*Acta Botanica Brasilica* - 34(2): 277-289. April-June 2020.
doi: 10.1590/0102-33062019abb0339

# Taxonomic study of *Marsypianthes* Mart. ex Benth. (Hyptidinae, Lamiaceae) in Brazil

**Márcia Yuriko Hashimoto[1]* and Heleno Dias Ferreira[2]**

Received: October 12, 2019
Accepted: December 10, 2019

## ABSTRACT

*Marsypianthes* is a Neotropical plant genus distributed from southern Mexico to northeastern Argentina. It is composed of six species — *M. arenosa, M. burchellii, M. chamaedrys, M. foliolosa, M. hassleri*, *M. montana* — with all occurring in Brazil except for *M. arenosa*, which occurs in Mexico. *Marsypianthes burchellii, M. foliolosa* and *M. montana* are endemic to Brazil, while *M. hassleri* also occurs in Argentina and Paraguay and *M. chamaedrys* is widely distributed from southern Mexico to Argentina. Species of *Marsypianthes* are found in all the biomes of Brazil — Amazonia, Caatinga, Cerrado, Atlantic Forest, Pampa and Pantanal. Goiás is the Brazilian state with the greatest species richness of *Marsypianthes*, with four of the five species that occur in the country. According to IUCN criteria, three of the species are classified as Least Concern, one as Data Deficient and one as Vulnerable. The present study provides descriptions, an identification key, illustrations, geographic distribution data and information on the conservation status for all the taxa of *Marsypianthes* in Brazil.

**Keywords:** Cerrado, Labiatae, Nepetoideae, Ocimeae, taxonomy

## Introduction

*Marsypianthes* belongs to the order Lamiales, family Lamiaceae, subfamily Nepetoideae, tribe Ocimeae and subtribe Hyptidinae. Hyptidinae is almost exclusively Neotropical, occurring throughout tropical and subtropical America (Harley *at al*. 2004). The flowers of species of this subtribe are arranged in a diverse array of modified bracteolate cymes, with a cupped inferior corolla lobe enclosing stamens, which provides an explosive pollination mechanism (Harley 1971) for nutlets, which have an expanded areole (Paton & Ryding 1998; O'Leary 2015).

Flowers of species of *Marsypianthes* are arranged in lax, few-flowered cymes, or in many-flowered cymes, and then in spherical capituliform heads. The calyx lobes are triangular, often reflexing in fruit. The gynoecium possesses a persistent, short, conic stylopodium and is attached to nutlets until maturity; the nutlets are cymbiform with an involute, laciniate margin and concave inner surface (Harley & Pastore 2012). Rudall (1981) mentioned that members of the subtribe Hyptidinae, other than *Marsypianthes*, possess ovoid nutlets. The gynoecial structure of *Marsypianthes* is unique within the family, making nutlet morphology a key character for identifying the genus (O'Leary 2015).

Recent phylogenetic studies have verified that *Marsypianthes* is a monophyletic group (Pastore *et al* 2011; Harley & Pastore 2012), characterized by nutlets with a concave inner surface and a fimbriated margin.

*Marsypianthes* occurs from southern Mexico to northeastern Argentina (Fig. 1A). The genus consists of six species: *M. arenosa*, *M. burchellii*, *M. chamaedrys*,

1 Part of the first author's Master's thesis, Universidade Federal de Goiás, 74690-900, Goiânia, GO, Brazil
2 Departamento de Biologia Geral, Universidade Federal de Goiás, 74690-900, Goiânia, GO, Brazil

* Corresponding author: myhcs@terra.com.br

*M. foliolosa*, *M. hassleri* and *M. montana* (Mallo & Xifreda 2004; Pastore *et al*. 2011; O'Leary 2015)(Fig. 2), all of which occur in Brazil, with the exception of *M. arenosa* (Harley *et al.* 2010; Harley & Pastore 2012).

This work aimed to contribute to the morphological and taxonomical knowledge of *Marsypianthes* in Brazil by providing full descriptions, botanical illustrations, an identification key, distribution maps and ecological notes.

## Materials and methods

This study was carried out based on the examination of specimens from the collections housed at BHCB, CEN, CGMS, HB, HEPH, HJ, HUEFS, HUTO, IBGE, ICN, INPA, JPB, MBM, R, RB, SP, SPF, UB, UFG and UFMT (acronyms according to Thiers); by consulting material deposited in virtual herbaria from INCT, K, KGF, NY, WU; and through the study of specimens collected during fieldwork, which were deposited in the herbarium of UFG.

Collection trips were carried out between October 2011 and May 2013, in the state of Goiás. Specimens were collected from different areas of the Cerrado biome — cerrado *sensu stricto*, campo cerrado (cerrado fields), cerrado rupestre (rupestrian cerrado), campo úmido (humid fields), cerrado denso (dense cerrado) and riparian and gallery forest edges. Material was prepared following standard herborization techniques (Mori *et al*. 1989).

Collected material was identified using the descriptions and keys in Bentham (1833, 1848), Schmidt (1858), Briquet (1907), Epling (1936) and Harley & Pastore (2012), and by comparison with type collections. Morphological descriptions follow Hickey (1973) for venation pattern terminology and Radford *et al*. (1974) for terminology related to pubescense and leaf, flower, fruit and seed morphology. Illustrations were made using a LEICA EZ4 stereoscopic microscope. Common names were acquired, when possible, from the labels of herbarium specimen and specialized literature.

The distribution map was produced in ArcGis 9.0 (Esri 2013) in the Laboratory of Image Processing and Geoprocessing (LAPIG) at UFG. Geographical coordinates were obtained from herbarium specimen labels when available, otherwise they were estimated using the coordinates of the headquarters of the municipality, available in Google Earth version 7.0.38542 (2013).

## Results and discussion

### *Taxonomic treatment*

***Marsypianthes*** Mart. ex Benth. Labiat. Gen. Spec.: 64, 1833.

Subshrubs or herbs, annual or perennial, aromatic, with or without underground system, with simple or glandular sticky trichomes. Stems erect, prostrate or procumbent, tetragonal, sometimes cylindrical, hairy and grooved. Leaves petiolate, subsessile or sessile; blade membranaceous or chartaceous, pubescent on both faces; venation semicraspedodromous. Inflorescences formed by axillary cymes with one-three flowers (few flowers) or many flowers, pedunculated, spherical; bracts and bracteoles narrow, elliptic-lanceolate, elliptic and linear forming a lax involucre. Flowers pedicellate; calyx persistent, gamosepalous, actinomorphic, campanulate to widely infundibuliform, five-lobbed, lobes equal, deltoid, connivent to erect, reflexed in fruit; corolla lilac, pink, violet, yellow or rarely beige to white, tube straight, cylindrical, two-lipped, upper lip sub-bifid, lower lip three-parted, median lobe shell-shaped; four-stamens, epipetalous, didynamous, anthers extrorse, dithecal, filaments fused to the corolla tube, hirsute; gynoecium two-carpelar, syncarpous, ovary superior, glabrous, disc at base of ovary, conic stylopodium fused to inner surface of the four ovary lobes, pseudo four-locular, style jointed, slender, glabrous or with trichomes. Nutlets four, cymbiform, outer surface convex, smooth or rough, inner surface concave, with involute, laciniate margin; color varying from light to dark brown.

### *Key to species of* ***Marsypianthes*** *in Brazil*

1. Peduncle 0.05–0.7 cm long., few flowered cymes (commonly 1-3(-5) flowers)..... 3. ***M. foliolosa***
1. Peduncle longer than 0.7 cm long., many flowered cymes (3–22 flowers) ..... 2
2. Corolla yellow, tube 15–20 mm long., calyx tube 9–12 mm long in anthesis .....1. ***M. burchellii***
2. Corolla or blue, or lilac, or pink or violet, tube up to 13 mm long., calyx tube up to 7 mm long in anthesis ..... 3
3. Underground system absent ..... 2. ***M. chamaedrys***
3. Underground system present .....4
4. Blades chartaceous, peduncle 2.5–8 cm long., rough, with dark-brown nutlets ..... 5. ***M. montana***
4. Blades membranaceous, peduncle 1–1.5 cm long., smooth, with light-brown nutlets ..... 4. ***M. hassleri***

1. ***Marsypianthes burchellii*** Epling. Repert. Spec. Nov. Regni Veg. Beih. 85: 186. 1936.

