convolvulaceae do Parque Estadual da Serra do Ouro Branco. MSc. Dissertation. Instituto de Botânica, São Paulo. 219p.

Romero R & Nakajima JN (1999) Espécies endêmicas do Parque Nacional da Serra da Canastra, Minas Gerais. Revista Brasileira de Botânica. Available at <https://doi.org/10.1590/S0100-84041999000500006>. Access on 15 June 2023.

Romero R & Martins AB (2002) Melastomataceae do Parque Nacional da Serra da Canastra, Minas Gerais, Brasil. Revista Brasileira de Botânica. Available at <//doi.org/10.1590/S0100-84042002000100004>. Access on 15 July 2023.

Romeiro LA, Silva EF, Vasconcelos LV, Lopes KS, Carreira LMM & Guimarães JTF (2023) Pollen Morphology of Convolvulaceae from Southeastern Amazonian Cangas and Its Relevance for Interaction Networks and Paleoenvironmental Studies. Plants. Available at <https://www.mdpi.com/2223-7747/12/12/2256>. Access on 14 November 2023. DOI: 10.3390/plants12122256.

Roth AW (1797) Catalecta Botanica (Quibus plantae novae et minus cognitae describuntur atque illustrantur). Vol. 1. Bibliopolio I. G. Mülleriano, Lipseae. 244p.

Rusby HH (1899) South American plants. Bulletin of the Torrey Botanical Club 26: 149-152.

Scudeller VV (2004) Bignoniaceae Juss. no Parque Nacional da Serra da Canastra - Minas Gerais, Brasil. Iheringia Série Botânica. Available at <https://isb.emnuvens.com.br/iheringia/article/viewFile/227/234>. Access on 23 July 2023.

Schrader HA (1821) Illustrationes super plantis quibusdam novis et minus cognitis, a Principe Serenissimo Maximiliano Neowidensi in Brasilia observatis:"Plantarum rariorum a Principe Serenissimo Maximiliano Neowidensi in itinere per Brasiliam observatarum Fascicul. I". Göttingische Gelehrte Anzeigen unter der Aufsicht der Königlichen Gesellschaft der Wissenschaften 2: 705-720.

Silva CV (2013) Estudos taxonômicos em *Evolvulus* L. seção Phyllostachyi Meisn. (Convolvulaceae). PhD. Thesis. Instituto de Botânica, São Paulo. 121p.

Silva MAO & Romero R (2008) Melastomataceae das serras do município de Delfinópolis, Minas Gerais, Brasil. Rodriguésia 59: 609-647. Available at <http://www.scielo.br/pdf/rod/v59n4/2175-7860-rod-59-04-0609.pdf>. Access on 13 June 2023.

Silva SS, Simão-Bianchini R & Souza-Buturi FO (2018) Convolvulaceae do Parque Estadual do Juquery, Franco da Rocha, SP, Brasil. Hoehnea. Available at <http://www.scielo.br/pdf/hoehnea/v45n3/2236-8906-hoehnea-72-2017.pdf>. Access on 17 August 2023. DOI: 10.1590/2236-8906-72/2017

Silveira MF (2010) Rubiaceae-Rubioideae Verdc. do Parque Nacional da Serra da Canastra, Minas Gerais. MSc. Dissertation. Universidade Estadual de Campinas, Campinas. 118p.

Simão-Bianchini R (1991) Convolvulaceae da Serra do Cipó Minas Gerais, Brasil. M.Sc. Thesis. Universidade de São Paulo, São Paulo. 260p.

Simão-Bianchini R (1997) Convolvulaceae. *In*: Marques MCM (ed.) Mapeamento da cobertura vegetal e listagem das espécies ocorrentes na área de proteção ambiental de Cairuçu, município de Paraty, Rio de Janeiro. Série Estudos e Contribuições. Jardim Botânico do Rio de Janeiro, Rio de Janeiro. 96p.

Simão-Bianchini R (1998) *Ipomoea* L. (Convolvulaceae) no sudeste do Brasil. PhD. Dissertation. Universidade de São Paulo, São Paulo. 476p.

Simão-Bianchini R (2005) Flora fanerogâmica da Ilha do Cardoso (São Paulo, Brasil): Convolvulaceae. *In*: Melo MMRF, Barros F, Chiea SAC, Kirizawa M, Jung-Mendaçolli SL & Wanderley MGL (eds.) Flora fanerogâmica da Ilha do Cardoso. Vol. 11. Imprensa Oficial, São Paulo. Pp. 129-146.

