



## Malpighiaceae in the Raso da Catarina Ecoregion, Bahia, Brazil

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**Abstract:** This study presents a floristic survey of Malpighiaceae species from in the Raso da Catarina Ecoregion in the state of Bahia, Brazil. After extensive field and herbarium studies, we identified 18 genera and 32 species of Malpighiaceae in the study area: *Aspicarpa harleyi* W.R.Anderson, *Banisteriopsis* C.B.Rob. (3 spp.), *Barnebya harleyi* W.R.Anderson & B.Gates, *Bronwenia ferruginea* (Cav.) W.R.Anderson & C.C.Davis, *Bunchosia pernambucana* W.R.Anderson, *Byrsonima* Rich. ex Kunth (4 spp.), *Carolus chasei* (W.R.Anderson) W.R.Anderson, *Diplopterys lutea* (Griseb.) W.R.Anderson & C.C.Davis, *Galphimia brasiliensis* (L.) A.Juss., *Heteropterys* Kunth (5 spp.), *Janusia anisandra* (A.Juss.) Griseb., *Mascagnia* Bertero (2 spp.), *Mcvaughia bahiana* W.R.Anderson, *Peixotoa hispidula* A.Juss., *Ptilochaeta* Turcz. (2 spp.), *Stigmaphyllon* A.Juss. (3 spp.), *Tetrapterys* Cav. (2 spp.) and *Thryallis longifolia* Mart. Among the species recorded, three represent new records for the Caatinga biome, 25 are endemic to Brazil, and six are exclusive to the Caatinga. We present an identification key to all species, comments on morphology, taxonomy, distribution and phenology, besides illustrations to most species.

**Keywords:** Brazilian semiarid, Caatinga biome, Floristics, Malpighiales, Seasonally dry, Tropical forests

## Malpighiaceae na Ecorregião Raso da Catarina, Bahia, Brasil

**Resumo:** Este estudo apresenta o levantamento florístico das espécies de Malpighiaceae na Ecorregião Raso da Catarina, no estado da Bahia, Brasil. Após extensos estudos de campo e herbário, identificamos 18 gêneros e 32 espécies de Malpighiaceae na área de estudo: *Aspicarpa harleyi* W.R.Anderson, *Banisteriopsis* C.B.Rob. (3 spp.), *Barnebya harleyi* W.R.Anderson & B.Gates, *Bronwenia ferruginea* (Cav.) W.R.Anderson & C.C.Davis, *Bunchosia pernambucana* W.R.Anderson, *Byrsonima* Rich. ex Kunth (4 spp.), *Carolus chasei* (W.R.Anderson) W.R.Anderson, *Diplopterys lutea* (Griseb.) W.R.Anderson & C.C.Davis, *Galphimia brasiliensis* (L.) A.Juss., *Heteropterys* Kunth (5 spp.), *Janusia anisandra* (A.Juss.) Griseb., *Mascagnia* Bertero (2 spp.), *Mcvaughia bahiana* W.R.Anderson, *Peixotoa hispidula* A.Juss., *Ptilochaeta* Turcz. (2 spp.), *Stigmaphyllon* A.Juss. (3 spp.), *Tetrapterys* Cav. (2 spp.), e *Thryallis longifolia* Mart. Entre as espécies catalogadas, três são novos registros para o bioma Caatinga, 25 são endêmicas do Brasil e seis são exclusivas da Caatinga. Apresentamos chave de identificação para todas as espécies, comentários sobre morfologia, taxonomia, distribuição e fenologia, além de ilustrações para a maioria espécies.

**Palavras-chave:** Semiárido brasileiro, Bioma Caatinga, Florística, Malpighiales, Sazonalmente seca, Florestas tropicais

## Introduction

Malpighiaceae Juss. comprises approximately 75 genera and 1,300 species distributed in tropical and subtropical regions worldwide (Anderson, W. 2013). Malpighiaceae species are recognized by the presence of hairs unicellular and medifixed, straight or rarely stellate in addition to “T”, “Y” or “V”-shaped (malpighiaceous hairs), simple opposite leaves, sepals generally with two oil secreting glands (elaiophores) on the base of the abaxial surface, petals unguiculate, gynoeceum 3-carpellate, commonly with 3 styles, 1 ovule per locule and generally schizocarpic fruits splitting into three winged mericarps

to, occasionally, nuts or drupes (Anderson, W. 1979a, 1981). Its greatest species diversity is found within the Neotropics (Anderson, W. 2013), and especially in Brazil with 60% are endemics comprising 44 genera and ca. 570 species (Mamede et al. 2017). In northeastern Brazil, this family is represented by 31 genera and 241 species, of which 22 genera and 82 species occur in the Caatinga biome from the state of in Bahia (Mamede et al. 2017).

The first monograph on Malpighiaceae was “*Monographie de la famille des Malpighiacées*” written by Jussieu (1843), and the second, and last revision was published as part of the “*Das Pflanzenreich*” by Niedenzu (1928), considered a masterwork to family.

Malpighiaceae is positioned within the order Malpighiales along with 41 families (Xi et al. 2012). The monophyly of the family is strongly supported by molecular (Cameron et al. 2001, Davis et al. 2001) and morphological data (Davis & Anderson 2010), with the most conspicuous synapomorphy being its conserved floral morphology in Neotropical lineages due to their mutualism with oil-collecting bees (Anderson, W. 1979a). After major advances in the study of the phylogenetic relationships of the group, Malpighiaceae was divided into 16 informal clades, which does not correspond to any classification system proposed for the family so far (Davis & Anderson 2010).

Among the taxonomic studies that have contributed to the knowledge of Neotropical Malpighiaceae, those from Anderson, C. (1989, 1995, 1997, 2007) and Anderson, W. (1982, 1987, 1990, 1993, 1995a, 1997, 1999, 2001, 2007) should be highlighted. In Brazil, there are several studies regarding this family from Mamede (1981, 1984, 1987), Amorim (1994, 2003), Sebastiani (2010), Sebastiani & Mamede (2010), Alexandrino et al. (2011); Francener et al. (2015), Almeida & Mamede (2014, 2016), Almeida (2015, 2016, 2017), Alves & Sebastiani (2015), Sebastiani et al. (2015), Almeida et al. (2013, 2016a, 2016b, 2017a, 2017b), Almeida & Amorim (2014a, 2014b, 2015a, 2015b), Amorim & Almeida (2015), Almeida & Hall (2016), and Almeida & Pellegrini (2016). For Northeastern Brazil, floristic studies were elaborated for the Malpighiaceae from Parque Estadual do Mirador, Maranhão (Conceição et al. 2011), Pico das Almas, Bahia (Anderson, W. 1995b), and those from state of Bahia: *Banisteriopsis* C.B. Rob. ex Small, *Bronwenia* W.R. Anderson & C.C. Davis, *Diplopterys* A. Juss. (Carvalho et al. 2010), and *Heteropterys* Kunth (Pessoa et al. 2014).

Despite the existence of studies about Malpighiaceae from the Brazilian semiarid areas, regional studies on this family within the state of Bahia are scarce, especially those that include identification keys and morphological descriptions for the family as a whole (pers. obs.). Given the representation of the Malpighiaceae in the Brazilian flora, this study aimed to elaborate a taxonomic study of this family within the Raso da Catarina Ecoregion (RCE) in the state of Bahia. We present morphological descriptions, an identification key, and comments on distribution, ecology and taxonomy of all studied species.

## Material and Methods

### 1. Study area

The Raso da Catarina Ecoregion (RCE) comprises an area of 30.800 km<sup>2</sup>, being one of the eight Ecoregions recognized for the Caatinga biome in Brazil. In the North-south direction it is narrow and elongated. In the North, West and East it is limited to the southern hinterland depression. The northeastern portion borders with the Borborema Plateau in the state of Pernambuco, and the southern part borders with hinterlands in the state of the Bahia. The Ecoregion is a sedimentary basin with a very flat relief, showing canyons formed by sandstone outcrops only in the western part. Altitudes above sea level vary from 400 to 600 m in the southern part (state of Bahia) and from 350 to 700 m in the northern part (Jatobá basin, state of Pernambuco). In the southern part (state of Bahia) most of the soils are composed of sand (deep, excessively drained, acid and very low fertility) and oxisol (deep, well drained, acid and low fertility) whereas in the northern part (Pernambuco) sandy soils prevail. Water availability is scarce in the

region, except in the areas of the canyons. The predominant vegetation is woodland Caatinga in sandy soils, and thorny Caatinga over crystalline soils (Velloso et al. 2002).

The climate of the Ecoregion is characterized as semiarid with average rainfalls of 650 mm/year in the southern part (state of Bahia), with rainy season from December to July. In the northern part (state of Pernambuco) the climate is drier with average rainfalls of 450 mm/year, with rainy season from January to April. Temperatures are very high with significant differences within day and night. The municipalities in this Ecoregion in the state of Bahia are: Canudos, Chorrochó, Cícero Dantas, Euclides da Cunha, Glória, Jeremoabo, Macururé, Paulo Afonso, Rodelas, Santa Brígida and Uauá. The Ecoregion includes six conservation units, five located in its southern part in the state of Bahia: Ecological Station Raso da Catarina, EPA Serra Branca, State Park of Canudos, Biological Station of Canudos, RPPN Farm Flor de Lis and Biological Reserve of Serra Negra, located in the northern part, in the state of Pernambuco (Velloso et al. 2002, Szabo et al. 2007).

### 2. Taxonomy

This study was based on fieldwork carried out from November 2013 to June 2015 during random walks exploring most of the study area. Fieldwork expeditions focused mainly conservation units (Figures 1, 2) within the southern part of the Ecoregion, in the state of Bahia: EPA Serra Branca (09°53'15.5" to 09°44'34.6" S and 38°49'36.1" to 38°52'20.4" W), Biological Station of Canudos (09°55'58.6" to 09°58'25.2" S and 38°57'32.2" to 39°01'38.5" W), Ecological Station of Raso da Catarina (09°33'13" to 09°54'30" S and 38°29'20" to 38°44'00" W), State Park of Canudos (09°56'19.7" to 09°54'32.4" S and 39°06'13.3" to 39° 04'20.5" W), and RPPN Farm Flor de Lis (10°50'14.1" to 10°50'26.4" S and 38°31'46.4" to 38°31'34.7" W) (Vieira et al. 2015).

Herborization of specimens followed Fosberg & Sachet (1965), and Mori et al. (1989), and observations on soil types followed Tricart (1972), and Sampaio (1995). All collected specimens were deposited at HUNEB herbarium (Paulo Afonso unit), and duplicates were sent to herbaria in the state of Bahia. Additional herbarium specimens from Brazilian herbaria were analyzed (ALCB, CEPEC, HST, HTSA, HUEFS, HUNEB, IPA and PEUFR, acronyms according to Thiers (2017) (continuously updated; Appendix 1). The descriptions of the species were based on the populations only collected in the study area. Identifications were made based on specialized literature (e.g., Jussieu 1843, Niedenzu 1901, 1928, Anderson & Gates 1981, Anderson, C. 1982, 1995, 1997, 2007, Mamede 1987, Anderson, W. 1979b, 1981, 1987, 1997, 2006, Amorim 2003, Carvalho et al. 2010, Sebastiani 2010, Almeida 2013 and Pessoa et al. 2014), protologues and images of type specimens. Morphological descriptions followed Radford et al. (1974), Anderson, W. (1981) and Harris & Harris (2001).