Figs. 1B, 2A, 3A-I

Subshrub, 0.5–2 m tall, perennial, with underground system. Stem erect, 0.5–0.7 cm diam., woody, cylindrical, hirsute, brownish; branches hirsute, tetragonal, sulcate,

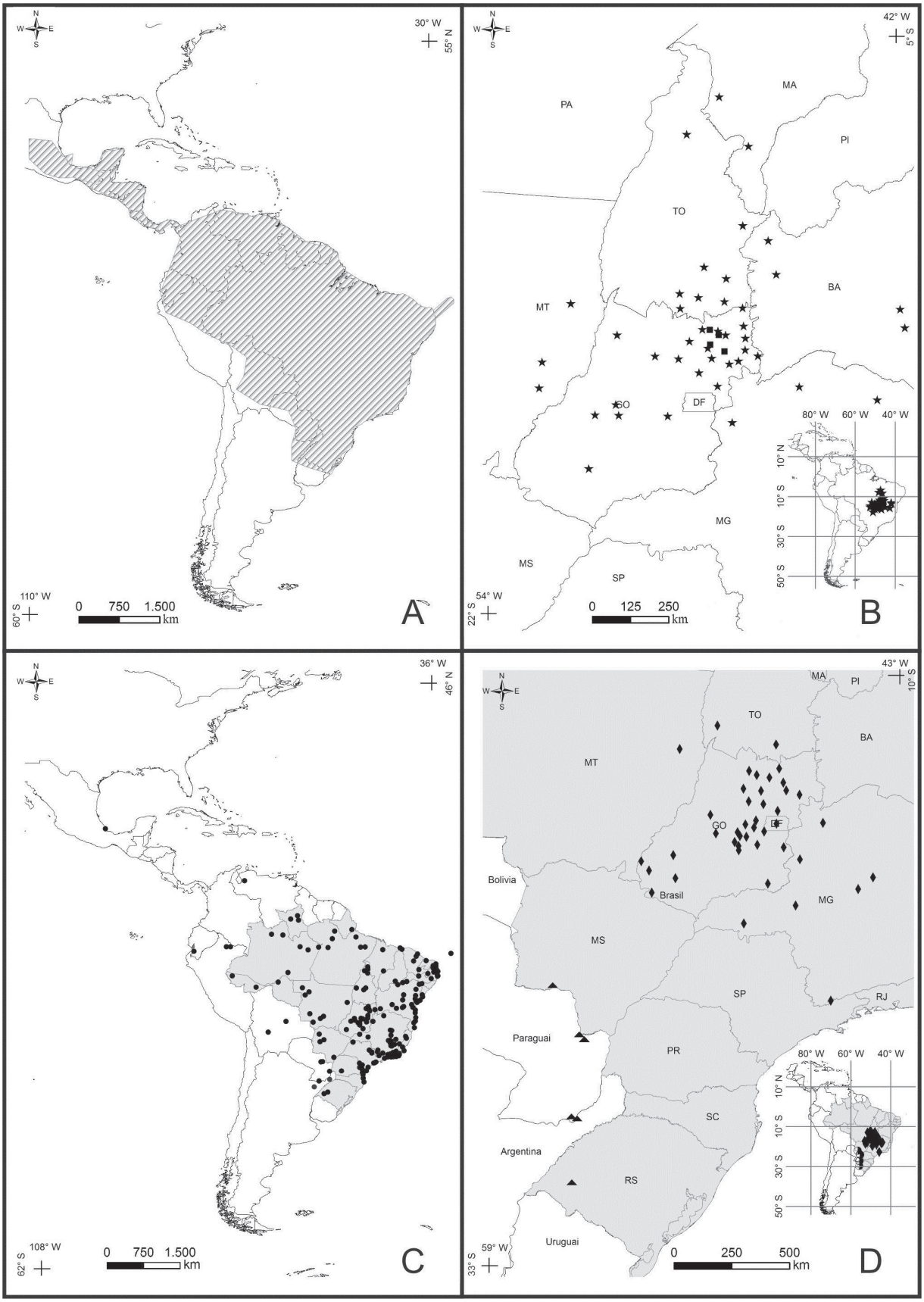


**Figure 1.** Distribution of species of the genus *Marsypianthes*. **A.** Neotropical distribution of the genus. **B.** *Marsypianthes burchellii* (■) and *Marsypianthes foliolosa* (★). **C.** *Marsypianthes chamaedrys* (●). **D.** *Marsypianthes montana* (♦) and *Marsypianthes hassleri* (▲).

woody, vinaceous in color. Leaves membranaceous, petiole 0.2–1.5 cm long., glandulose-hirsute; blades 1.2–5.6 × 0.6–2.5 cm, elliptic, ovate or narrow-ovate, hirsute on both faces, vinaceous colored midrib on adaxial face, green midrib on abaxial face and vinaceous color on abaxial face at the apex of the leaves, apex obtuse, base decurrent, asymmetric, margin serrate. Inflorescence formed by hemispherical cymes, 1.5–3.5 cm diam., (three)nine–10(17) flowered, fructiferous cyme 2–3 cm diam.; peduncle 0.7–3 cm long, densely hirsute, forked, each branch ca. 0.25 cm long, with flowers disposed on these branches; bracteoles 5–10 × 0.1–1 mm, linear, hirsute, green and vinaceous in color, numerous (10–26); pedicels, 1–4 mm long, densely hirsute or glabrous; calyx campanulate in anthesis, membranaceous, tube 9–12 × 5–6.5 mm, vinaceous in color, externally hirsute, teeth 3.8–6 × 1.8–3 mm, narrow-ovate, apex attenuate; fructiferous calyx tube 6–12 × 2–7 mm with reflexed teeth, straw colored, hirsute; corolla tubular, yellow or clear yellow in color, inferior lip with purplish margins, tube 15–20 × 2–3 mm, external and internally hirsute at the base, lobes 2.5–3 × 2 mm, externally densely hirsute; dark-purple anthers, stamens with beige filaments, 1.5–2 mm long., hirsute; ovary 0.5 mm long., style 15 mm long., beige in color, sparsely hirsute, two-stigmas, nectariferous disc 0.6–1 mm long., stylopodium 0.8–2 mm long. Nutlets (three) four, 2.5–4 × 2–3 mm, oblong, rough, dark-brown.

Brazilian material selected: BRAZIL. Goiás: Alto Paraíso, 7 / III / 2003, fl. fr., *J.F.B. Pastore & E. Suganuma 396* (CEN); 13º 38’ 38’’S, 47º 28’ 39’’W, 13 / III / 2007, fl. fr., *J.F.B. Pastore et al.* 1822 (HUEFS); *ibid.*, 21 / IV / 2012, fl. fr., *H.D. Ferreira 5081* (UFG); Teresina de Goiás, 13º 46’ 93’’S, 47º 12’ 51’’W, 4 / IV / 1997, fl. fr., *T.B. Cavalcanti et al.* 2216 (HUEFS).

*Marsypianthes burchelli* is endemic to Chapada dos Veadeiros in Goiás State, growing near waterfalls, between rocks on hill slopes, edges of gallery forests, campo rupestre, campo cerrado, campo úmido, or sandy, loamy or sandy-clay soils, from 823 to 1700 m in elevation. Flowering and fruiting throughout the year. The species is classified here as Vulnerable (VU), according to the criteria of IUCN (2017).

*Marsypianthes burchellii* is easily recognized due to it being the only species of the genus with yellow corollas with a long tube (15-20 mm long), strongly vinaceously-colored calyces, style 15 mm long and oblong nutlets.

2. ***Marsypianthes chamaedrys*** (Vahl) Kuntze. Revis. Gen. Pl. 2: 524. 1891.