Simão-Bianchini R (2009) Flora de Grão-Mogol, Minas Gerais: Convolvulaceae. Boletim de Botânica 27: 33-41.

Simão-Bianchini R (2012) Convolvulaceae *In*: Jacobi CM & Carmo FF (orgs.) Diversidade florística nas cangas do quadrilátero ferrífero. Código Editora, Belo Horizonte. Pp. 103-105.

Simão-Bianchini R, Ferreira PPA, Pastore M, Delgado-Junior GC, Vasconcelos LV, Petrongari FS, Moreira ALC, Buril M T, Simões AR & Silva CV (2023) Convolvulaceae in Flora e Funga do Brasil. Jardim Botânico do Rio de Janeiro. Available at <http://reflora.jbrj.gov.br/reflora/floradobrasil/FB93>. Access on 19 May 2023.

Simão-Bianchini R & Pirani JR (1997) Flora da Serra do Cipó, Minas Gerais: Convolvulaceae. Boletim de Botânica da Universidade de São Paulo. Available at <https://www.jstor.org/stable/pdf/42871472.pdf?refreqid=excelsior%3A17c7d778ca3e6677946f1c83a402bb3e>. Access on 23 May 2023.

Simão-Bianchini R & Pirani JR (2005) Duas novas espécies de Convolvulaceae de Minas Gerais, Brasi. Hoehnea, São Paulo 32: 295-300.

Simões AR & More S (2018) Synopsis and lectotypification of *Distimake rhyncorhiza* (Dalzell) Simões & Staples (Convolvulaceae): a little known species from the Western Ghats (India). Phytotaxa. Available at <https://phytotaxa.mapress.com/pt/article/view/phytotaxa.336.3.8>. Access on 17 November 2023. DOI: 10.11646/PHYTOTAXA.336.3.8

Simões ARG, Culham A & Carine M (2015) Resolving the unresolved tribe: a molecular phylogenetic framework for the *Merremieae* (Convolvulaceae). Botanical Journal of the Linnean Society. Available at <https://academic.oup.com/botlinnean/article-pdf/179/3/374/17041709/boj12339.pdf>. Access on 9 May 2023. DOI: 10.1111/boj.12339

Simões ARG & Staples G (2017) Dissolution of Convolvulaceae tribe Merremieae and a new classification of the constituent genera. Botanical Journal of the Linnean Society. Available at <https://academic.oup.com/botlinnean/article-pdf/183/4/561/13650632/box007.pdf>. Access on 3 May 2023. DOI: 10.1093/botlinnean/box007

Simões ARG, Furness CA & Luz CFP (2019) The systematic value of pollen morphology in *Operculina* (Convolvulaceae). Grana. Available at <https://www.tandfonline.com/doi/abs/10.1080/00173134.2018.1511750>. Access on 17 November 2023.

Simões ARG, Pisuttimarn P, Luz CFP, Furness C, Pornpongrungrueng P & Chatrou LW (2021) Palynological characterization of the Southeast Asian woody climbers Decalobanthus Ooststr. (Convolvulaceae). Grana. Available at: <https://www.tandfonline.com/doi/abs/10.1080/00173134.2021.1874512>. Access on 15 November 2023. DOI: 10.1080/00173134.2021.1874512

Simões ARG, Eserman LA, Zuntini AR, Chatrou LW, Utteridge TMA, Maurin O, Rokni S, Roy S, Forest F, Baker WJ & Stefanovic S (2022) A bird's eye view of the systematics of Convolvulaceae: novel insights from nuclear genomic data. Frontiers in Plant Science. Available at: <https://www.frontiersin.org/articles/10.3389/fpls.2022.889988/full>. Access on 15 November 2023. DOI: 10.3389/fpls.2022.889988

Staples GW (2012) Convolvulaceae - the morning glories and bindweeds. Available at <http://convolvulaceae.myspecies.info/node/9>. Access on 14 April 2023.

Staples GW & Brummitt RK (2007) Convolvulaceae. *In*: Heywood VH, Brummitt RK, Culham A & Seberg O (eds.) Flowering plant families of the world. Royal Botanic Gardens, Kew. Pp. 108-110.

Staples GW, Carine M & Austin DF (2008) Convolvulaceae Pollen Atlas. Available at <http://cals.arizona.edu/herbarium/sites/cals.arizona.edu.herbarium/files/old_site/assoc/projects/convolv/

Convolvulaceae_Pollen_Atlas.htm>. Access on 14 July 2023.