## Results and Discussion

Malpighiaceae is represented by 18 genera and 32 species in the southern part (state of BA) of the RCE. The genera represented by the most species were *Heteropterys* Kunth (five spp.) and *Byrsonima* Rich. ex Kunth (four spp.). Three new occurrences for the Caatinga domain were recorded for species previously cited only for the phytogeographic dominions of Amazônia, Cerrado and/or Atlantic Forest: *Byrsonima*

## Malpighiaceae in the RCE

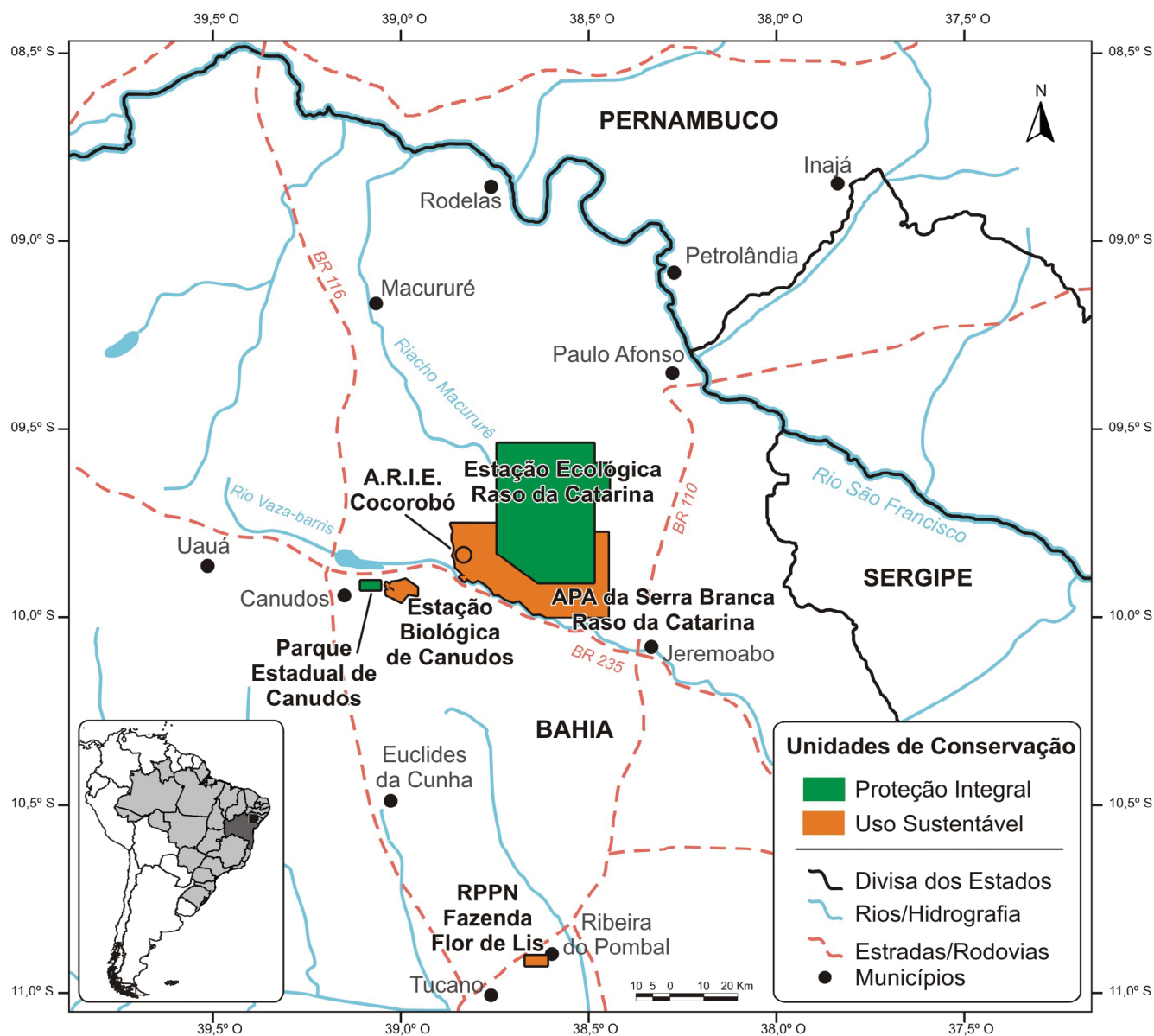


Figure 1. Location of conservation units of the Raso da Catarina Ecoregion, state of Bahia, Brazil (Varjão et al. 2013, modified)

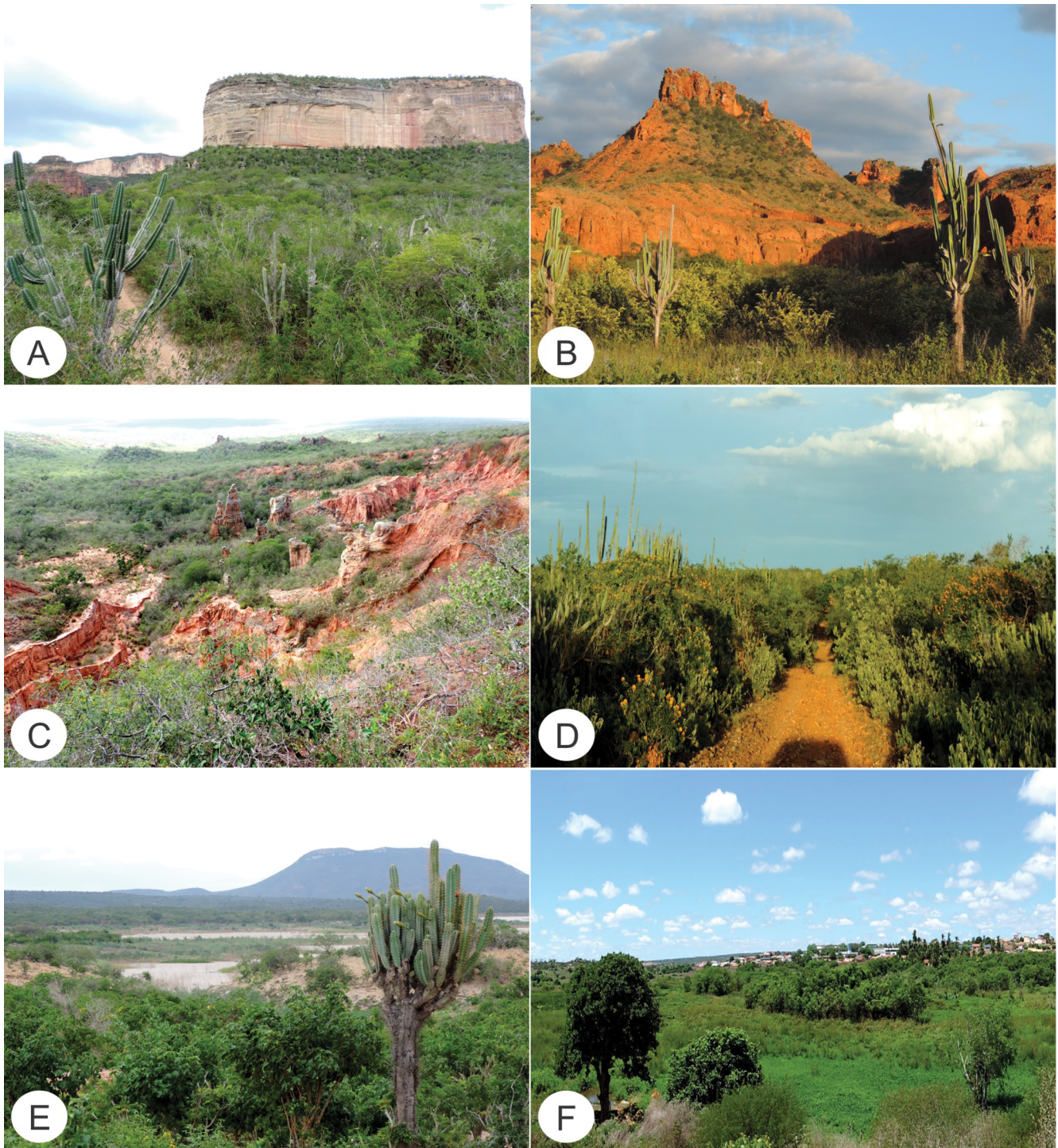
*coccolobifolia* Kunth, *Peixotoa hispidula* A.Juss. and *Tetrapterys paludosa* A.Juss. Among the catalogued species 25 are endemic from Brazil. *Aspicarpa harleyi* W.R.Anderson, *Barnebya harleyi* W.R.Anderson & B.Gates, *Bunchosia pernambucana* W.R.Anderson, *Carolus chasei* (W.R.Anderson) W.R.Anderson, *Galphimia brasiliensis* (L.) A.Juss., *Heteropterys caducibracteata* W.R.Anderson, *Heteropterys catingarum* A.Juss. and *Mcvaughia bahiana* W.R.Anderson are restricted to the Northeast Region, with the first and fourth occurring only in the state of Bahia. *Barnebya harleyi*, *Carolus chasei*, *H. caducibracteata*, *H. catingarum*, *Heteropterys trichanthera* A.Juss. and *Mcvaughia bahiana* are endemic to the Caatinga biome.

### Malpighiaceae Juss.

Trees, shrubs, erect or scandent subshrubs or vines; hairs unicellular, medifixed, straight and appressed, T, Y or V-shaped, rarely stellate. Leaves mostly opposite, subopposite, sometimes verticillate or alternate; often bearing large multicellular glands on the petiole or

lamina; stipules epi- to interpetiolar, free to connate, persistent or deciduous; lamina simple, entire to lobed, margin entire to variously toothed or ciliate with filiform hairs. Inflorescences of 1-flowered cincinni, arranged in pseudoracemes, thyrsi, panicles, dichasia, corymbs or umbels, terminal to axillary; bracts and bracteoles diminutive to enlarged, eglandular to often glandular. Flowers usually zygomorphic, rarely actinomorphic, chasmogamous to rarely cleistogamous; pedicel usually well developed; sepals 5, persistent, mostly imbricate in bud or valvate, distinct or partially connate at base, apex erect to revolute to deflexed, each sepal bearing (0–) 2 large abaxial oil glands; petals 5, distinct, clawed, alternating with sepals, yellow, pink, or white, the posterior petal often differentiated from the lateral 4. Androecium bearing (3–7–) 10 stamens (sometimes reduced to staminodes) in two connate whorls, filaments always present, short to elongate, monomorphic or heteromorphic, distinct or partially connate at base, anthers monomorphic or heteromorphic, 4-locular, mostly longitudinally dehiscent. Gynoecium superior, carpels usually 3, distinct to connate,





**Figure 2.** Units of Conservation of the Raso da Catarina Ecoregion, part Bahia, Brazil. A. Environmental Protection Area Serra Branca; B. Biological Station of Canudos; C-D. Ecological Station Raso da Catarina; E. State Park of Canudos; F. RPPN Farm Flor de Lis. Photos by J.V. Santos.



each fertile locule bearing 1 pendent anatropous ovule, styles generally as many as carpels, distinct to partially to entirely connate. Fruits fleshy (drupes) or dry nut, schizocarps (cocci and samaras) usually splitting into 3 smooth, setose to winged mericarps, indehiscent in a few genera. Seeds 1 per mericarp, endosperm absent (Anderson, W. 1981, Anderson, W. et al. 2006).

### Identification key for Malpighiaceae from the Raso da Catarina Ecoregion, Bahia, Brazil

1. Gynoecium with 1 style.
  2. Androecium with 3 stamens fertile, 2 staminodes. Samaras with dorsal wings reduced to crests ..... **1. *Aspicarpa harleyi***
  - 2'. Androecium with 6 stamens fertile, staminodes absent. Samaras with dorsal wings developed ..... **20. *Janusia anisandra***
- 1'. Gynoecium with 3 styles.
  3. Androecium with 5 stamens fertile and 5 staminodes ..... **24. *Peixotoa hispidula***
  - 3'. Androecium with 7 stamens fertile and 3 staminodes, or 10 stamens fertile and staminodes absent.
    4. Latero-anterior petals not entirely expanded, nested one inside the other; 7 stamens fertile and 3 staminodes ..... **23. *Mcvaughia bahiana***
    - 4'. Latero-anterior petals entirely expanded, free; 10 stamens fertile, staminodes absent.
      5. Inflorescence of umbels disposed in dichasia; style with apex foliaceous.
        6. Erect subshrubs; branches flattened; leaves decussate. Samaras with dorsal wings reduced to crests ..... **29. *Stigmaphyllon paralias***
        - 6'. Lianas; branches cylindrical; leaves opposite. Samaras with dorsal wings developed.
          7. Lamina glabrous or glabrescent on both surfaces ..... **27. *Stigmaphyllon auriculatum***
          - 7'. Lamina adaxial surface tomentose to glabrescent and abaxial surface densely tomentose ..... **28. *Stigmaphyllon blanchetii***
- 5'. Inflorescence of corymbs, umbels, umbelliform corymbs, disposed or not in panicles, pseudoracemes or thyrses; style with apex acute, obtuse, dorsally apiculate, obtuse-apiculate or truncate.
  8. Sepals without elaiophores.
    9. Posterior styles pubescent at base and anterior style pubescent proximally to the middle **13. *Diplopterys lutea***
    - 9'. Styles glabrous or with base sericeous.
      10. Lamina abaxial surface densely stellate-pubescent. Sepals straight, stiff and spreading on the fruit ..... **32. *Thryallis longifolia***
      - 10'. Lamina abaxial surface sparsely or densely velutinous to tomentose, glabrescent or glabrous. Sepals not spreading on the fruit.
        11. Inflorescence of terminal pseudoracemes; petals yellow, often marked with 1 reddish line abaxially .. **14. *Galpimia brasiliensis***
        - 11'. Inflorescence of umbelliform corymbs; petals yellow without red marking.
          12. Lamina adaxial surface sparsely sericeous or glabrescent, abaxial surface sparsely velutinous to tomentose or glabrescent. Pedicel 8–13 mm long ..... **25. *Ptilochaeta bahiensis***
          - 12'. Lamina adaxial surface sparsely velutinous or glabrescent, abaxial surface densely velutinous to tomentose. Pedicel 3–6 mm long ..... **26. *Ptilochaeta cf. densiflora***
- 8'. Sepals with elaiophores, sometimes absent in *Byrsonima sericea*.
  13. Trees, treelets to erect shrubs.
    14. Bracteoles 1-2 glandular. Drupes 3-lobed with 3 pyrene free from each other at maturity ..... **7. *Bunchosia pernambucana***
    - 14'. Bracteoles eglandular. Drupes with only 1 pyrene or samaras.
      15. All elaiophores decurrent on the pedicel. Samaras with dorsal wing well developed **5. *Barnebya harleyi***
      - 15'. Elaiophores not decurrent on the pedicel. Drupes with 1 pyrene.
        16. Leaves abaxial surface densely sericeous, ferruginous ..... **10. *Byrsonima sericea***
        - 16'. Leaves abaxial surface glabrous, or with sparse hairs, or densely tomentose.
          17. Leaves abaxial surface densely tomentose. Petals yellow-orange **11. *Byrsonima verbascifolia***
          - 17'. Leaves abaxial surface glabrous or with sparse hairs. Petals pink to white.
            18. Leaves with veins pink. Petals pink to white with posterior petal entirely pink ..... **8. *Byrsonima coccolobifolia***
            - 18'. Leaves with veins green. Petals predominantly white **9. *Byrsonima gardneriana***
  - 13'. Decumbent to scandent shrubs or lianas.
    19. Samaras with 2 lateral wings or with lateral wings well developed, fused into a single orbicular wing.
      20. Petals abaxial surface densely sericeous. Samaras with 2 lateral wings ..... **12. *Carolus chasei***
      - 20'. Petals abaxial surface sparsely tomentose to glabrescent. Samaras with lateral wings well developed, fused into a single orbicular wing.
        21. Petals pink. Orbicular wings 2.3–2.6 cm in diameter, sparsely sericeous ..... **21. *Mascagnia cordifolia***
        - 21'. Petals yellow. Orbicular wings ca. 6 mm in diameter, densely sericeous **22. *Mascagnia sepium***
    - 19'. Samaras with only dorsal wings or 4 lateral wings X-shaped.
      22. Stamens monomorphic; styles parallel ..... **6. *Bronwenia ferruginea***
      - 22'. Stamens heteromorphic; styles divergent, parallel in *Banisteriopsis malifolia*.