Figs. 1C, 2B, 4A-J

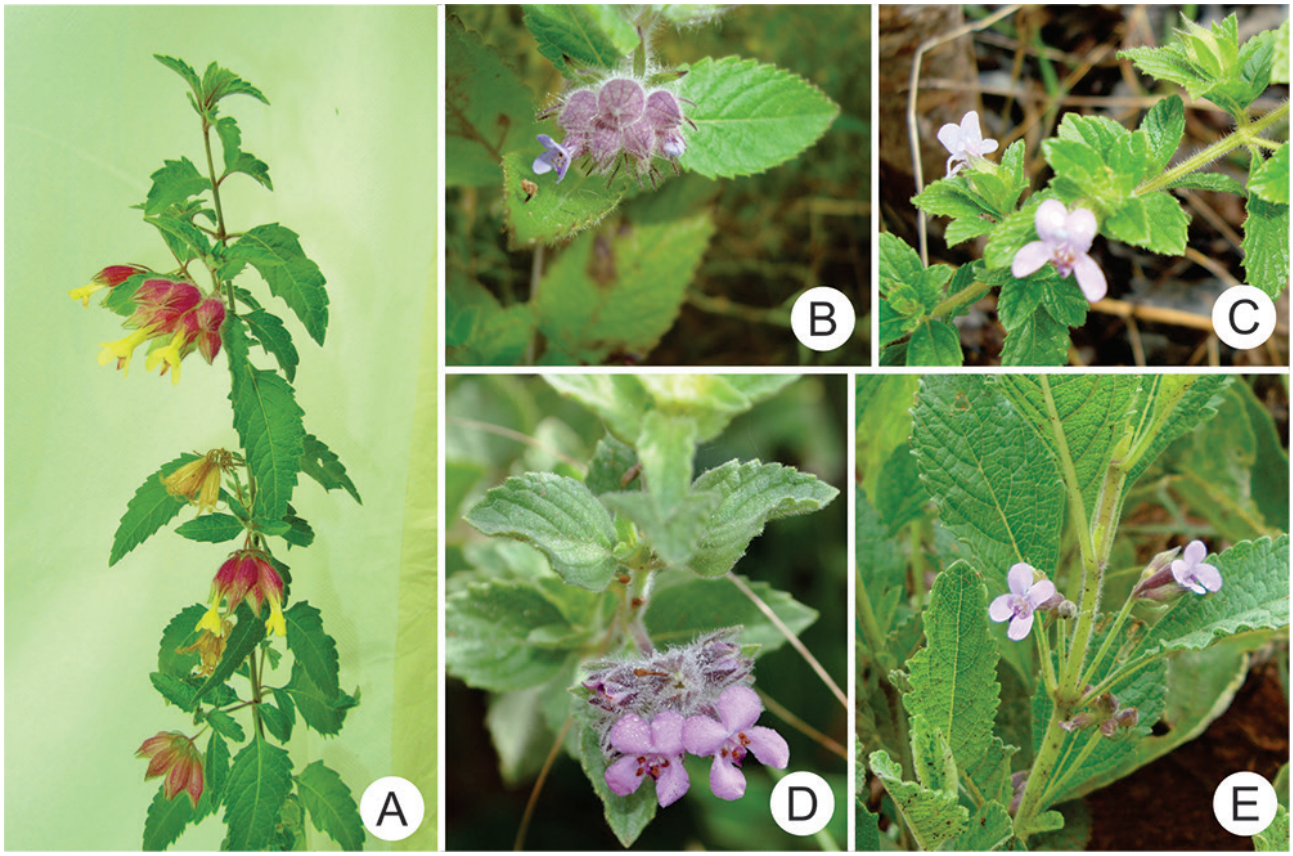


**Figure 2. A.** *Marsypianthes burchellii*. **B.** *Marsypianthes chamaedrys*. **C.** *Marsypianthes foliolosa* **D.** *Marsypianthes hassleri* **E.** *Marsypianthes montana*.

Herb or subshrub, 0.1–1.5 m tall, annual, without underground system. Stem erect, prostrate or decumbent, 0.4–0.8 cm diam., herbaceous, tetragonal, hirsute, green-vinaceous in color; branches tetragonal, sulcate, hirsute, slightly vinaceous in color. Leaves membranaceous, petiole 0.5–3.5 cm long, glandulose-hirsute; blades 2–8.5 × 0.7–3.5 cm, elliptic, ovate or narrow-ovate, slightly hirsute on both faces, prominent veins in abaxial face, vinaceous in color on abaxial face at the apex of the leaves, apex acute or obtuse, base decurrent, asymmetric, margin serrate. Inflorescence

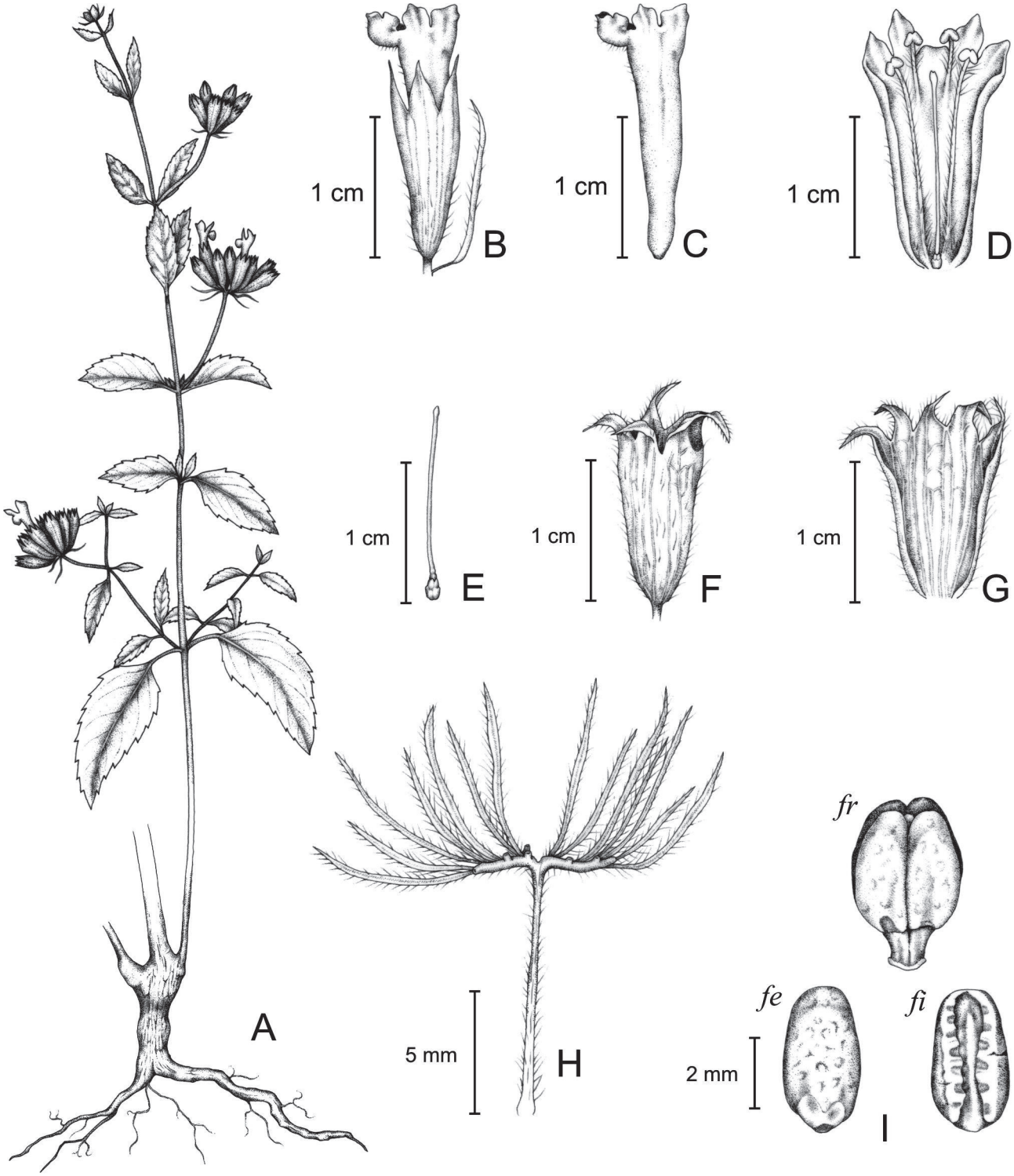


**Figure 3**. *Marsypianthes burchellii*: **A.** General aspect. **B.** Flower. **C.** Corolla. **D.** Open corolla showing androecium and gynoecium. **E.** Gynoecium. **F.** Fructiferous calyx. **G.** Open fructiferous calyx. **H.** Peduncle and bracteoles. **I.** Nutlets (*fr*: overlap, *fe*: outside surface, *fi*: inner surface with fimbriate margin). (A-underground system: *J.F.B. Pastore & E. Suganuma 396* – CEN, **A-I**: *H.D. Ferreira 5081*–UFG).

formed by hemispherical cymes, 1–1.7 cm diam., 11–22 flowered, fructiferous cyme 1–2 cm diam.; peduncle 1.8–5.4 cm long, hirsute, forked, each branch ca. 0.5 cm long, with flowers disposed on these branches; bracteoles 7–10 × 0.5–1 mm, narrow-elliptic, linear, hirsute, green and vinaceous in color, numerous (18–32); pedicels 1 mm long, hirsute; calyx campanulate in anthesis, membranaceous, tube 3 × 3–2 mm, green-vinaceous in color, externally hirsute, teeth 3.5–5 × 2–2.5 mm, ovate or narrow-ovate, externally and internally hirsute, apex acute, slightly vinaceous in color;