Stefanović S, Krueger L & Olmstead R (2002) Monophyly of the Convolvulaceae and circumscription of their major lineages based on DNA sequences of multiple chloroplast loci. American Journal of Botany. Available at <https://pubmed.ncbi.nlm.nih.gov/21665753/>. Access on 14 November 2023. DOI: 10.3732/ajb.89.9.1510

Stefanović S, Austin DF & Olmstead RG (2003) Classification of Convolvulaceae: a phylogenetic approach. Systematic Botany. Available at <https://bioone.org/journals/systematic-botany/volume-28/issue-4/0245.1/Classification-of-Convolvulaceae-A-Phylogenetic-Approach/10.1043/02-45.1.short>. Access on 14 November 2023. DOI: 10.1043/02-45.1

Sweet R (1826) Sweet's Hortus Britannicus: or a catalogue of plants cultivated in the gardens of Great Britain, arranged in natural orders. J. Ridgway, London. 492p.

Tellería MC & Daners G (2003) Pollen types in Southern New World Convolvulaceae and their taxonomic significance. Plant Systematics and Evolution. Available at <https://link.springer.com/content/pdf/10.1007%2Fs00606-003-0069-z.pdf>. Access on 15 May 2023. DOI 10.1007/s00606-003-0069-z

Thiers B (continuously updated) Index Herbariorum: a global directory of public herbaria and associated staff. New York Botanical Garden's Virtual Herbarium. Available at <http://sweetgum.nybg.org/science/ih/>. Access on 12 July 2023.

Vasconcelos LV, Saba MD, Junqueira MER & Simão-Bianchini R (2015) Morfologia polínica de espécies das tribos Ipomoeeae Hallier f. e Merremieae D.F. Austin (Convolvulaceae) ocorrentes numa região de ecótono do município de Caetité, BA, Brasil. Hoehnea. Available at <http://www.scielo.br/scielo. php?pid=S2236-89062015000200253&script=sci_arttext>. Access on 23 October 2023. DOI:10.1590/2236-8906-37/2014

Vasconcelos LV, Junqueira MER, Simão-Bianchini R & Saba MD (2019) Morfologia polínica de espécies de *Bonamia* Thouars, *Evolvulus* L. e *Jacquemontia* Choisy (Convolvulaceae) ocorrentes numa região de ecótono no município de Caetité, BA, Brasil. Hoehnea. Available at <http://www.scielo.br/scielo.php?pid=S2236-89062019000200201&script=sci_arttext>. Access on 10 June 2023. DOI: 10.1590/2236-8906-103/2018

Volpi RL (2006) Malpighiaceae no Parque Nacional da Serra da Canastra, Minas Gerais, Brasil. MSc. Dissertation. Universidade Federal do Paraná, Curitiba. 118p.

Welsh M, Stefanović S & Costea M (2010) Pollen evolution and its taxonomic significance in *Cuscuta* (dodder, Convolvulaceae). Plant Systematics and Evolution. Available at <https://link.springer.com/article/10.1007/s00606-009-0259-4>. Access on 14 November 2023. DOI: 10.1007/s00606-009-0259-4

Wood JRI, Carine MA, Harris D, Wilkin P, Williams B & Scotland RW (2015) *Ipomoea* (Convolvulaceae) in Bolivia. Kew Bulletin. Available at <https://link.springer.com/content/pdf/10.1007%2Fs12225-015-9592-7.pdf>. Access on 8 June 2023. DOI: 10.1007/S12225-015-9592-7

Wood JRI, Arrúa, RD, Rojas GD & Scotland RW (2016) Two overlooked species of *Ipomoea* L. (Convolvulaceae) from Paraguay. Available at <https://link.springer.com/article/10.1007/s12225-016-9636-7>. Access on 28 November 2023. DOI: 10.1007/s12225-016-9636-7

Wood JRI & Scotland RW (2017) Misapplied names, synonyms and new species of *Ipomoea* (Convolvulaceae) from South America. Kew Bulletin. Available at <https://link.springer.com/content/pdf/10.1007%2Fs12225-017-9680-y.pdf>. Access on 25 June 2023. DOI:10.1007/ s12225-017-9680-y

Wood JRI, Vasconcelos LV, Simão-Bianchini R & Scotland RW (2017) New species of *Ipomoea* (Convolvulaceae) from Bahia. Kew Bulletin. Available at <https://link.springer.com/article/10.1007/s12225-017-9678-5>. Access on 28 November 2023. DOI: 10.1007/s12225-017-9678-5

Wood JRI, Muñoz-Rodríguez P, Degen R & Scotland RW (2017) New species of *Ipomoea* (Convolvulaceae) from South America. PhytoKeys 88: 1-38. DOI: 10.3897/phytokeys.@.12891

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