23. Ovary with lateral wings. Samaras with 4 lateral wings X-shaped.

24. Leaves with margin entire, adaxial surface sericeous, abaxial surface densely sericeous to tomentose. Inflorescence of pseudoracemes ..... **30. *Tetrapterys paludosa***

24'. Leaves with margin undulate, tomentose on both surfaces. Inflorescence of umbelliform corymbs ..... **31. *Tetrapterys ramiflora***  
23'. Ovary without lateral wings. Samaras with dorsal wing well developed.

25. Flowers usually 4. Anthers with glandular connectives. Samaras with dorsal wing thickened along the upper margin.

26. Leaves abaxial surface densely sericeous, silver, bright. Petals pink or white with age. Samara with nut muricate ..... **3. *Banisteriopsis muricata***

26'. Leaves abaxial surface glabrous, glabrescent or densely tomentose. Petals white, pink or sometimes pink in the center in the posterior petal, or yellow pale. Samara with nut not muricate.

27. Leaves adaxial surface sparsely tomentose and abaxial surface densely tomentose ..... **2. *Banisteriopsis malifolia***

27'. Leaves entirely glabrous or glabrescent on both surfaces **4. *Banisteriopsis stellaris***

25'. Flowers 2–10, never usually 4. Anthers without glandular connectives. Samaras with dorsal wing thickened along the lower margin.

28. Leaves with 7–10 glands borne on lamina abaxial surface. Peduncle absent ..... **16. *Heteropterys catingarum***

28'. Leaves with 1–5 glands or eglandular. Peduncle 1.5–9 mm long.

29. Petiole 2–3 mm long. Samaras with dorsal wing 1–1.4 × 0.5–0.7 cm ..... **15. *Heteropterys caducibracteata***

29'. Petiole 3–8 mm long. Samaras with dorsal wing 1.5–3 × 0.7–1.6 cm.

30. Thecae pilose along entire length ..... **18. *Heteropterys trichanthera***

30'. Thecae pilose only at apex or glabrous.

31. Leaves with margin undulate. Sepals with apex revolute; petals yellow ..... **17. *Heteropterys grandiflora***

31'. Leaves with margin revolute. Sepals with apex erect; lateral petals white, posterior petal white with lines pink ..... **19. *Heteropterys trigoniifolia***

**1. *Aspicarpa harleyi*** W.R. Anderson, Contr. Univ. Michigan Herb. 16: 55. 1987. Iconography: Anderson, W. (1987: 56). Figure 3A

Erect subshrubs 10–40 cm tall. Leaves chartaceous, decussate; stipules 1.5–2 mm long, persistent; petiole 1–3 mm long, sericeous, eglandular; lamina 3–4.5 × 0.9–2 cm, elliptic or slightly ovate, apex

acute, usually apiculate, base cuneate or rounded, with (1)–2 stipitate peltate glands, margin entire, adaxial surface velutinous, abaxial surface densely velutinous. Inflorescence of umbelliform corymbs; bracts 2–3 mm long, linear; peduncle 0.5–1 cm long; bracteoles 1–2 mm long, ovate, located at the joint or below; pedicel 0.5–0.9 cm long. Flowers axillary, mostly 1 per axil but occasionally 2; sepals 3.5–5 × 3.5–4 mm, apex acute, adaxial surface sparsely sericeous, glabrescent at base, abaxial surface sparsely sericeous, tomentose to velutinous; elaiophores 8, ca. 2 mm long, anterior sepals sometimes with 1 elaiophore; petals orange-yellow, glabrous, margin short-fimbriate, lateral petals with limb 7–8 × 7–8 mm, claw ca. 3–4 mm long, latero-anterior petals entirely expanded, free, posterior petal with limb 6–7 × 7–8 mm, claw ca. 4 mm long; stamens 3, fertile, monomorphic or heteromorphic; filaments 2–3 mm long, glabrous; anthers ca. 1 mm long, thecae glabrous or sparsely tomentose; staminodes 2, 2–2.5 mm long, glabrous. Ovary ca. 2 mm long, velutinous; style 1, 3–4.2 mm long, sparsely tomentose, erect; stigmas apical, capitate. Samaras immature green, dorsal wings reduced to crests, 0.5–1.5 mm long, velutinous, hairs not irritating at the touch; nut ca. 2.5 mm long, with 1 lateral rib on each side; carpophore absent.

**Specimens examined:** BRAZIL, BAHIA: Paulo Afonso, Estação Ecológica Raso da Catarina, estrada em direção à Base Velha, próximo a barragem, 9°43'36.7"S, 38°40'34"W, 606 m, 16.III.2014, fl., J.V. Santos 282 (HUNEB); *ibid.*, Início da Estação, estrada em direção à Base Nova, 09°39'02.5"S, 38°27'22.3"W, 499 m, 05.III.2015, fl; fr., J.V. Santos 514 (HUNEB).

**Distribution, ecology and phenology:** *Aspicarpa harleyi* is endemic to Brazil and is restricted to the state of Bahia where it is associated with the phytogeographic dominions of Caatinga and Cerrado (Mamede et al. 2017). In the Ecorregion Raso da Catarina, the species was recorded only in the ESRC and on sandy soils in preserved areas. It was collected with flowers and fruits only in March.

**Conservation:** Due to the degree of endemism, the species was assessed and categorized as “Vulnerable (VU)” according to Biodiversitas (2005), “Threatened with Extinction” (MMA 2008) and “Near Threatened (NT)” by CNCFlora in 2017.

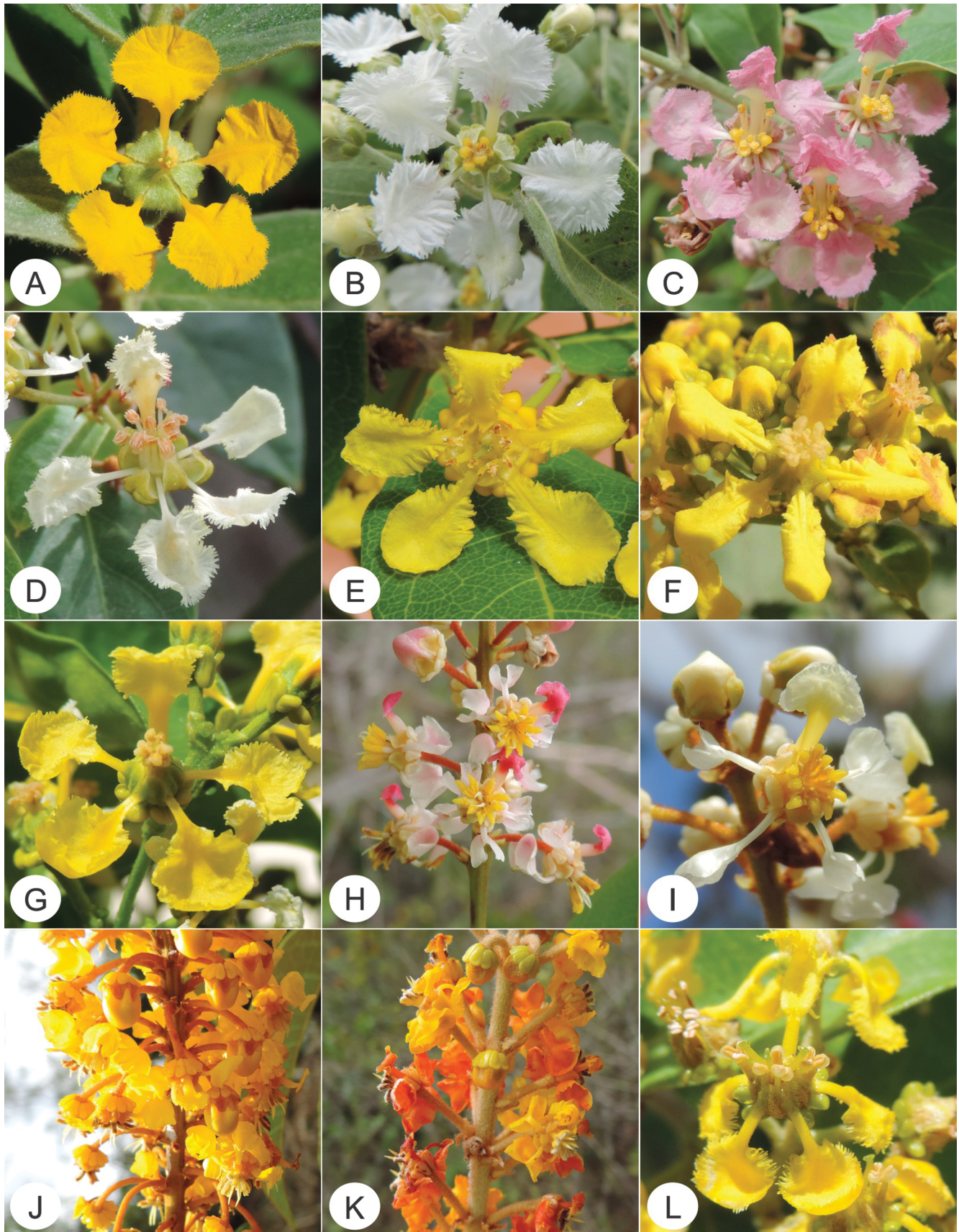
**Taxonomy:** *Aspicarpa harleyi* is distinguished from the remaining species in this study by its flowers with androecium consisting of three stamens and two staminodes, gynoecium with only one style and samaras with dorsal wings reduced to crests.

**2. *Banisteriopsis malifolia*** (Nees & Mart.) B.Gates, Fl. Neotrop. Monogr. 30: 76. 1982. Iconography: Carvalho et al. (2010: 170). Figure 3B

Scandent shrubs ca. 2 m tall. Leaves chartaceous, opposite; stipules ca. 0.5 mm long, persistent; petiole 2–8 mm long, tomentose, eglandular; lamina 3.2–8 × 2–5 cm, elliptic, ovate or orbicular, apex acute or apiculate, base obtuse or cordate, margin entire, adaxial surface sparsely tomentose, abaxial surface densely tomentose, 1 pair of peltate glands stipitate at base of primary or secondary veins. Inflorescence of terminal or axillary umbels; bracts 2–2.5 mm long, triangular or oblong; peduncle absent; bracteoles 2–2.5 mm long, persistent or deciduous, triangular or oblong; pedicel 1–1.5 cm long. Flowers usually 4; sepals 3–5 × 2–2.8 mm, apex acute to obtuse, adaxial surface glabrous, abaxial surface sericeous; elaiophores ca. 2 mm long, anterior sepal eglandular, sometimes with 1 elaiophore; petals white or pink, sometimes pink in the center in the posterior petal, pale yellow with age, glandular, glabrous,



## Malpigiaceae in the RCE



**Figure 3.** Representatives of the Malpigiaceae in the Raso da Catarina Ecotone. A. *Aspicarpa harleyi*; B. *Banisteriopsis malifolia*; C. *B. muricata*; D. *B. stellaris*; E. *Barnebya harleyi*; F. *Bronwenia ferruginea*; G. *Bunchosia pernambucana*; H. *Byrsonima coccolobifolia*; I. *B. gardneriana*; J. *B. sericea*; K. *B. verbascifolia*; L. *Carolus chasei*. Photos by J.V. Santos.



lateral petals with limb ca.  $8 \times 6-7$  mm, claw ca. 2 mm long, latero-anterior petals entirely expanded, free, posterior petal with limb ca.  $8 \times 7$  mm, claw ca. 3 mm long; stamens 10, heteromorphic; filaments 2–4 mm long, glabrous; anthers ca. 1 mm long, thecae sparsely pubescent, connectives glandular; staminodes absent. Ovary ca. 2 mm long, sericeous, wings absent; styles monomorphic, ca. 3 mm long, glabrous, apex truncate, parallel, erect; stigmas apical, capitate. Samaras immature green to green-vinaceous, dorsal wing well developed, thickened along the upper margin,  $1.4-2.1 \times 0.5-1$  cm, sericeous, hairs not irritating at the touch; nut ca.  $7 \times 5$  mm, not muricate, densely sericeous; carpophore not seen.