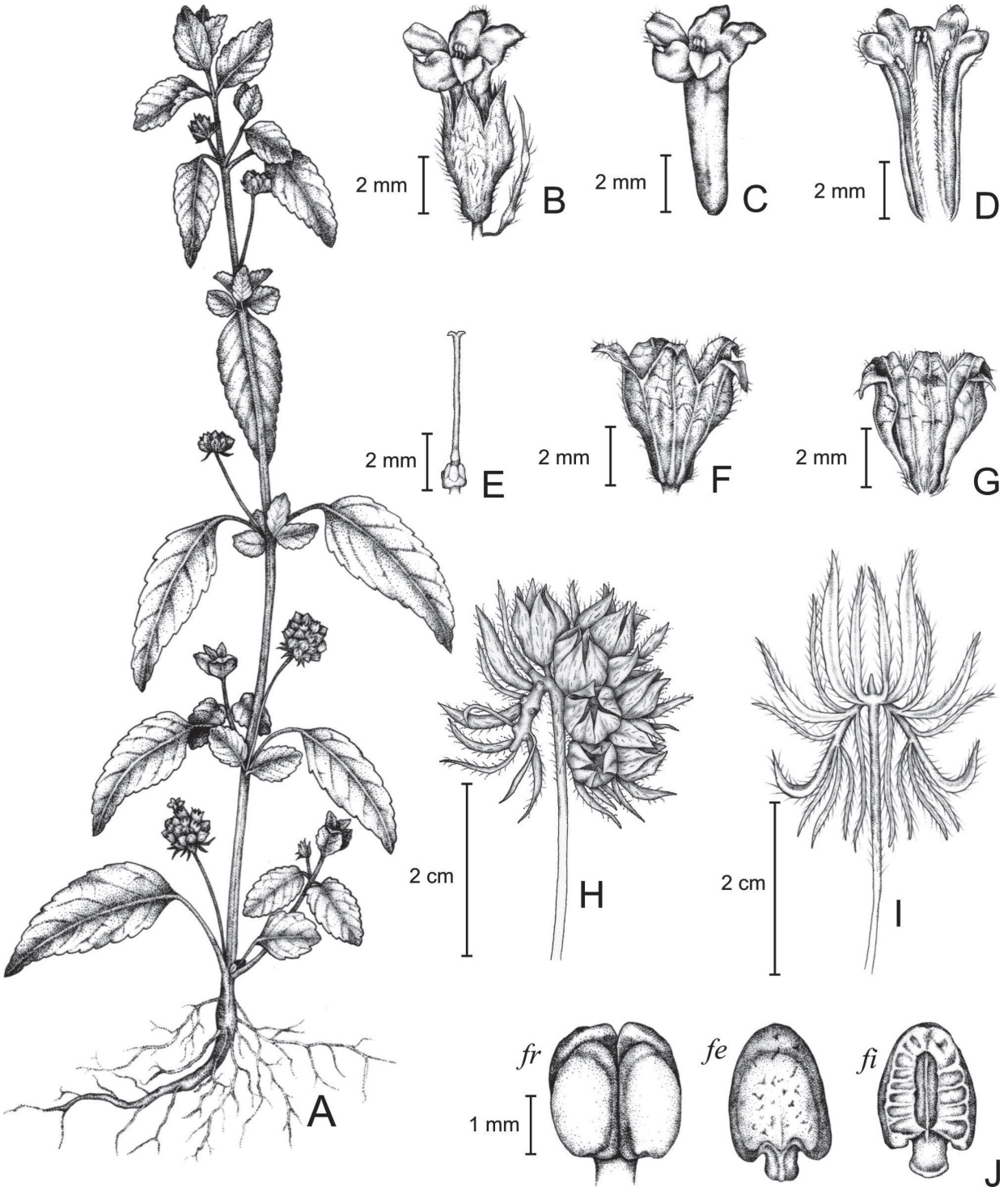


**Figure 4.** *Marsypianthes chamaedrys*: **A.** General aspect. **B.** Flower with bracteole. **C.** Corolla. **D.** Open corolla showing androecium and gynoecium. **E.** Gynoecium. **F.** Fructiferous calyx. **G.** Open fructiferous calyx. **H.** Hemispheric cymes, showing terminal flower and bracteoles. **I.** Peduncle and bracteoles. **J.** Nutlets (*fr*: overlap, *fe*: outside surface, *fi*: inner surface with fimbriate margin). (**A-J**: *M.Y. Hashimoto 2950 & H.D. Ferreira 5019* – UFG).

fructiferous calyx tube 3–4 × 4–5 mm, brown, externally hirsute, reflexed teeth; corolla tubular, white or blue with white fauce, tube 4.5–5 × 1 mm long, externally glabrous, lobes 2–3 × 1 mm, externally hirsute; anthers vinaceous colored, stamens with white and blue filaments, 1.5–2 mm long., hirsute; ovary 0.5 mm long, style 4–8 mm long., violet, glabrous, two-stigmas, brief, nectariferous disc 0.5 mm long, stylopodium 0.7 mm long. Nutlets (one–three) four, 2.5–3 × 2 mm, ovoid, smooth, light-brown.

Brazilian material selected: BRAZIL. Acre: Cruzeiro do Sul, 07º 37'S, 72º 42'W, 27 / XI / 1987, fl. fr., *M.C. Ferreira & A.P. Araújo 28* (RB); Alagoas: Olho d'Água do Casado, 9º 31' 03.3''S, 37º 48' 49.5''W, 7 / VIII / 2000, fl. fr., *R.A. Silva & D. Moura 1607* (SP); Amapá: Macapá, 4 / II / 1955, *A. Mattos-Filho 80* (RB); Amazonas: Humaitá, 7º 31'S, 63º 10'W, 15 / III / 1976, fl. fr., *M.R. Estrela & W. Bellusci 15376* (INPA, SP); Bahia: Morro do Chapéu, 11º 37' 37''S, 41º 00' 03''W, 5 / X / 2007, fl. fr., *J.F.B. Pastore et al. 2224* (HUEFS); Ceará: fl. fr., *F. Allemão* 1144 (R); Distrito Federal: Brasília, 18 / X / 1976, fl. fr., *E.P. Heringer 16217* (IBGE); Espírito Santo: Colatina, 6 / VII / 1942, fl. fr., *E.A. Bueno & L. Emygdio 122* (R); Goiás: Caiapônia, 16º 18' 28''S, 50º 53' 39.2''W, 16 / IX / 2012, fl. fr., *M.Y. Hashimoto 2962* (UFG); Cavalcante, 13º 34' 57.1''S, 47º 28' 14.2''W, 10 / II / 2012, fl. fr., *M.Y. Hashimoto & H.D. Ferreira 2953* (UFG); Goiânia, 14 / I / 2003, fl. fr., *H.D. Ferreira 4293* (UFG); Jataí, 17º 55' 11''S, 51º 43' 0.9''W, 1 / XI / 2012, fl. fr., *M.Y. Hashimoto 2983* (UFG); Mineiros, Parque Nacional das Emas, 20 / X / 1989, fl. fr., *H.D. Ferreira et al. 2292* (UFG); Mossâmedes, Serra Dourada, 17 / VIII / 2007, fl. fr., *H.D. Ferreira & M.T. Faria 4694* (UFG); Niquelândia, 14º 09' 34.5''S, 47º 46' 14.7''W, 15 / X / 2011, fl. fr., *M.Y. Hashimoto 2933* (UFG); Posse, 14º 04' 58.2''S, 46º 20' 57.4''W, 12 / X / 2012, fl. fr., *M.Y. Hashimoto 2976* (UFG); São João d'Aliança, 14º 42' 31''S, 47º 31' 17''W, 6 / III / 2011, fl. fr., *H.D. Ferreira 5023* (UFG); Trindade, 16º 38' 52''S, 49º 29' 53''W, 15 / XII / 2011, fl. fr., *M.Y. Hashimoto 2950 & H.D. Ferreira 5019* (UFG); Maranhão: Loreto, 7º 23'S, 45º 03'W, 14 / II / 1970, fl. fr., *G. Eiten & L.T. Eiten 10598* (SP); Mato Grosso: Nova Xavantina, 23 / X / 1968, fl. fr., *R.M. Harley et al. 10784* (RB); Mato Grosso do Sul: Corumbá, 19º 34' 32.20''S, 57º 01' 07.80''W, 02 / VIII / 2007, fl. fr., *W.M. Ramos et al. 2* (CGMS); Minas Gerais: São Gonçalo do Rio Preto, 18º 07' 34''S, 43º 21' 24''W, 9 / IV / 2000, fl. fr., *J.A. Lombardi et al. 3912* (BHCB); Pará: Palestina do Pará, 6º 07' 08''S, 48º 25' 02''W, 17 / IV / 2004, fl. fr., *G. Pereira-Silva et al. 8746* (CEN); Paraíba: Araruna, 6º 27'S, 35º 41'W, 31 / VIII / 2003, fl. fr., *M.F. Agra et al. 6164* (JPB); Paraná: Jaguarialva, 24º 08'S, 49º 16'W, 18 / I / 1965, fl. fr., *L.B. Smith et al. 14764* (R); Pernambuco: Agrestina, 8º 23' 29.7''S, 36º 00' 37.6''W, 23 / VII / 2010, fl. fr., *L.A. Pereira & L.A.F. Vieira 20* (JPB); Piauí: São Raimundo Nonato, 2 / II / 1964, fl. fr., *Emperaire 228* (RB); Rio de Janeiro: Santa Cruz de Cabrália, 16º 19'S, 39º 01'W, 18 / III / 1974, fl. fr., *R.M. Harley 17119* (RB); Rio Grande do Norte: Arês, 3 / VII / 1766, fl. fr., *L. Emygdio 1766* (R); Rio Grande do Sul: Alegrete, 6 / I / 2007, fl. fr., *E. Santos s/n* (ICN 159202); Rondônia: Porto Velho, 26 / IX / 1962, fl. fr., *A.P. Duarte 7206* (INPA); Roraima: Boa Vista, 2º 29'N, 60º 14'W, 15 / I / 1969, fl. fr., *G.T. Prance et al. 9283* (R); Santa Catarina: Florianópolis, 19 / IV / 1966, fl. fr., *R.M. Klein et al. 6719* (RB); São Paulo: Pirassununga, 22º 02'S, 47º 30'W, 21 / IV / 1995, fl. fr., *M. Batalha 376* (SP); Sergipe: Cristianópolis, 02 / IV / 1976, fl. fr., *G. Davidse & W.G. D'Arcy 11816* (SP); Tocantins: Palmas, 13 / III / 2008, fl. fr., *E.R. Santos 1257* (HUTO); Tocantinópolis, 6º 45'S, 47º 29' 56''W, 21 / II / 2005, fl. fr., *G. Pereira-Silva 9502* (CEN, HUEFS).

The species is widespread throughout Central America and the Caribbean, reaching south to northeastern Argentina (Mallo & Xifreda 2004; Espinosa-Jiménez *et al.* 2011; Harley 2012; O'Leary 2015).

It occurs in all the biomes of Brazil in firm and swampy terrains, dunes and sandbank environments. Commonly grows on river or stream banks, under the shade of trees or shrubs, in vacant lots, on roads sides, in crops and pastures, on clay soils, latosols, sandy and rocky outcrops, from sea level to 1950 m elevation. It is considered a weed species (Lorenzi & Matos 2002). Flowering and fruiting throughout the year. Considering its wide occurrence, this species was assessed as Least Concern (LC), according to the criteria of IUCN (2017).

*Marsypianthes chamaedrys* differs from the other species of the genus by being the only one that lacks an underground system and has peduncle branches (5 mm) and externally glabrous corolla tubes.

*Marsypianthes chamaedrys* is the best-known species of the genus,and has antirheumatic medicinal properties (Heinrich 1992). Leaf extract is used against snake bite, as well as for diarrhea treatment, by the Tikunas indians in the Amazon region (Heinrich 1992). Pharmacological studies confirm the presence of triterpenoids in the species and reveal that its aqueous extract has analgesic, molluscicide, antibacterial and antifungal functions (Menezes *et al.* 1999) and anti-inflammatory and edema inhibitory action against the bite of *Bothrops jararaca* (pit viper) (Menezes *et al.* 1998).

*Marsypianthes chamaedrys* is popularly known as Alecrim (BA), Alfavaca-de-cheiro (SP), Betônica-brava (GO, SP, PR), Boiá-caá, Coração-de-frade, Erva-de-campo, Erva-de-cobra, Erva-de-paracari, Erva-santa (MG), Hortelã-branco (BA), Hortelã-do-Brasil, Hortelã-do-campo (SP), Hortelã-do-mato (BA), Malva, Mata-pasto (GO), Melosa (BA, PB, PE), Mentrasto (MA), Paracari (AM, MG), Pincel (AM), Erva-madre, Rabugem-de-cachorro (SP) and Rabujo (BA).

3. ***Marsypianthes foliolosa*** Benth. in DC. Prodr. Syst. Nat. Regni Veg. 12: 85. 1848.

Figs. 1B, 2C, 5A-M

Herb or branched subshrub, 0.6–1.20 m tall, perennial, with underground system. Stem erect, 0.15–0.7 cm diam., herbaceous or woody, hirsute, brownish; branches densely

hirsute, tetragonal, slightly sulcate. Leaves membranaceous, petiole 0.–1.7 cm long., hirsute; blades 0.8–5.5 × 0.3–2.3 cm, elliptic or narrow-elliptic, hirsute on both faces, prominent veins on abaxial face, apex acute, base cuneate, decurrent, symmetric, margin serrate. Inflorescence formed by hemispherical cymes, one-two flowered (rarely three or five) or with axillary solitary flowers, fructiferous cyme 1.2–2.5 cm diam.; peduncle 0.05–0.7 cm long., hirsute; bracteoles 3–12 × 0.4–3.5 mm, involucral, acicular, linear and lanceolate, hirsute, green in color, two per flower; pedicels 0.5–2 mm long., hirsute; calyx campanulate in anthesis, membranaceus, tube 4–7 × 3–6 mm, light green-vinaceous

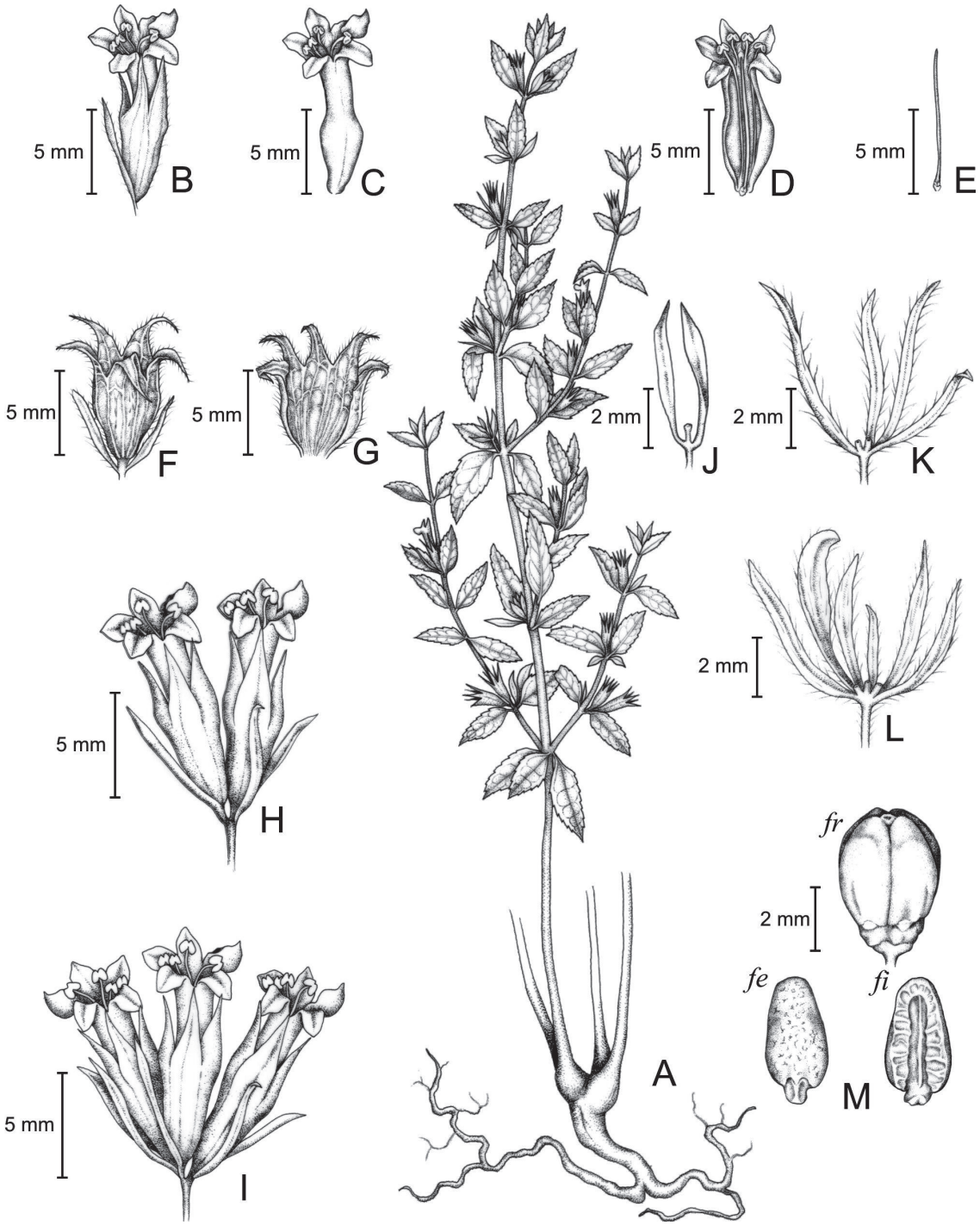


**Figure 5.** *Marsypianthes foliolosa*: **A.** General aspect. **B.** Flower with bracteole. **C.** Corolla. **D.** Open corolla showing androecium and gynoecium. **E.** Gynoecium. F. Fructiferous calyx and bracteoles. **G.** Open fructiferous calyx. **H.** Flowers (2) and bracteoles. **I.** Flowers (3) and bracteoles. **J.** Cymes with two bracteoles. **K.** Cymes with four bracteoles. **L.** Cymes with six bracteoles. **M.** Nutlets (*fr*: overlap, *fe*: outside surface, *fi*: inner surface with fimbriate margin). (**A-M**: *M.Y. Hashimoto 2959 & H.D. Ferreira 5080* – UFG).

in color, externally and internally hirsute, teeth 4–7 × 1.5–3 mm, narrow-ovate, externally hirsute and internally hirsute at the apex, apex acuminate, green in color; fructiferous calyx, tube 3.5–8 × 4–7 mm, brown, externally hirsute, teeth reflexed; corolla tubular, lilac, tube 6–13 × 1–2 mm, externally sparsely hirsute, lobes 2–6 × 1.5 mm, externally hirsute; anthers vinaceous colored, stamens with lilac filament, 1–3 mm long., hirsute; ovary 0.3–0.8 mm long., style 8–13 mm long., lilac, sparsely hirsute, two-stigmas, white, nectariferous disc 0.5–1 mm long., stylopodium 0.5–1 mm long. Nutlets four, 2.5–3.5 × 1–2.6 mm, narrow-ovoid, rough, dark-brown.