**Specimens examined:** BRAZIL, BAHIA: Jeremoabo, estrada secundária do Povoado Quelés sentido à ESEC,  $09^{\circ}56'36.2''S$ ,  $38^{\circ}27'15.3''W$ , 541 m, 20.XII.2013, fl., J.V. Santos 118 (HUNEB); *ibid.*,  $09^{\circ}56'36.2''S$ ,  $38^{\circ}27'15.3''W$ , 541 m, 20.XII.2013, fl.; fr., J.V. Santos 120 (HUNEB); Paulo Afonso, Estação Ecológica Raso da Catarina, estrada sentido a Mata da Pororoca, antes da casa do Sr. Divá,  $09^{\circ}39'13.2''S$ ,  $38^{\circ}29'26.7''W$ , 612 m, 19.III.2014, fl.; fr., J.V. Santos 200 (HUNEB); *ibid.*, estrada em direção às Bases III e II,  $09^{\circ}38'09''S$ ,  $38^{\circ}29'26.9''W$ , 593 m, 11.IV.2014, fl.; fr., J.V. Santos 360 (HUNEB).

**Distribution, ecology and phenology:** *Banisteriopsis malifolia* is found only in Brazil. It occurs in the North, Northeast, Midwest, Southeast and South Regions, in the phytogeographic dominions of Amazon rainforest, Caatinga, Cerrado and Atlantic Forest (Mamede et al. 2017). In the RCE the species is found on sandy soils in preserved areas. It was collected with flowers and fruits from March, April and December.

**Taxonomy:** It can be easily differentiated from its congeners by leaves with the adaxial surface sparsely tomentose and the abaxial surface densely tomentose.

### 3. *Banisteriopsis muricata* (Cav.) Cuatrec., Webbia 13: 503. 1958.

Iconography: Gates (1982: 122), Anderson, W. (2013: 114). Figure 3C  
Scandent shrubs ca. 2 m tall or lianas. Leaves chartaceous, opposite; stipules ca. 0.8 mm long, persistent; petiole 1–2 cm long, 1–2 glands in the median region or apical, or absent; lamina 4–11  $\times$  2–5.5 cm, ovate to elliptic, apex acuminate to apiculate, base cuneate, margin entire, adaxial surface sparsely sericeous, abaxial surface densely sericeous, silver, bright, 1–5 stipitate glands. Inflorescence of terminal or axillary umbels; bracts ca. 1 mm long, triangular; peduncle absent or ca. 1–2 mm long; bracteoles ca. 1 mm long, triangular; pedicel 0.5–1.3 cm long. Flowers usually 4; sepals ca.  $4 \times 2.5$  mm, apex acuminate, erect, adaxial and abaxial surfaces sericeous; elaiophores vinaceous, anterior sepal eglandular; petals pink, white with age, glabrous, lateral petals eglandular, limb ca.  $6-7 \times 6$  mm, margin denticulate, claw 1–2 mm long, latero-anterior petals entirely expanded, free, posterior petal glandular, limb ca.  $7 \times 5$  mm, margin fimbriate-denticulate, claw ca. 2.5 mm long; stamens 10, heteromorphic; filaments 1.2–4 mm long, glabrous; anthers ca. 1 mm long, thecae glabrous, connectives glandular; staminodes absent. Ovary ca. 1.5 mm long, sericeous, wings absent; styles heteromorphic, 3–4 mm long, glabrous, apex truncate, divergent, erect or base curved; stigmas apical, capitate. Samaras immature brown-reddish or vinaceous, dorsal wing well developed, thickened along the upper margin,  $2-2.5 \times 0.6-1$  cm, sericeous, hairs not irritating at the touch; nut ca.  $7 \times 4$  mm, muricate, densely sericeous; carpophore not seen.

**Specimens examined:** BRAZIL, BAHIA: Banzaê, Povoado Salgado, na estrada do Pau Branco,  $10^{\circ}35'55.1''S$ ,  $38^{\circ}41'55.8''W$ , 306 m, 15.I.2014, fr., J.V. Santos 147 (HUNEB); Canudos, Estação Biológica de Canudos, Caminho Saco de Doninha,  $09^{\circ}57'01.0''S$ ,  $39^{\circ}00'54.8''W$ , 429 m, 28.III.2014, fl., J.V. Santos 247 (HUNEB); *ibid.*, caminho em direção à Lagoa do Menezão,  $09^{\circ}56'58.3''S$ ,  $39^{\circ}00'46.8''W$ , 421 m, 13.III.2014, fl.; fr., J.V. Santos 327 (HUNEB); *ibid.*, Saco do Gavião,  $09^{\circ}57'13.8''S$ ,  $39^{\circ}00'15.1''W$ , 420 m, 16.IX.2014, fl.; fr., J.V. Santos 429 (HUNEB); *ibid.*, trilha do Roçado de Menezão,  $09^{\circ}56'58.2''S$ ,  $39^{\circ}00'47''W$ , 426 m, 26.IX.2014, fr., J.V. Santos 470 (HUNEB); Cícero Dantas, Povoado Boqueirão,  $10^{\circ}33'12.6''S$ ,  $38^{\circ}24'11.4''W$ , 427 m, 04.VIII.2014, fl.; fr., J.V. Santos 363 (HUNEB); *ibid.*, Pombos, na estrada em direção ao Povoado Boqueirão,  $10^{\circ}34'37.3''S$ ,  $38^{\circ}23'47.4''W$ , 403 m, 04.VIII.2014, fl.; fr., J.V. Santos 364 (HUNEB); *ibid.*, Sapé,  $10^{\circ}19'27''S$ ,  $38^{\circ}35'52.9''W$ , 611 m, 05.VIII.2014, fr., J.V. Santos 369 (HUNEB); Jeremoabo, APA Serra Branca, próximo a Serra do Navio,  $09^{\circ}52'01.3''S$ ,  $38^{\circ}38'48''W$ , 453 m, 25.IX.2014, fr., J.V. Santos 468 (HUNEB).

**Distribution, ecology and phenology:** The species occurs in Central and South America in diverse habitats such as rainforests, dry forests, and roadside vegetation (Anderson, W. 2013). In Brazil it is widely distributed in the North, Northeast, Midwest, Southeast and South regions in the Amazon rainforest, Caatinga, Cerrado and Atlantic Forest (Mamede et al. 2017). In the Ecorregion Raso da Catarina, *Banisteriopsis muricata* is found on sandy and sandy-loam soils in preserved, open and anthropized areas. It was collected with flowers in March, August and September and with fruit in January, March, August, September and November.

**Taxonomy:** In the study area it can be recognized by leaves with abaxial surface densely sericeous, silver bright, flowers with pink petals, white in age, and samara with a muricate nut.

### 4. *Banisteriopsis stellaris* (Griseb.) B.Gates, Fl. Neotrop. Monogr. 30: 71. 1982. Iconography: Gates (1982: 72). Figure 3D

Scandent shrubs ca. 2 m tall or lianas. Leaves chartaceous, opposite; stipules ca. 0.2 mm long, persistent; petiole 1–2 mm long, sericeous to glabrescent, eglandular; lamina 1–6  $\times$  0.8–3.5 cm, lanceolate, elliptic to ovate, apex acute to apiculate, base cordate to truncate, margin entire, adaxial and abaxial surfaces entirely glabrous or glabrescent, 1–2 pairs of glands abaxially or absent. Inflorescence of terminal or axillary umbels; bracts ca. 1 mm long, triangular to lanceolate; peduncle absent; bracteoles ca. 1 mm long, triangular to lanceolate; pedicel 9–12 mm long. Flowers usually 4; sepals ca.  $2.5 \times 1.5-2$  mm, apex obtuse, adaxial surface glabrous, abaxial surface sericeous; elaiophores ca. 2 mm long, green to brown; petals white, sometimes white to pink, glandular, lateral petals with limb  $4-5 \times 4.5-5$  mm, claw ca. 2 mm long, latero-anterior petals entirely expanded, free, posterior petal with limb ca.  $3 \times 3$  mm, claw ca. 3 mm long; stamens 10, heteromorphic; filaments 2–2.3 mm long, glabrous; anthers ca. 1 mm long, thecae pilose, connectives glandular; staminodes absent. Ovary ca. 2 mm long, sericeous, wings absent; styles monomorphic, ca. 2 mm long, glabrous, apex truncate, divergent, erect; stigmas apical, capitate. Samaras vinaceous when immature and brown when mature, dorsal wing well developed, thickened along the upper margin,  $1-2.2 \times 0.6-1.1$  cm, sparsely sericeous, hairs not irritating at the touch; nut  $5-6 \times$  ca. 4 mm, not muricate, sericeous; carpophore not seen.



**Specimens examined:** BRAZIL, BAHIA: Cícero Dantas, Pombos, na estrada em direção ao Povoado Boqueirão, 10°34'37.3"S, 38°23'47.4"W, 403 m, 04.VIII.2014, fl.; fr., J.V. Santos 367 (HUNEB); *ibid.*, Sapé, 10°19'27"S, 38°35'52.9"W, 611 m, 05.VIII.2014, fl.; fr., J.V. Santos 368 (HUNEB); Jeremoabo, estrada secundária, do Povoado Quelés sentido à ESEC, 09°56'36.2"S, 38°27'15.3"W, 541 m, 20.XII.2013, fl.; fr., J.V. Santos 128 (HUNEB); *ibid.*, depois da Baixa da Forra, 09°59'27.2"S, 38°23'41.9"W, 591 m, 05.VI.2014, fl., J.V. Santos 341 (HUNEB); *ibid.*, 10°02'22.7"S, 38°21'45.5"W, 315 m, 31.VII.2014, fl., J.B. Lima 462 (HUNEB) Euclides da Cunha, Sucupira do Galo, 10°21'01"S, 38°41'11.6"W, 544 m, 16.I.2014, fl., J.V. Santos 153 (HUNEB); *ibid.*, 10°20'21.6"S, 38°42'29.6"W, 588 m, 16.I.2014, fl., J.V. Santos 157 (HUNEB); Jeremoabo, APA Serra Branca, Areia Branca, 09°58'41.8"S, 38°27'41.3"W, 394 m, 10.II.2014, fl., J.V. Santos 169 (HUNEB); Paulo Afonso, Estação Ecológica Raso da Catarina, estrada após a Mata da Pororoca sentido Jeremoabo, 09°52'45.2"S, 38°29'31"W, 632 m, 18.III.2014, fl.; fr., J.V. Santos 193 (HUNEB); *ibid.*, próximo a Mata da Pororoca, 09°39'14.9"S, 38°29'26.7"W, 615 m, 07.III.2014, fl.; fr., J.V. Santos 301 (HUNEB); *ibid.*, início da estrada em direção à Mata da Pororoca, 09°39'03.9"S, 38°29'26.8"W, 617 m, 09.VI.2014, fl., J.V. Santos 349 (HUNEB); *ibid.*, 09°47'33.3"S, 38°29'30.4"W, 699 m, 16.VI.2015, fl.; fr., J.V. Santos 562 (HUNEB); *ibid.*, 09°39'13.3"S, 38°29'26.8"W, 610 m, 21.VII.2014, fl.; fr., J.B. Lima 430 (HUNEB); *ibid.*, estrada em direção às Bases III e IV, 09°38'38.9"S, 38°29'26.8"W, 601 m, 03.IX.2014, fl., J.V. Santos 426 (HUNEB).

**Distribution, ecology and phenology:** *Banisteriopsis stellaris* is endemic to Brazil, occurring in the North, Northeast, Midwest and Southeast regions in the phytogeographic dominions of Amazon rainforest, Caatinga and Cerrado (Mamede et al. 2017). In the Ecorregion Raso da Catarina, the species can be found in open, anthropized and preserved areas with sandy or sandy-loam soils. It was collected with flowers during almost the entire year and with fruits in March, June, July August and December.

**Taxonomy:** It is abundant in the study area and can be differentiated from its congeners by show up entirely glabrous or glabrescent leaves.

**5. *Banisteriopsis harleyi*** W.R.Anderson & B.Gates, Brittonia 33 (3): 281. 1981. Iconography: Anderson & Gates (1981: 282). Figure 3E

Tree ca. 15 m tall. Leaves coriaceous, alternate; stipules absent; petiole 2–7 mm long, sericeous to glabrescent, eglandular; lamina 6–20.3 × 2–8.2 cm, elliptic or obovate, apex acute to obtuse or rounded, base attenuate or cuneate, 1–6 glands near of midrib, margin revolute, 2–6 glands distally between the midrib and margin, adaxial and abaxial surfaces sericeous to glabrous, hairs usually persistent at midrib abaxially. Inflorescence of terminal pseudoracemes; bracts 1–4 mm long, triangular or subulate; peduncle 5–12 mm long; bracteoles 1–4 mm long, triangular or subulate, eglandular, deciduous; pedicel 12–22 mm long. Flowers with sepals ca. 6 × 3.5 mm, apex rounded, adaxial surface glabrous, abaxial surface and margin sparsely tomentose; elaiophores 10, 7–11 mm long, 3.5–5 long at sepals and ca. 1.5–4 mm long at pedicel, all decurrent on the pedicel; petals yellow, glabrous or claw sparsely sericeous abaxially, margin erose or glandular, lateral petals with limb 7–11 × 5–8 mm, claw 3 mm long, latero-anterior petals entirely expanded, free, posterior petal with limb 7–9 × 4.5–5 mm, claw ca. 1 mm long; stamens 10, fertile, heteromorphic; filaments 2–3 mm long, glabrescent; anthers 2.3–3 mm long, thecae glabrescent, connectives

eglandular; staminodes absent. Ovary ca. 3 mm long, densely sericeous; styles 3, rare 4, heteromorphic, ca. 5 cm long, glabrous, apex obtuse, erect; stigmas subapical. Samaras green when immature and brown when mature, dorsal wing well developed, thickened along the upper margin, 2.4–3.5 × 1.1–1.5 cm, sparsely sericeous to glabrous, hairs not irritating at the touch; nut 1.5–1.6 × 0.8–1 cm, sparsely tomentose, carpophore absent.