Brazilian material selected: BRAZIL. Bahia: Formosa do Rio Preto, 11º 06' 33''S, 45º 33' 1''W, 5 / IV / 2000, fl. fr., *R.M. Harley et al. 53697* (R, RB, UB); Piatã, 13º 04' 19''S, 41º 55' 24''W, 23 / II / 1994, fl. fr., *R.M. Harley et al. s/n* (MBM 344421); Goiás: Alto Paraíso de Goiás, 13º 54' 52.1''S, 47º 24' 52.8''W, 9 / II / 2012, fl. fr., *M.Y. Hashimoto & H.D. Ferreira 2951* (UFG); Chapada dos Veadeiros, 14º 10'S, 47º 30'W, 11 / V / 2013, fl. fr., *M.Y. Hashimoto 3010* (UFG); Colinas do Sul, 48º 07' 21.8''W, 10 / III / 2012, fl. fr., *M.Y. Hashimoto 2959 & H.D. Ferreira 5080* (UFG); Goiás, Serra Dourada, 15 / IV / 1994, fl. fr., *J.A. Rizzo & M.Y. Hashimoto 11274* (RB, UB); Posse, 14º 02' 31.9''S, 46º 19' 0.5''W, 12 / X / 2012, fl. fr., *M.Y. Hashimoto 2971* (UFG); São Domingos, 13º 21' 29''S, 46º 15' 12''W, 19 / I / 2008, fl. fr., *R.M. Harley et al. 55723* (HUEFS); São João d'Aliança, 15 / XI / 2007, fl. fr., *J.F.B. Pastore et al. 2317* (HUEFS); Teresina de Goiás, 13º 36' 42.6''S, 47º 13' 15.7''W, 11 / II / 2012, fl. fr., *M.Y. Hashimoto & H.D. Ferreira 2954* (UFG); Mato Grosso: Cuiabá, 3 / XII / 1968, fl. fr., *R.M. Harley et al. 11281* (RB); Nova Xavantina, 25 / V / 1966, fl. fr., *H.S. Irwin et al. 16046* (RB); Minas Gerais: Unaí, 16º 32'S, 46º 53'W, 11 / II / 1988, fl. fr., *W.W. Thomas 5862* (SPF); Tocantins: Mateiros, Jalapão, 10º 33'S, 46º 8'W, 7 / V / 2001, fl. fr., *L.H. Soares-Silva et al. 905* (UFG); Natividade, 11º 41' 37''S, 47º 42' 03''W, 16 / I / 2008, fl. fr., *J.F.B. Pastore et al. 2469* (HUEFS); Taipas do Tocantins, 12º 11' 25''S, 46º 59' 53''W, 15 / I /2008, fl. fr., *J.F.B. Pastore et al. 2429* (HUEFS).

*Marsypianthes foliolosa* is endemic to Brazil where it occurs in the North (TO), Northeast (BA, PI), Central-West (GO, MT) and Southeast (MG) regions. It can be found in the Cerrado biome in campos rupestres and associated to sandy-stony soils with rock outcrops, close to rivers and streams, from 173 to 1600 m in elevation. Flowering and fruiting throghout the year, with a peak in February. The species is classified as Least Concern (LC), according to the criteria of IUCN (2017).

*Marsypianthes foliolosa* is easily recognized by its elliptic or narrow-elliptic leaves. It is distinguished from the other species of the genus by its clearly smaller leaves (0.3–1.7 cm), shorter peduncle (0.5–7 mm) and few flowered cymes (one–two, rarely three or five), while the rest of the species have larger leaves, peduncles longer than 7 mm and many flowered cymes (three–22). The species can be also recognized by fewer bracteoles (two per flower), one–five flowers per inflorescence, and narrow-ovoid nutlets. Bentham (1848) mentioned that this species has usually one flower or rarely two to three flowers per cyme. The present research confirms Bentham's assertion, however, cymes with up to five flowers were also found.

4. ***Marsypianthes hassleri*** Briq., Bull. Herb. Boiss. Sér. II. 7: 620. 1907.
Figs. 1D, 2D, 6A-J

Herb or branched subshrub, 0.2–1 m tall, perennial, with underground system. Stem erect, 0.2–0.3 cm diam., woody, tetragonal, hirsute, green-vinaceous in color; branches densely villous-viscous, ascending, thick and woody, tetragonal, sulcate, brown in color. Leaves membranaceous, petiole 0.5–0.8 cm long., hirsute; blades 1.5–3.5 × 0.6–1.4 cm, elliptic or obovate, hirsute on both faces, apex acute, base cuneate, decurrent, symmetric, margin toothed-serrated upper of the limb's superior half. Inflorescence formed by hemispherical cymes, 1–2 cm diam., five–11 flowered, fructiferous cyme 0.7–2 cm diam.; peduncle 1–1.5 cm long, hairy-glandule, forked, each branch ca. 0.1–0.4 cm long., with flowers arranged on these branches; bracteoles 4–10 × 0.5–2 mm, elliptic or linear, glandular-hirsute, green and vinaceous in color, numerous (10–22); pedicels 0.1 mm long., glandular-hirsute; calyx campanulate in anthesis, membranaceous, tube 4–7 × 3–6 mm, green-vinaceous in color, densely hirsute externally, subequal teeth 2.5–4 × 1–3 mm, ovate or narrow-ovate, apex acute, vinaceous in color; fructiferous calyx tube 5 × 3–4 mm with teeth reflexed, light-brown, villous, hirsute externally and internally on the edges; corolla tubular, pink or violet, tube 4–10 × 1–2 mm, externally hirsute, lobes 3–5 × 1.5–2.5 mm, externally hirsute; dark-purple anthers, stamens with white filaments, 1–2 mm long., hirsute; ovary 0.4–0.5 mm long., style 7–7.5 mm long., lilac in color, glabrous, two-stigmas, nectariferous disc 0.5–0.8 mm long., stylopodium 0.8 mm long. Nutlets four, 1–3.5 × 1.5–3 mm, ovoid, smooth, light-brown.

Brazilian material selected: BRAZIL. Rio Grande do Sul: Alegrete, 5 / I / 2007, fl. fr., *E. Freitas 62* (ICN); *ibid.,* 29 / X / 2007fl. fr., *E. Freitas 331* (ICN).

*Marsypianthes hassleri* occurs in Argentina, Paraguay and southern Brazil (Mallo & Xifreda, 2004; O'Leary 2015).

The species is found in sandy and closed fields, commonly growing in the shade of trees, in sandy loam and moist soils between from 115 to 1060 m in elevation. Flowering and fruiting probably throughout the year. Due to insufficient data to evaluate the conservation status of this species, it is here classified as Data Deficient (DD) according to the criteria of IUCN (2017).

This species can be easily recognized by the stigmas surpassing the anthers. This species morphologically resembles *M. montana,* by having elliptic and obovate leaf blades and cuneate and decurrent leaf base; however, it

differs by having a membranaceous blade (*vs*. chartaceous in *M. montana*), a glabrous style (*vs*. sparsely hirsute in *M. montana*), smooth light-brown colored nutlets (*vs*. rough and dark-brown colored nutlets in *M. montana*), and peduncle measuring 1–1.5 cm long (*vs*. 2.5-8 mm long in *M. montana*).

5. ***Marsypianthes montana*** Benth. Prodr. Syst. Nat. Regni Veg. 17: 85. 1848.

Figs. 1D, 2E, 7A-J

Herb, 5–40 cm tall, caespitose, perennial, with underground system. Stem erect, 0.1–0.2 cm diam.,

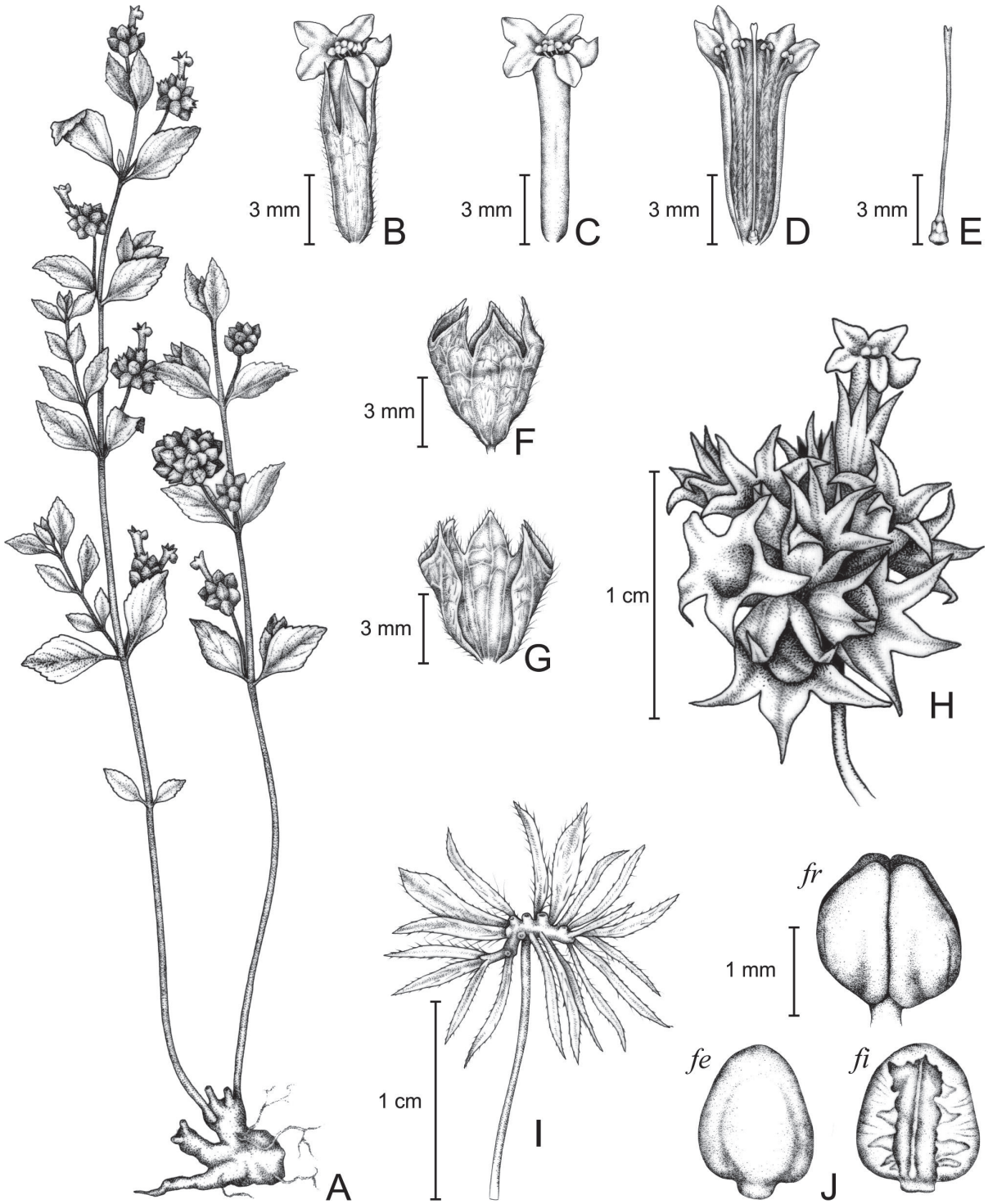


**Figure 6.** *Marsypianthes hassleri*: **A.** General aspect. **B.** Flower. **C.** Corolla. **D.** Open corolla showing androecium and gynoecium. **E.** Gynoecium. **F.** Fructiferous calyx. **G.** Open fructiferous calyx. **H.** Hemispheric cymes and peduncle. **I.** Peduncle and bracteoles. **J.** Nutlets (*fr*: overlap, *fe*: outside surface, *fi*: inner surface with fimbriate margin). (**A-J:** *E. Freitas 62* – ICN).

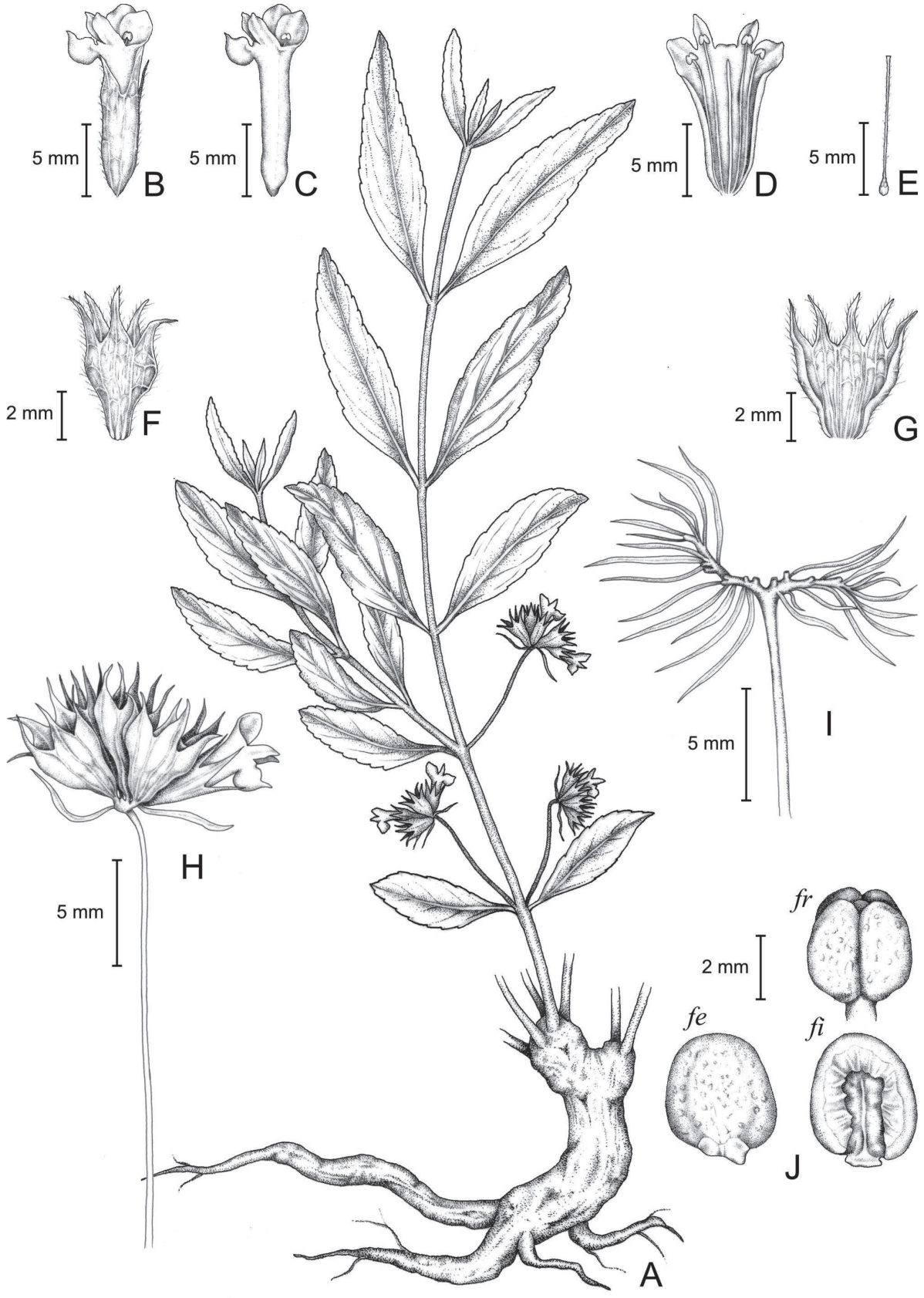


**Figure 7.** *Marsypianthes montana*: **A**. General aspect. **B.** Flower. **C.** Corolla. **D.** Open corolla showing androecium and gynoecium. **E.** Gynoecium. **F.** Fructiferous calyx. **G.** Open fructiferous calyx. **H.** Subglobose cymes. **I.** Peduncle and bracteoles. **J.** Nutlets (*fr*: overlap, *fe*: outside surface, *fi*: inner surface with fimbriate margin). (**A-J:** *M.Y. Hashimoto 2992* – UFG).

herbaceous, tetragonal, hirsute, green-vinaceous in color; branches densely hirsute, tetragonal, sulcate, slightly vinaceous in color. Leaves chartaceous, sessile or subsessile, densely hirsute; blades 1.5–7 × 0.5–2.8 cm, elliptic or obovate, densely hirsute on both faces, prominent veins on abaxial face, apex acute or obtuse, base cuneate, decurrent, symmetric, margin irregularly serrate. Inflorescence formed by subglobose cymes, 1.2–2.2 cm diam., 10–16 flowered, fructiferous cyme 1.2–2 cm diam.; peduncle 2.5–8 cm long., hirsute, forked, each branch ca. 0.25 cm long., with flowers arranged on these branches; bracteoles 5–8 × 1 mm, involucral, linear, dense-hirsute, green and vinaceous in color, numerous (18–26); pedicels 1.5–3 mm long., dense-hirsute; calyx campanulate in anthesis, membranaceous, tube 4–5 × 3.5–5 mm, green-vinaceous in color, externally hirsute, teeth 3–5.5 × 1.5–7 mm, narrow-ovate, externally and internally hirsute, apex attenuate; fructiferous calyx tube 5 × 4–7 mm, brown in color, with teeth reflexed, externally hirsute; corolla tubular, lilac in color, tube 8–10 × 0.3–2 mm, externally hirsute, lobes 2–3 × 1.5 mm, externally hirsute; dark-purple anthers, stamens with purple filaments, 1–2.5 mm long., hirsute; ovary 0.8–2 mm long., style 5–8 mm long., white in color, sparsely hirsute, two-short stigmas, white in color, nectariferous disc 0.8–2.5 mm long., stylopodium 1 mm long. Nutlets four, 3.5–4 × 2.5–3 mm, ovoid, rough, dark-brown.