**Specimens examined:** BRAZIL, BAHIA: Canudos, Estação Biológica de Canudos, Saco das Araras I, 09°57'14.3"S, 38°59'58"W, 413 m, 27.III.2014, fl., J.V. Santos 233 (HUNEB); *ibid.*, caminho em direção à Lagoa de Menezão, 09°56'47.7"S, 39°00'43.2"W, 421 m, 12.V.2014, fl.; fr., J.V. Santos 328 (HUNEB); *ibid.*, Saco das Araras I, 09°57'14.3"S, 38°59'58"W, 413 m, 16.IX.2014, fr., J.V. Santos 431 (HUNEB); *ibid.*, trilha em direção à roça de Menezão, 09°57'16.1"S, 39°00'54.7"W, 438 m, 26.IX.2014, fr., J.V. Santos 471 (HUNEB); Jeremoabo, APA Serra Branca, Baixa dos Quelés, próximo a casa de Antônio Rouxinho, 09°57'30.3"S, 38°26'20"W, 504 m, 20.XII.2013, fl., J.V. Santos 109 (HUNEB); *ibid.*, Baixa do Tamburi, em direção à estrada secundária, 09°57'44.4"S, 38°26'15"W, 506 m, 26.VI.2015, fr., J.V. Santos 548 (HUNEB); Tucano, Tucano de Fora, Buraco do Vento, 10°57'23"S, 38°44'01"W, 354 m, 8.VIII.2014, fl., J.V. Santos 391 (HUNEB).

**Distribution, ecology and phenology:** *Banisteriopsis harleyi* occurs only in the Northeast Region of Brazil in the states of Alagoas, Bahia, Ceará, Paraíba, Pernambuco, Piauí and Sergipe in the Caatinga environments (Mamede et al. 2017). The species is found in preserved areas of the RCE in sandy soils. It was collected with flowers in March, May, July and August and with fruits in May, June, September and November.

**Taxonomy:** It is easily recognized by its arboreal habit with alternate leaves, flowers with 10 elaiophores at the base of the sepals, all decurrent on the pedicel and, completely yellow petals.

**6. *Bronwenia ferruginea*** (Cav.) W.R.Anderson & C.C.Davis, Contr. Univ. Michigan Herb. 25: 143. 2007. Iconography: Carvalho et al. (2010: 179), Almeida (2013: 122). Figure 3F

Scandent shrubs ca. 2 m tall or lianas. Leaves chartaceous, opposite; stipules to 1 mm long, interpetiolar, persistent; petiole 5–7 mm long, densely sericeous or glabrescent, eglandular; lamina 4.7–7.3 × 3.5–5.5 cm, elliptic to ovate, apex obtuse to emarginate, base obtuse to truncate, 1 pair of peltate sessile glands, margin entire, adaxial surface glabrous, abaxial surface sparsely sericeous. Inflorescence of corymbs disposed in panicles; bracts 0.8–1.5 mm long, triangular; peduncle absent; bracteoles 0.8–1.5 mm long, triangular; pedicel 0.6–1 cm long. Flowers with sepals 2–3.8 × 1.5–2 mm, apex obtuse, adaxial surface glabrous, abaxial surface sparsely sericeous; elaiophores 8, 2–2.5 mm long; petals yellow, glabrous, margin erose, lateral petals with limb ca. 5.8 × 4 mm, claw ca. 1 mm long, latero-anterior petals entirely expanded, free, posterior petal with limb ca. 5 × 3.5 mm, two pairs of glands at base, claw ca. 2 mm long; stamens 10, fertile, monomorphic; filaments 2–3 mm long, sparsely sericeous to glabrous; anthers ca. 1.2 mm long, thecae glabrescent, connectives eglandular; staminodes absent. Ovary ca. 2 mm long, densely sericeous; styles 3, heteromorphic, 1.8–2 mm long, parallel, glabrous, apex truncate; stigmas apical, capitate. Samaras green when immature and brown when mature, dorsal wing well developed 2–3 × 1.0–1.5 cm, sericeous, hairs not irritating at the touch;

nut 0.5–1 × 0.5–0.6 cm, densely sericeous, 1 pair of lateral winglets present, sericeous; carpophore present.

**Specimens examined:** BRAZIL, BAHIA: Banzaê, Fazenda Gameleira, 10°33'20.7"S, 38°40'02.4"W, 382 m, 21.VIII.2014, fl.; fr., J.V. Santos 476 (HUNEB).

**Distribution, ecology and phenology:** Endemic to Brazil, *Bronwenia ferruginea* is distributed in the Northeast and Southeast regions in environments of the Caatinga and Atlantic Forest (Mamede et al. 2017). In the RCE, the species was found along a trail in open areas on sandy soils. It was collected only one time in October with flowers and fruits.

**Taxonomy:** It is recognized by the presence of flowers with androecium consisting of stamens monomorphic, gynoecium with three parallel styles with apex truncate and samara bearing a pair of winglets on the nut.

**7. *Bunchosia pernambucana*** W.R.Anderson, Contr. Univ. Michigan Herb. 21: 39. 1997. Figures 3G; 4A-F

Erect shrubs 20 to 60 cm tall. Leaves chartaceous, opposite or decussate; stipules 1–2 mm long, persistent; petiole 2.5–6 mm long, sericeous or glabrescent; lamina 4.5–10 × 2–4.3 cm, elliptic to ovate, apex obtuse to acuminate, base cuneate to decurrent, margin entire or undulate, adaxial surface glabrous, abaxial surface glabrous or with sparse hairs at midrib, 1–2 glands sessile at base or eglandular. Inflorescence of axillary pseudoracemes; bracts 1–2 mm long, ovate; peduncle 0.5–3 mm long; bracteoles 1–1.5 mm long, 1–2 glandular, ovate; pedicel 2–7 mm long. Flowers 6–10, decussate; sepals 3–4 × 1.5–2.5 mm, apex obtuse or rounded, glabrous, except at margins, elaiophores 8, 1–4 mm long, 2 anterior smaller elaiophores, 2 posterior larger elaiophores decurrent further on the pedicel; petals yellow, glabrous, margin erose, lateral petals with limb 6–8 × 6–7 mm, claw ca. 3–4 mm long, latero-anterior petals entirely expanded, free, posterior petal with limb 6–7 × 5.5 mm, claw ca. 5 mm long; stamens 10, fertile, heteromorphic; filaments 2–3 mm long, glabrous; anthers 1–2 mm long, thecae glabrous, connectives eglandular; staminodes absent. Ovary ca. 2 mm long, glabrous; styles 3, heteromorphic, 2–3 mm long, apex acute, glabrous, erect, parallel; stigmas apical, capitate. Drupes orange-reddish when mature, 7–10 × 7–10 mm, ovoid, 3-lobed with 3 pyrenes free from each other at maturity, glabrous.

**Specimens examined:** BRAZIL, BAHIA: Glória, Serra do Retiro, depois da Estação XIII, 09°20'05.1"S, 38°18'44.7"W, 598 m, 22.IV.2014, fl., J.V. Santos 286 (HUNEB); Jeremoabo, APA Serra Branca, estrada em direção à ESEC, depois da Casa de Antônio Rouxinho, 09°57'16.1"S, 38°26'23.2"W, 505 m, 20.XII.2013, fl.; fr., J.V. Santos 111 (HUNEB); *ibid.*, antes da Casa de Antônio Rouxinho, 09°57'32.1"S, 38°27'07.2"W, 532 m, 31.VII.2014, fl., J.B. Lima 466 (HUNEB); *ibid.*, estrada secundária do Povoado Quelés sentido à ESEC, 09°56'36.2"S, 38°27'15.3"W, 541 m, 20.XII.2013, fl.; fr., J.V. Santos 123 (HUNEB); *ibid.*, estrada secundária sentido ESEC, 09°56'34.4"S, 38°27'23"W, 549 m, 21.XII.2013, fr., J.V. Santos 138 (HUNEB); *ibid.*, próximo a casa de Beneficiamento de Mel, 09°58'00.2"S, 38°24'38.6"W, 515 m, 26.VI.2015, fr., J.V. Santos 547 (HUNEB); Paulo Afonso, Estação Ecológica Raso da Catarina, estrada sentido a Mata da Pororoca, antes da casa do Sr. Divá, 09°39'13.4"S, 38°29'27.8"W, 613 m, 19.III.2014, fl.; fr., J.V. Santos 198 (HUNEB); *ibid.*, caminho para a Pororoca, 09°47'16.7"S, 38°29'30.2"W, 685 m, 21.VII.2014, fr., J.B.

Lima 440 (HUNEB); *ibid.*, próximo à Mata da Pororoca, 09°47'59.6"S, 38°29'30.7"W, 691 m, 07.V.2014, fl.; fr., J.V. Santos 295 (HUNEB); *ibid.*, após a Mata da Pororoca, 09°48'55.4"S, 38°29'31.2"W, 691 m, 12.VII.2014, fl.; fr., J.V. Santos 397 (HUNEB); *ibid.*, estrada em direção à Base Velha, após o barreiro, 09°40'53.6"S, 38°37'00.4"W, 619 m, 02.IX.2014, fr., J.V. Santos 425 (HUNEB); *ibid.*, estrada em direção à da Mata da Pororoca, 09°39'13.3"S, 38°29'27.6"W, 615 m, 14.XII.2014, fl., J.V. Santos 478 (HUNEB); *ibid.*, Mata da Pororoca, 09°48'29.5"S, 38°29'30.6"W, 724 m, 16.VI.2015, fl., J.V. Santos 563 (HUNEB); Paulo Afonso, estrada entre o Povoado Serrota e Juá, 09°24'28.3"S, 38°26'31.1"W, 404 m, 2.IV.2014, fl.; fr., J.V. Santos 294 (HUNEB).

**Distribution, ecology and phenology:** *Bunchosia pernambucana* is endemic to Brazil with a distribution restricted to the Northeast Region in the phytogeographic dominions of Caatinga and Atlantic Forest (Mamede et al. 2017). In the RCE, it was found in open and closed preserved areas on sandy soils. It was collected with flowers and fruits in March, April, May, June, July and December and in June, July and November only with fruits.

**Conservation:** The species was categorized as "Endangered" (EN) in 2013 when collected only in a conservation unit (CNCFlora 2017, Amorim et al. 2013).

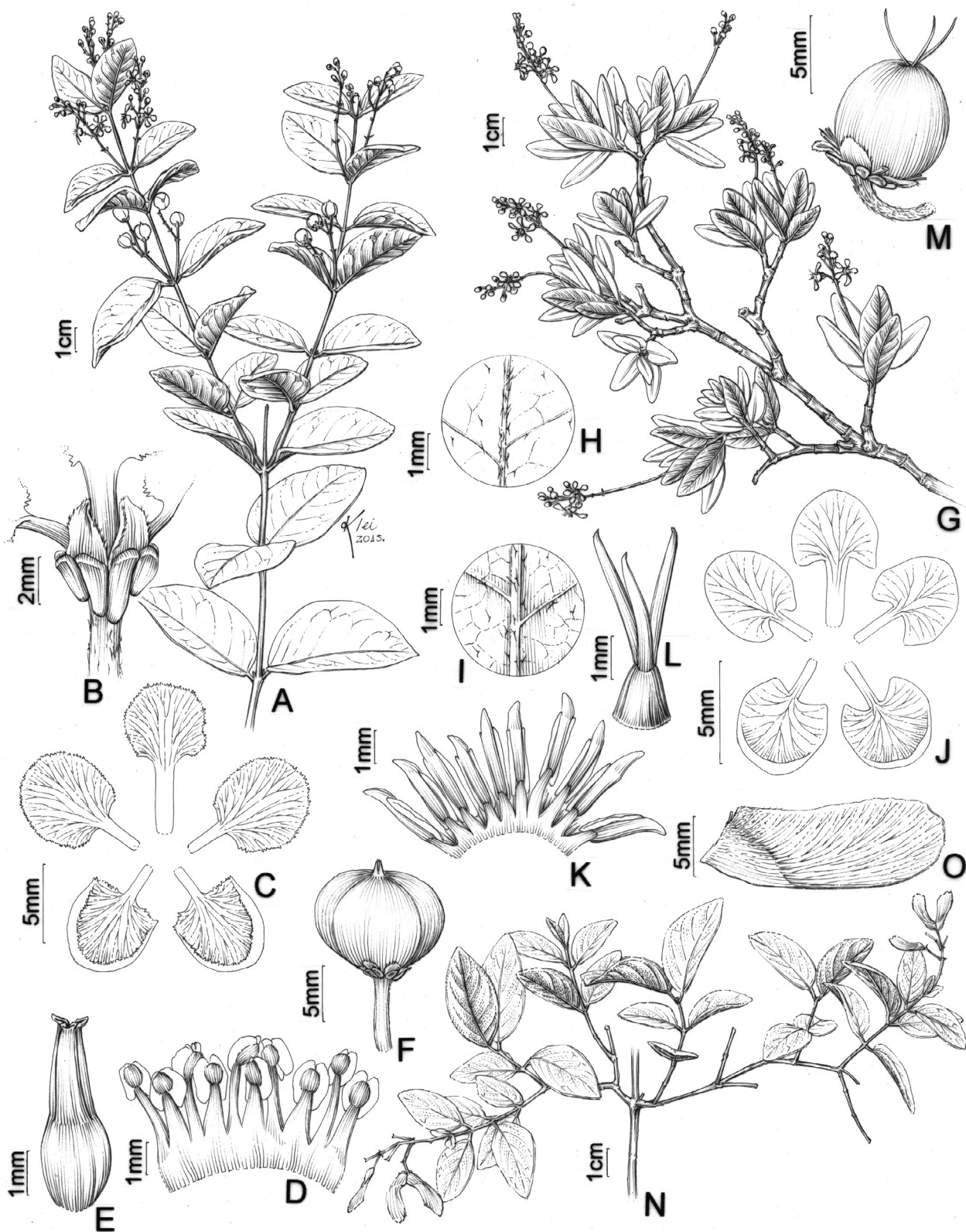
**Taxonomy:** It is recognized by the presence of eight elaiophores at the base of the sepals, the larger posterior two further decurrent on the pedicel than the others, and a 3-lobed drupe with three pyrenes free from each other at maturity.