Brazilian material selected: BRAZIL. Distrito Federal: Brasília, road Brasília-Fortaleza, *J.F.B. Pastore & J.B.A. Bringel 688* (HUEFS); Goiás: Alto Paraíso de Goiás, 16 / XI / 2007, fl. fr., *H.D. Ferreira 4477* (UFG); *ibid.*, 14º 02' 33.6''S, 47º 32' 32.2''W, 11 / V / 2013, fl. fr., *M.Y. Hashimoto 3009* (UFG); Corumbá de Goiás, 16º 03' 15''S, 48º 15' 13''W, 14 / VIII / 1996, fl. fr., *R.M. Harley et al. 28149* (UFG); Cristalina, Serra do Topázio, 23 / VII / 1973, fl. fr., *J.A. Rizzo 914* (UFG); Jataí, 2 / X / 1968, fl. fr., *H.D. Ferreira 2027* (UFG); Mineiros, Parque Nacional das Emas, 24 / XI / 1991, fl. fr., *H.D. Ferreira 2027* (UFG); Mossâmedes, 5 / IV / 1969, fl. fr., *J.A. Rizzo 4122* (UFG); Serra Dourada, 8 / X / 2011, fl. fr., *H.D. Ferreira 4900* (UFG); São Gabriel, 12 / X / 2006, fl. fr., *H.D. Ferreira & M. Schielive 4547* (UFG); *ibid.*,14º 41' 32.9''S, 47º 31' 02.4''W, 22 / XI / 2012, fl. fr., *M.Y. Hashimoto 2992* (UFG); São João D'Aliança, 14 / XI / 2011, fl. fr., *H.D. Ferreira et al. 5273* (UFG); Mato Grosso: Alto Araguaia, 30 / IX / 1963, fl. fr., *J. Murça-Pires et al. 56959* (R, UB); Nova Xavantina, 5 / XII / 1967, *D. Philcox et al. 3391* (UB); Minas Gerais: Unaí, 15º 55'S, 46º 40'W, 8/XI/1993, fl. fr., *M.A. Silva 1693* (IBGE); Tocantins: Formoso do Araguaia, 14 / IX / 1972, fl. fr., *J.A. Rizzo 8330* (UFG).

*Marsypianthes montana* is endemic to Brazil, occurring in Distrito Federal and the states of Goiás, Mato Grosso, Minas Gerais and Tocantins. It can be found in campo sujo, campo limpo, campo rupestre, Cerrado *sensu stricto*, campo cerrado, cerrado near paths, riparian forest, cerradão, newly-burned cerrado, river and stream margins, associated with sandy, clayey or sandy-clay soils from 121 to 1700 m in elevation. Flowering and fruiting throughout the year. The species is classified as Least Concern (LC), according to the criteria of IUCN (2017).

*Marsypianthes montana* resembles *M. chamaedrys* and *M. hassleri* by having ovoid nutlets (vs. oblong in *M. burchellii* and narrow-ovoid in *M. foliolosa*), and externally hirsute corolla lobes (vs. externally densely hirsute in *M. burchellii*).

*Marsypianthes montana* is easily recognized from the other species of the genus by being a caespitose growing herb and having chartaceous blades with irregularly serrated margins and purple filaments, all of which differ in the other species.

## Acknowledgements

We thank: Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) for the master's scholarship granted to the first author; curators of the Brazilian and foreign herbaria for loans, donations and permission to consult collections; Dr. Raymond Mervyn Harley and Dr. José Floriano Barêa Pastore for their availability and valuable suggestions; Vinícius Yano for producing the botanical illustrations; Luiz Valério Afiune Costa for editing; Genival Fernandes Rocha for helping with the maps; and Ludmila Déroulède for translating this work.

## References

Bentham G. 1833. Labiatarum Genera et Species. London, Ridgeway.

Bentham G. 1848. Labiatae. In: Candolle AP. (ed.) Prodromus Systematis Naturalis Regni Vegetabilis. Paris, Victoris Masson. p. 436-447.

Briquet JH. 1907. Em Chodat y Hassler, Plantae Hasslerianae. Bulletin de l'Herbier Boissier 2: 7-620.

Epling CC. 1936. Synopsis of the South American Labiatae. Repertorium Specierum Novarum Regni Vegetabilis, Beihefte 85. Berlin, Verlag des Repertoriums.

Espinosa-Jiménez JA, Pérez-Farrera MA, Martínez-Camilo R. 2011. Inventario Florístico del Parque Nacional Cañón Del Sumidero, Chiapas, México. Boletín de La Sociedad Botánica de México 89: 37-82.

Esri. 2013. Arcgis explorer website. http://www.esri.com/software/arcgis/explorer/index.html. 03 Mar. 2013.

Google Earth 2013. Google Earth website. http://earth.google.com/. 03 Mar. 2013.

Harley RM. 1971. Pollination in Eriope. An explosive pollination mechanism in Eriope crassipes, a Brazilian Labiatae. Biological Journal of the Linnean Society 3: 183-186.

Harley RM. 2012. Checklist and key of genera and species of the Lamiaceae of the Brazilian Amazon. Rodriguésia 63: 129-144.

Harley RM, Atkins S, Budantsev A, *et al.* 2004. Labiatae. In: Kadereit JW. (ed.) The families and genera of vascular plants. Berlin/ Heidelberg, Springer–Verlag. p. 167-275.

Harley RM, França F, Santos EP, Santos JS. 2010. Lamiaceae. In: Forzza RC, Baumgratz JFA, Bicudo CDM, *et al.* (eds.) Catálogo de plantas e fungos do Brasil. Vol. 2. Rio de Janeiro, Instituto de Pesquisas Jardim Botânico do Rio de Janeiro, Andrea Jakobson Estúdio. p. 1130-1146.

Harley RM, Pastore JFB. 2012. A generic revision and new combinations in the Hyptidinae (Lamiaceae), based on molecular and morphological evidence. Phytotaxa 58: 1-55.

Heinrich M. 1992. Economic botany of American Labiatae. In: Harley RM, Reynolds T. (eds.) Advances in Labiatae science. Kew, Royal Botanics Gardens Kew. p. 475-488.

Hickey LJ. 1973. Classification of the architecture of dicotyledonous leaves. American Journal of Botany 60: 17-33.

IUCN – International Union for Conservation of Nature. 2017. Guidelines for using the IUCN red list categories and criteria. Version 13. http://www.iucnredlist.org/documents/RedListGuidelines.pdf. 21 Jun. 2019.

Lorenzi H, Matos FJA. 2002. Plantas Medicinais no Brasil: nativas e exóticas cultivadas. Nova Odessa, Instituto Plantarum.

Mallo AC, Xifreda CC. 2004. Sobre dos especies de *Marsypianthes* (Lamiaceae, Ocimeae) del noreste argentino. Darwiniana 2: 201-206.

Menezes FS, Saboia AB, Pereira NA, Matos FJA, Borsatto AS, Kaplan MAC. 1998. Chemical constituents from *Marsypianthes chamaedrys*. Anais da Academia Brasileira de Ciências 70: 761-766.

Menezes FS, Silva CS, Pereira NA, Matos FJA, Borsatto AS, Kaplan MAC. 1999. Molluscicidal constituents of *Marsypianthes chamaedrys*. Phytotherapy Research 13: 433-435.

Mori SA, Silva LAM, Lisboa G, Coradin L. 1989. Manual de manejo de herbário fanerogâmico. 2nd. edn. Ilhéus, Centro de Pesquisas do Cacau.

O'Leary N. 2015. Synopsis of subtribe Hyptidinae (Lamiaceae) in Argentina. Phytotaxa 233: 201-235.

Pastore JFB, Harley RM, Forrest F, Paton AJ, Berg C. 2011. Phylogeny of the subtribe Hyptidinae (Lamiaceae tribe Ocimeae) as inferred from nuclear and plastid DNA. Taxon 60: 1317-1329.

Paton AJ, Ryding O. 1998. *Hanceola*, *Siphocranion* and *Isodon* and their position in the Ocimeae (Labiatae). Kew Bulletin 53: 723-731.

Radford AE, Dickson WC, Massey JR, Bell CR. 1974. Vascular Plant Systematics. New York, Harper & Row.

Rudall P. 1981. Flower anatomy of the subtribe Hypitidinae (Labiatae). Botanical Journal of the Linnean Society 83: 251-262.

Schmidt JA. 1858. Labiatae. In: Martius CFP, Eichler AG, Urban NI. (eds.) Flora brasiliensis. Vol. 8. Munich, Typographia Regia. p. 67-157.

Thiers B. 2018. Index Herbariorum: A global directory of public herbaria and associated staff. New York, New York Botanical Garden's Virtual Herbarium. http://sweetgum.nybg.org/ih/. 14 May. 2018.