**8. *Byrsonima coccolobifolia*** Kunth, Nov. Gen. Spec. Pl. 5: 148. 1821. Iconography: Anderson, W. (1981: 233). Figure 3H

Trees ca. 10 m tall. Leaves chartaceous or chartaceous-coriaceous, opposite; petiole sessile or subsessile, ca. 2 mm long, sericeous, eglandular; stipules 2–4 mm long, persistent; lamina 4–1.5 × 2.3–9 cm, ovate to orbicular or obovate, sometimes elliptic or oblong, apex obtuse, rounded or emarginate, base cordate, subcordate or cuneate, margin entire, plane, veins pink, adaxial and abaxial surfaces glabrous or with sparse hairs. Inflorescence of terminal pseudoracemes, rachis 7–11 cm long; bracts 2–2.5 mm long, oblong; peduncle absent; bracteoles 1.5–2 mm long, oblong, eglandular, persistent or deciduous; pedicel 6–10 mm long. Flowers with sepals 4–6 × 2–3.5 mm, apex rounded, revolute, adaxial and abaxial surfaces sparsely tomentose or glabrescent; elaiophores 10, ca. 2–3 long, not decurrent on the pedicel; petals pink to white, posterior petal entirely pink, glabrous, margin entire to subdentate, lateral petals reflexed, limb 4.5 × 4–6 mm, claw ca. 3–4 mm long, latero-anterior petals entirely expanded, cucullate, free, posterior petal erect, with limb ca. 3 × 5 mm, claw ca. 5 mm long; stamens 10, heteromorphic; filaments ca. 1 mm long, hirsute at base; anthers 1.7–2 mm long, thecae sparsely hirsute, connectives exceeding the anthers 2.5–3 mm long; staminodes absent. Ovary ca. 2 mm long, glabrous; styles heteromorphic, ca. 5 cm long, apex acute, glabrous, erect; stigmas apical. Drupes green when immature and orange when mature, 7–12 mm in diam., glabrous, globose to ovoid, with 1 pyrene, styles persistent.

**Specimens examined:** BRAZIL, BAHIA: Euclides da Cunha, Sucupira do Galo, 10°20'00.3"S, 38°43'21.4"W, 620 m, 16.I.2014, fl., J.V. Santos 160 (HUNEB); *ibid.*, 10°20'21.6"S, 38°42'29.6"W, 588 m, 16.I.2014, fl.; fr., J.V. Santos 156 (HUNEB); Jeremoabo, Estrada em direção ao Povoado Quelés, 09°58'52.6"S, 38°23'45.1"W, 589 m,





**Figure 4.** A-F. *Bunchosia pernambucana*. A. flowering branch; B. posterior elaiophores decurrent on the pedicel; C. petals; D. androecium; E. gynoecium; F. fruit. G-M. *Byrsonima gardneriana*. G. flowering branch; H. adaxial surface leaf; I. abaxial surface leaf; J. petals; K. androecium; L. gynoecium; M. fruit. N-O. *Heteropterys caducibracteata*. N. fruiting branch; O. fruit. A-F from J.V. Santos 295; G-M from J.V. Santos 274; N-O from J.V. Santos 359.

19.I.2015, fl.; fr., J.V. Santos 506 (HUNEB); *ibid.*, Baixa da Forra, 09°58'51.8"S, 38°23'45.3"W, 593 m, 18.III.2015, bot.; fr., J.V. Santos 532 (HUNEB).

**Distribution, ecology and phenology:** *Byrsonima coccolobifolia* is distributed in Bolivia, Brazil, Cuba, Paraguay and Venezuela (Benezar & Pessoni 2006). According to Mamede et al. (2017), the species is widely distributed in Brazil, occurring in the North, Northeast, Central-West, Southeast and South regions where it occurs only in the phytogeographic dominions of Amazon rainforest, Cerrado and Atlantic Forest. Therefore, this work provides a new occurrence for this species in the Caatinga environments. In the RCE, the species is found on sandy soils in anthropized areas such as roadsides. It was collected with flowers only in January and fruit in January and March.

**Economic potential:** The species has pharmacological activity and has medicinal potential, where as the fruits provide food for the fauna (Silva Júnior 2015).

**Taxonomy:** *Byrsonima coccolobifolia* can be differentiated from its congeners by glabrous or sparsely hairy leaves, veins pink, and flowers with petals pink to white and posterior petal entirely pink.

**9. *Byrsonima gardneriana*** A.Juss., Arch. Mus. Hist. Nat. 3: 296. 1843. Figure 3I; 4G-M

Treellets or shrubs ca. 4 m tall. Leaves chartaceous, opposite or subopposite; stipules 2–3 mm long; petiole sessile or subsessile, ca. 2.2 mm long, sericeous, eglandular; lamina 2–6 × 1–4 cm, elliptic, obovate or suborbicular, apex emarginate, rounded or acute, base rounded, acute or cuneate, margin entire, veins green, adaxial and abaxial surfaces glabrous or with sparse hairs. Inflorescence of terminal pseudoracemes, rachis 4–6 cm long; bracts 1–2.2 mm long, triangular to oblong; peduncle absent; bracteoles 1–2.2 mm long, triangular to oblong, eglandular, persistent; pedicel 3–5 mm long. Flowers with sepals 3–4 × 1.5–2.2 mm, apex rounded, revolute, adaxial and abaxial surfaces sparsely sericeous or glabrescent; elaiophores 10, ca. 1.5 long, not decurrent on the pedicel; petals predominantly white, sometimes white a pink, glabrous, margin entire to subdentate, lateral petals reflexed, limb 3.2–3.5 × 4–4.2 mm, claw ca. 2 mm long, latero-anterior petals entirely expanded, cucullate, free, posterior petal erect, with limb ca. 2.5 × 4 mm, claw ca. 2 mm long; stamens 10, heteromorphic; filaments ca. 2 mm long, hirsute at base; anthers ca. 2 mm long, thecae sparsely hirsute at base, connectives exceeding the anthers ca. 0.7 mm long; staminodes absent. Ovary 1–2 mm long, glabrous; styles heteromorphic, ca. 3 cm long, apex acute, glabrous, erect, divergent; stigmas apical. Drupes green when immature and orange when mature, 5–18 mm in diam, glabrous, globose to ovoid, with 1 pyrene, styles persistent.

**Specimens examined:** BRAZIL, BAHIA: Jeremoabo, estrada em direção ao Povoado Quelés, depois da Baixa da Forra, 10°00'49.1"S, 38°22'52.4"W, 564 m, 20.XII.2013, fl.; fr., J.V. Santos 105 (HUNEB); Paulo Afonso, Estação Ecológica Raso da Catarina, Estrada em direção à base velha, 09°39'02.4"S, 38°29'38.1"W, 621 m, 16.IV.2014, fl.; fr., J.V. Santos 274 (HUNEB); Estação Ecológica Raso da Catarina, Estrada em direção à Mata da Pororoca, antes da casa do Sr. Divá, 09°39'48"S, 38°29'26.7"W, 628 m, 07.V.2014, fl., J.V. Santos 300 (HUNEB); *ibid.*, Base Velha, 09°43'51.5"S, 38°40'57"W, 611 m, 24.IX.2014, fl., J.V. Santos 363 (HUNEB); Ribeira do Pombal, estrada de Ribeira do Pombal à Euclides da Cunha, próximo ao assentamento, 10°43'52.1"S, 38°40'49.2"W, 434 m, 06.VIII.2014, fl.; fr., J.V. Santos 375 (HUNEB).

**Distribution, ecology and phenology:** *Byrsonima gardneriana* occurs only in Brazil, and is widely distributed in the North Northeast and Southeast regions, associated with the phytogeographic dominions of Amazon rainforest, Caatinga, Cerrado and Atlantic Forest (Mamede et al. 2017). The species is found in sandy soils in preserved or anthropized areas in the study area. It was collected with flowers and fruits in August and November, and only with flowers in May and August.

**Economic potential:** In the RCE, *Byrsonima gardneriana* has nutritional potential, with its fruits being used by the local population, and according to Guilhon-Simplicio & Pereira (2011), it has pharmacological activity.

**Taxonomy:** It is distinguished from its congeners by a predominantly shrubby habit and flowers with predominantly white petals.

**10. *Byrsonima sericea*** DC., Prodr. 1: 580. 1824. Iconography: Anderson, W. (1981: 195–196). Figure 3J

Trees or treelets ca. 15 m tall. Leaves chartaceous or chartaceous-coriaceous, opposite; petiole 4–10 mm long, sericeous, eglandular; stipules 2–3 mm long; lamina 4–12 × 2–5 cm, elliptic to lanceolate, apex acuminate to acute, base cuneate to acute, margin entire, veins green, adaxial surface glabrous, abaxial surface densely sericeous, ferruginous. Inflorescence of terminal pseudoracemes, rachis 6–13 long; bracts ca. 1.5–2 mm long, triangular; peduncle absent; bracteoles ca. 1.5–2 mm long, triangular, eglandular, persistent; pedicel 6–8 mm long. Flowers with sepals ca. 2–2.2 × 1.8–2 mm, apex rounded, erect, adaxial surface sericeous, abaxial surface sparsely sericeous; elaiophores 10, sometimes absent, ca. 2 long, not decurrent on the pedicel; petals yellow, glabrous, margin entire to subdentate, lateral petals reflexed, limb 4–5 × 5–6 mm, claw ca. 2–2.5 mm long, latero-anterior petals entirely expanded, cucullate, free, posterior petal erect, with limb ca. 3 × 4 mm, claw ca. 3 mm long; stamens 10, monomorphic; filaments ca. 1.5 mm long, hirsute at base; anthers ca. 2.5–3 mm long, thecae glabrous, connectives not exceeding the anthers, ca. 2 mm long; staminodes absent. Ovary ca. 1.5 mm long, sericeous; styles heteromorphic, ca. 4 cm long, glabrous, apex acute, curved; stigmas apical. Drupes green when immature, ca. 5 mm in diam, glabrous at base and sericeous at apex, ovoid, with 1 pyrene, styles persistent.

**Specimens examined:** BRAZIL, BAHIA: Jeremoabo, estrada em direção ao Povoado Quelés, após a Baixa da Forra, 09°57'53.9"S, 38°24'33.8"W, 537 m, 20.XII.2013, fl., J.V. Santos 106 (HUNEB); *ibid.*, 09°59'27.2"S, 38°23'41.9"W, 591 m, 05.VI.2014, fl., J.V. Santos 342 (HUNEB); *ibid.*, após a Casa do Beneficiamento do Mel, 09°58'40.1"S, 38°26'00.3"W, 399 m, 10.II.2014, fl., J.V. Santos 175 (HUNEB); *ibid.*, Estrada em direção ao Povoado Quelés, 10°00'19.5"S, 38°23'20.1"W, 574 m, 19.I.2015, fl.; fr., J.V. Santos 504 (HUNEB); *ibid.*, Baixa da Forra, 09°58'51.8"S, 38°23'45.3"W, 593 m, 18.III.2015, fl.; fr., J.V. Santos 533 (HUNEB); *ibid.*, 09°58'51.8"S, 38°23'45.3"W, 593 m, 18.V.2015, fr., J.V. Santos 539 (HUNEB).

**Distribution, ecology and phenology:** The species is not endemic in the Brazil. In Brazil, it is widely distributed in the North, Northeast, Midwest to the Southeast regions and is found in the phytogeographical dominions of Amazon rainforest, Caatinga, Cerrado and Atlantic Forest (Mamede et al. 2017). In the study area, *Byrsonima sericea* is found in open environments along trails on sandy soils. It was collected with flowers in January, February, March, June and December and with fruits in January, March and May.

**Economic potential:** *Byrsonima sericea* has nutritional potential, the root and bark are used to dye fabrics, and it features ethnopharmacological and pharmacological activity (Guilhon-Simplicio & Pereira 2011).

**Taxonomy:** It is an easily recognized plant in the RCE by being generally a tree with the abaxial surface of the leaves sericeous-ferruginous and the petals completely yellow. The species exhibits morphological variation in the presence of elaiophores at the base of the sepals, and there may be individuals who do not have this character.

**11. *Byrsonima verbascifolia* (L.) DC.,** Ann. Mus. Natl. Hist. Nat. 18: 481. 1811; DC. Prodr. 1: 579 1824. Iconography: Anderson, W. (1981: 228). Figure 3K

Trees or treelets ca. 2.5 m tall. Leaves chartaceous or chartaceous-coriaceous, opposite; stipules 3–5 mm long, persistent; petiole sessile or subsessile, ca. 2–10 mm long, tomentose, eglandular; lamina 6–12.5 × 2–7.5 cm, obovate, spatulate, sometimes elliptic or orbicular, apex obtuse, rounded, apiculate or emarginate, base cuneate or attenuate, margin entire, veins green, adaxial surface glabrous, abaxial surface densely tomentose. Inflorescence of terminal pseudoracemes, rachis 7–15 long; bracts 4–7 mm long, triangular to linear; peduncle absent; bracteoles 4–7 mm long, triangular to linear, eglandular, persistent; pedicel 13–18 mm long. Flowers with sepals ca. 3–5 × 2–2.5 mm, apex obtuse or rounded, revolute, adaxial surface glabrous, abaxial surface tomentose; elaiophores 10, ca. 2–2.5 long, not decurrent on the pedicel; petals yellow-orange, glabrous, margin entire to erose, lateral petals reflexed, limb 5–6 × 6–8 mm, claw ca. 4–5 mm long, latero-anterior petals entirely expanded, cucullate, free, posterior petal erect, with limb ca. 4 × 5 mm, claw ca. 4 mm long; stamens 10, heteromorphic; filaments 3–3.5 mm long, hirsute at base; anthers 2.5–3 mm long, thecae sparsely tomentose, connectives little or not exceeding the anthers, 1.5–2.5 mm long; staminodes absent. Ovary ca. 2 mm long, glabrous; styles heteromorphic, ca. 4–5 cm long, apex acute, glabrous, erect; stigmas apical. Drupes green when immature and orange when mature, 6–9 mm in diameter, glabrous, globose, with 1 pyrene, styles persistent.

**Specimens examined:** BRAZIL, BAHIA: Banzaê, Pedra Furada, 10°33'42.3"S, 38°37'50.9"W, 305 m, 15.I.2014, fl., J.V. Santos 152 (HUNEB); Jeremoabo, estrada em direção a Areia Branca, 09°59'15.4"S, 38°26'49.5"W, 759 m, 10.II.2014, fl.; fr., J.V. Santos 172 (HUNEB); *ibid.*, estrada em direção ao Povoado Quelés, 09°58'52.6"S, 38°23'45.1"W, 589 m, 19.I.2015, fl., J.V. Santos 507 (HUNEB).

**Distribution, ecology and phenology:** The species is found in South America from Colombia and Venezuela to Brazil. In Brazil, *Byrsonima verbascifolia* occurs in the North, Northeast, Midwest, Southeast and South regions in the dominions of Amazon rainforest, Caatinga, Cerrado and Atlantic Forest (Mamede et al. 2017). In the RCE the species is found in open areas along trails or in well-preserved areas with sandy soils. It was collected only with flowers in January and with flowers and fruits in February.

**Economic potential:** According to Almeida et al. (1998), *Byrsonima verbascifolia* has nutritional, medicinal, beekeeping and forage potential.

**Taxonomy:** The main characteristics that distinguish it from its congeners are leaves with the abaxial surface densely tomentose and flowers with yellow-orange petals.

**12. *Carolus chasei* (W.R.Anderson) W.R.Anderson,** Novon 16(2): 187. 2006. Iconography: Anderson, W. (1993: 379). Figure 3L

Lianas. Leaves chartaceous, opposite; stipules ca. 0.3 mm long, persistent; petiole 2.5–6 mm long, sericeous, eglandular; lamina 3–7 × 1–2.2 cm, elliptic, apex acute to acuminate, sometimes obtuse, base cuneate, margin entire, sometimes slightly revolute, adaxial surface sericeous to glabrescent, abaxial surface densely sericeous. Inflorescence of axillary pseudoracemes; bracts 1–2.5 mm long, triangular; peduncle 0.5–2 mm long; bracteoles 0.5–1 mm long, triangular, eglandular, persistent; pedicel 3–4 mm long. Flowers 4–10, mostly decussate; sepals ca. 2 × 1.2 mm, apex obtuse to rounded, adaxial surface glabrous, abaxial surface densely sericeous; elaiophores 8, ca. 1 mm long; petals yellow, adaxial surface glabrous, abaxial surface densely sericeous, margin fimbriate or fimbriate glandular, lateral petals with limb 3–4 × 3–4 mm, claw ca. 1.5–2.2 mm long, latero-anterior petals entirely expanded, free, posterior petal with limb 3 × 2.5 mm, claw ca. 2.5 mm long; stamens 10, fertile, heteromorphic; filaments 1.2–2 mm long, sericeous to glabrous; anthers ca. 0.7 mm long, thecae glabrous, connectives eglandular; staminodes absent. Ovary ca. 1.5 mm long, densely sericeous; styles 3, heteromorphic, ca. 2 mm long, base sericeous, erect, divergent, flattened laterally and dorsally short-apiculate in apex; stigmas lateral. Samaras green when immature and brown when mature, 2 lateral wings developed, wings 10–15 × 8–10 mm, sericeous, hairs not irritating at the touch; nut ca. 4 × 3 cm, sericeous; carpophore absent.

**Specimens examined:** BRAZIL, BAHIA: Cícero Dantas, Sapé, 10°19'32.5"S, 38°35'26.2"W, 622 m, 05.VIII.2014, fr., J.V. Santos 371 (HUNEB); Jeremoabo, APA Serra Branca, estrada sentido Serra do Navio, 09°54'57.0"S, 38°41'48.0"W, 359 m, 11.II.2014, fl., J.V. Santos 179 (HUNEB); Paulo Afonso, Estação Ecológica Raso da Catarina (ESEC), estrada em direção à Mata da Pororoca, 09°39'14.1"S, 38°29'26.7"W, 619 m, 14.IV.2014, fr., J.V. Santos 252 (HUNEB); Paulo Afonso, Estação Ecológica Raso da Catarina (ESEC), estrada em direção à da Mata da Pororoca, 09°45'55.3"S, 38°29'29.6"W, 647 m, 09.VI.2014, fl., J.V. Santos 354 (HUNEB); *ibid.*, início da estrada em direção à Mata da Pororoca, 09°39'03.9"S, 38°29'26.8"W, 617 m, 09.VI.2014, fr., J.V. Santos 348 (HUNEB); *ibid.*, 09°39'13.3"S, 38°29'26.8"W, 610 m, 21.VII.2014, fr., J.B. Lima 431 (HUNEB); *ibid.*, estrada em direção à Mata da Pororoca, depois da casa de Sr. Divá, 09°46'21.8"S, 38°29'30.2"W, 612 m, 12.VIII.2014, fr., J.V. Santos 393 (HUNEB); *ibid.*, estrada em direção à Mata da Pororoca, 09°47'16.9"S, 38°29'29.7"W, 561 m, 01.IX.2014, fr., J.V. Santos 422 (HUNEB).

**Distribution, ecology and phenology:** *Carolus chasei* is endemic to Brazil and occurs only in the Northeast region in the state of Bahia, in the phytogeographic dominion of Caatinga (Anderson, W. 1993). The species is associated with sandy soils in preserved areas in RCE. It was collected with flowers in February, March and June and with fruits in April, June, July, August and September, with a flowering peak recorded in March in RCE.

**Taxonomy:** It can be recognized by the axillary pseudoracemes with the flowers mostly decussate, petals with abaxial surface densely sericeous and samaras with two lateral developed wings.



**13. *Diplopterys lutea*** (Griseb.) W.R.Anderson & C.C.Davis, Harvard Pap. Bot. 11(1): 10. 2006. Iconography: Almeida (2013: 122). Figure 5A

Lianas. Leaves chartaceous, opposite; stipules ca. 0.5 mm, persistent; petiole 1–1.5 cm long, densely tomentose, 1 pair of glands patelliform sessile, acropetiolear or absent; lamina 3.5–8.5 × 3.2–7.2 cm, deciduous or persistent, ovate, orbicular or elliptic, apex acuminate or obtuse, base obtuse to rounded, margin entire, eglandular, adaxial surface sparsely tomentose, glabrescent with age, abaxial surface densely tomentose. Inflorescence of umbelliform corymbs, axillary; bracts 1–3 mm long, lanceolate; peduncle absent; bracteoles 1–3 mm long, lanceolate, persistent or deciduous; pedicel 1.2–2.8 cm long. Flowers 4–6; sepals ca. 3–3.2 × 2.7–3 mm, elaiophores absent, apex obtuse, adaxial surface sparsely tomentose, abaxial surface tomentose; lateral petals yellow, posterior petal yellow, red-orange at base, glabrous, margin denticulate, lateral petals with limb ca. 7 × 8 mm, claw ca. 3 mm long, eglandular, latero-anterior petals entirely expanded, free, posterior petal with limb ca. 6 × 6 mm, claw ca. 4 mm long; stamens 10, fertile, heteromorphic, free; filaments 3–5 mm long, glabrous; anthers ca. 1 mm long thecae glabrous, connectives glandular; staminodes absent. Ovary ca. 1.2 mm long, densely sericeous; styles 3, heteromorphic, apex acute, the posterior two 5–6 mm long, pubescent at base, the anterior 6.5–7 mm long, pubescent proximally to the middle, divergent, erect, base slightly arched, stigmas apical. Samaras green when immature and brown when mature, dorsal wing well developed 2–3.5 × 0.9–1.2 cm, sericeous, with hairs irritating at the touch; nut ca. 6 × 3 mm, sericeous, with hairs irritating at the touch; 1–6 lateral winglets, sericeous; carpophore absent.

**Specimens examined:** BRAZIL, BAHIA: Jeremoabo, estrada em direção aos Quelés, 10°02'39.5"S, 38°21'43.3"W, 310 m, 14.VII.2014, fl., J.V. Santos 406 (HUNEB); *ibid.*, APA Serra Branca, estrada sentido à Vaca Morta, 09°56'35.1"S, 38°42'16.3"W, 330 m, 15.VIII.2014, fl., J.V. Santos 414 (HUNEB); *ibid.*, 09°56'35.0"S, 38°42'16.1"W, 327 m, 25.IX.2014, fr., J.V. Santos 465 (HUNEB); Paulo Afonso, Estação Ecológica Raso da Catarina (ESEC), depois da Base IV, no Pereiro, 09°32'45.5"S, 38°33'50.0"W, 496 m, 09.V.2014, fr., J.V. Santos 314 (HUNEB).

**Distribution, ecology and phenology:** The species occurs in Argentina, Brazil, Bolivia, Paraguay and Peru (Almeida 2013). It is widely distributed in the North, Northeast, Midwest, Southeast and South regions of Brazil in the dominions of Amazon rainforest, Caatinga and Cerrado (Mamede et al. 2017). *Diplopterys lutea* is associated with sandy soils and sandstone outcrops in preserved or open areas. It was collected with flowers in August and with fruits in May and November.

**Taxonomy:** The species can be recognized by umbelliform corymbose inflorescences, flowers with petals yellow and posterior petal yellow with red-orange at base, the gynoeceium with the anterior style pubescent proximally to the middle, samaras with hairs irritating at the touch and bearing 1–6 lateral winglets on the nut. In the study area, the leaves are persistent or deciduous in periods of flowering and fruiting.

**14. *Galphimia brasiliensis*** (L.) A.Juss., Fl. Bras. Merid. 3. 71. 1833 ["1832"]. Iconography: Anderson, C. (2007: 45). Figure 5B

Erect shrubs to 30 cm tall. Leaves membranous, opposite; stipules 1.5–5 mm long, persistent; petiole 2.5–5 mm long, sparsely sericeous, eglandular; lamina 1.7–3.2 × 0.8–6 cm, ovate or elliptic, apex acute to apiculate, base acute to truncate, margin entire, glabrous on both surfaces, sometimes with sparse hairs at abaxial surface and along

at margin. Inflorescence of terminal pseudoracemes; bracts 2–3 mm long, linear; peduncle absent or 1–1.2 mm long; bracteoles 1–1.3 mm long, linear, eglandular, persistent; pedicel 3–6 mm long. Flowers with sepals ca. 3 × 1.1 mm, elaiophores absent, apex acuminate, glabrous on both surfaces, usually with hairs at apex; petals yellow, often marked with 1 reddish line abaxially, or entirely yellow, turning red with age, glabrous, margin subdenticulate to erose, latero-anterior petals entirely expanded, free, posterior petal sometimes with slightly wider claw, limb 4–5 × 2.8–3.5 mm, claw ca. 1–1.6 mm long; stamens 10, fertile, heteromorphic; filaments 2.1–3.8 mm long, glabrous; anthers ca. 0.8 mm long, thecae glabrous, connectives eglandular; staminodes absent. Ovary ca. 1.2 mm long, sparsely sericeous; styles 3, heteromorphic, ca. 4.5 cm long, glabrous, apex acute, erect; stigmas apical. Cocci green when immature with one narrow dorsal keel, 2.4–3.5 × 1.1–1.5 mm, sparsely sericeous to glabrous, hairs not irritating at the touch; nut 1.5–1.6 × 0.8–1 cm, sparsely tomentose; carpophore absent.

**Specimens examined:** BRAZIL, BAHIA: Jeremoabo, estrada em direção à Comunidade Olho D'Água dos Negros, 10°02'37.0"S, 38°21'43.8"W, 307 m, 18.III.2015, fl.; fr., J.V. Santos 527 (HUNEB); Paulo Afonso, próximo ao lago Capuxú, 10°01'29.8"S, 38°32'21.7"W, 277 m, 24.IX.2014, fl., J.V. Santos 455 (HUNEB); Tucano, Povoado da Pedra Grande, Serra do Pai Miguel, 11°07'24.0"S, 38°46'25.0"W, 224 m, 08.VIII.2014, fl.; fr., J.V. Santos 387 (HUNEB).

**Distribution, ecology and phenology:** *Galphimia brasiliensis* is endemic to Brazil and is restricted to the Northeast Region in the states of Bahia, Paraíba, Pernambuco, Piauí and Sergipe in the phytogeographic dominions of Caatinga, Cerrado and Atlantic Forest (Anderson, C. 2007, Mamede et al. 2017). The species can be found in sandy soils in preserved or anthropized areas such as the borders of trails. It was collected in the study area with flowers and fruits in March, August and September.

**Economic potential:** *Galphimia brasiliensis* has ornamental potential (Souza & Lorenzi 2012).

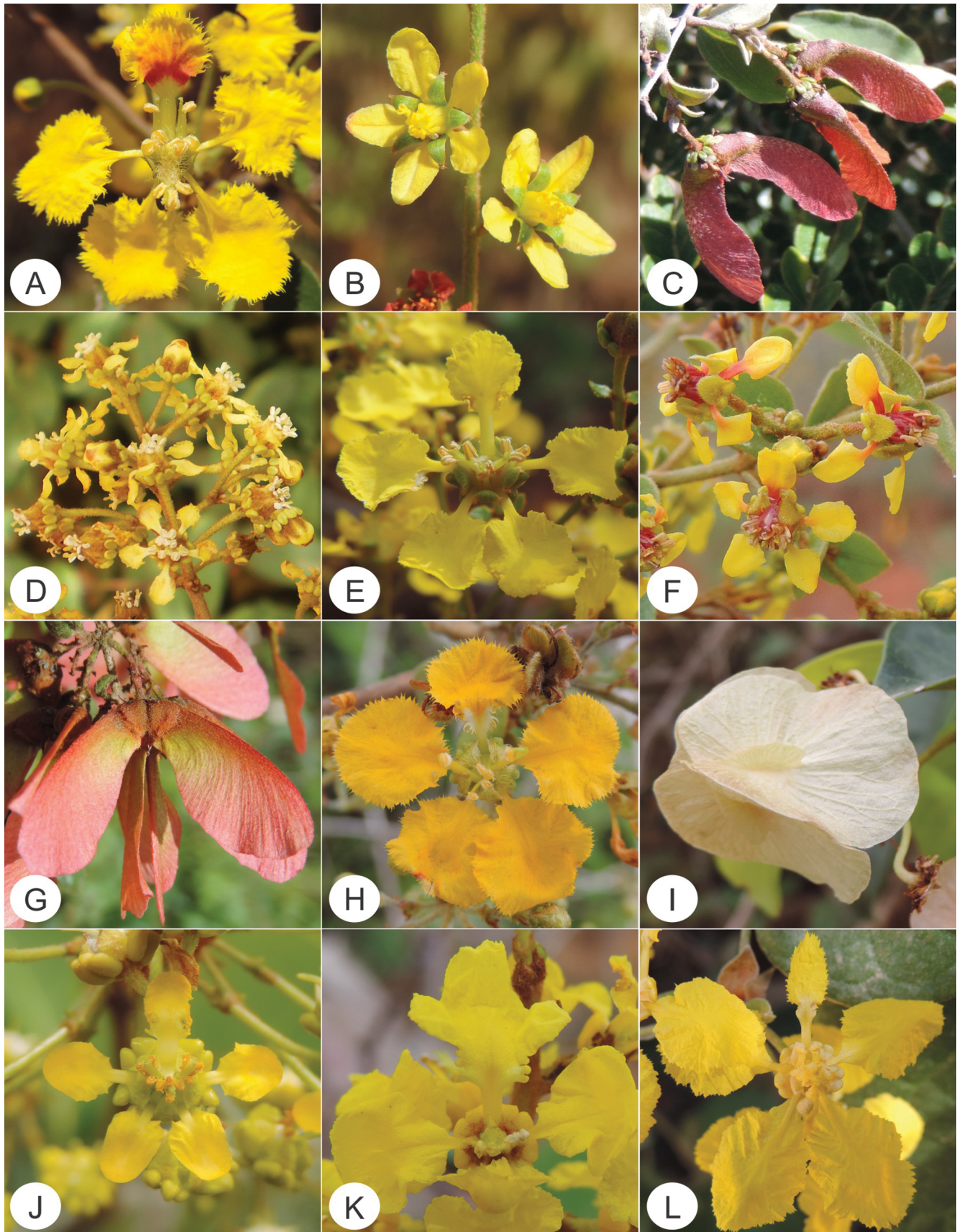
**Taxonomy:** It can be easily recognized in the RCE by shrubby habit, absence of elaiophores at the base of the sepals and petals yellow, often marked with 1 reddish line abaxially.

**15. *Heteropterys caducibracteata*** W.R.Anderson, Contr. Univ. Michigan Herb. 15: 118. 1982. Iconography: Anderson, W. et al. (2006). Figure 4N-O; 5C

Lianas. Leaves chartaceous, opposite; stipules deciduous; petiole 2–3 mm long, tomentose to velutinous, eglandular, sometimes glandular; lamina 1.3–3 × 0.9–2 cm, elliptic or ovate, apex acute or obtuse, base rounded, slightly cordate, margin slightly revolute; adaxial surface tomentose to glabrescent, abaxial surface densely tomentose, with 1–4 marginal glands or eglandular; bracts ca. 1 mm long, ovate, peduncle 1.5–3 mm long, bracteoles ca. 1 mm long, pedicel 1.5–2 mm long. Flowers not observed. Samaras vinaceous when immature and entirely brown when mature, dorsal wing well developed, thickened along the lower margin, 1–1.4 × 0.5–0.7 cm; nut 5 × 3–4 mm, with lateral veins conspicuous, sparse hairs not irritating at the touch; carpophore absent.

**Specimens examined:** BRAZIL, BAHIA: Paulo Afonso, Estação Ecológica Raso da Catarina, Trilha secundária da estrada em direção à base velha do ICMBio, 09°39'39.8"S, 38°34'14.7"W, 589 m, 10.VI.2014, fr., J.V. Santos 359 (HUNEB).

## Malpighiaceae in the RCE



**Figure 5.** Representatives of the Malpighiaceae in the Raso da Catarina Ecoregion. A. *Diploteryx lutea*; B. *Galphimia brasiliensis*; C. *Heteropterys caducibracteata*; D. *H. catingarum*; E. *H. grandiflora*; F. *H. trichanthera*; G. *H. trigoniifolia*; H. *Janusia anisandra*; I. *Mascagnia cordifolia*; J. *M. sepium*; K. *Mcvaughia bahiana*; L. *Peixotoa hispidula*. Photos by J.V. Santos.



**Distribution, ecology and phenology:** *Heteropterys caducibracteata* is endemic to Brazil and is distributed in the Northeast Region in the states of Bahia and Piauí, where it occurs only in the Caatinga (Mamede et al. 2017). In the study area, the species is found on sandy rocky soils in preserved areas. It was collected once when it was bearing fruit in March.

**Taxonomy:** *Heteropterys caducibracteata* can be differentiated from all congeners in the study area by having a nut with lateral veins conspicuous.

**16. *Heteropterys catingarum*** A.Juss., Arch. Mus. Hist. Nat. 3: 443. 1843. Iconography: Amorim (2003: 203). Figure 5D

Lianas. Leaves chartaceous, opposite; stipules deciduous; petiole 7–15 mm long, velutinous, median or apex biglandular or eglandular; lamina 4–8.7 × 2–3.7 cm, elliptic, lanceolate or oblong, apex acute, apiculate, obtuse, rarely emarginate, base obtuse, margin slightly revolute, adaxial surface sparsely velutinous, abaxial surface densely velutinous, 7–10 glands borne on lamina. Inflorescence in umbels disposed in panicles; bracts ca. 2–3 mm long, triangular; peduncle absent; bracteoles 0.8–1.5 mm, triangular, eglandular, persistent; pedicel 7–10 mm long. Flowers 4–8; sepals 3–3.5 × 1.5–2 mm, apex erect, truncate or obtuse, adaxial surface sparsely sericeous, abaxial surface sericeous, brown; elaiophores (7)–8, 1–1.5 mm long; petals yellow, glabrous, margin erose, lateral petals patent to reflexed, limb 2.5–3 × 2.2–2.5 mm, claw ca. 2 mm long, latero-anterior petals entirely expanded, free, posterior petal erect to erect-patent, limb 2.6–3 × 2–2.5 mm, claw ca. 2.2 mm long; stamens 10, fertile, heteromorphic; filaments 2.1–3.5 mm long, glabrous; anthers ca. 1 mm long, thecae glabrous, connectives eglandular; staminodes absent. Ovary ca. 2 mm long, sericeous, wings absent; styles heteromorphic, 2.2–2.5 mm long, glabrous, curved, divergent distally, apex dorsally obtuse; stigmas subapical or lateral. Fruit not observed.

**Specimens examined:** BRAZIL, BAHIA: Jeremoabo, em frente à casa de Amelinda, 10°01'29.8"S, 38°32'21.7"W, 277 m, 20.VIII.2013, fl., J.V. Santos 115 (HUNEB).

**Distribution, ecology and phenology:** A species endemic to Brazil, *Heteropterys catingarum* is distributed in the Northeast region in the phytogeographic dominions of Caatinga (Amorim 2003). In the RCE, the species is associated with sandy soils in anthropized areas of roadsides. It was collected only once when it was with flowers in October.

**Taxonomy:** It can be differentiated from its congeners by leaves with 7–10 glands borne on the abaxial surface, flowers with peduncles absent and with brown sepals.

**17. *Heteropterys grandiflora*** A.Juss., Arch. Mus. Hist. Nat. 3: 461. 1843. Iconography: Pessoa et al. (2014: 34). Figure 5E; 6A-F

Scandent shrubs to 4 m tall or lianas. Leaves chartaceous to coriaceous, opposite; stipules deciduous; petiole 3–4 mm long, glabrous or glabrescent, eglandular; lamina 3–8.5 × 1.5–4.8 cm, oblong, elliptic to ovate, apex acute or acuminate, base acute or cuneate, margin undulate, glabrous on both surfaces, 2–5 glands or eglandular abaxially. Inflorescence in corymbs disposed in panicles; bracts 1.5–1.9 mm long, ovate, 1–4 marginal glands; peduncle 4–7 mm long; bracteoles 1.2–2 mm long, with 1–3 marginal glands, ovate; pedicel 3–6 mm long. Flowers 2–10; sepals 3–3.5 × 1.5–2.2 mm, apex revolute,

acute or obtuse, adaxial surface glabrous, abaxial surface tomentose-ferruginous; elaiophores (7)–8, 1.5–2 mm long; petals yellow, glabrous, margin erose, lateral petals subreflexed, limb 5–6.2 × 4.7–5.2 mm, claw 2–2.5 mm long, latero-anterior petals entirely expanded, free, posterior petal erect, limb ca. 4.8 × 4.3 mm, claw ca. 3 mm long; stamens 10, fertile, heteromorphic; filaments 2.2–3.1 mm long, glabrous; anthers ca. 1 mm long, thecae pilose only at apex, rare glabrous, connectives eglandular; staminodes absent. Ovary ca. 2 mm long, sericeous, wings absent; styles heteromorphic, 2.4–2.7 mm long, glabrous, erect, divergent distally, apex dorsally apiculate or obtuse-apiculate; stigmas lateral. Samaras green when immature and brown when mature, dorsal wing well developed, thickened along the lower margin, 1.5–3 × 0.9–1.5 cm, sericeous, hairs not irritating at the touch; nut ca. 5 × 7 mm, with lateral veins inconspicuous, sericeous; carpophore absent.

**Specimens examined:** BRAZIL, BAHIA: Canudos, Estação Biológica de Canudos, trilha do roçado de Manezão, 09°56'56.4"S, 39°00'47.1"W, 425 m, 26.IX.2014, fl.; fr., J.V. Santos 472 (HUNEB); ibid., Toca Velha, Saco I das Araras, 09°57'20"S, 39°59'98"W, 413 m, 26.IV.2012, fl., D.D. Vieira 260 (HUNEB).

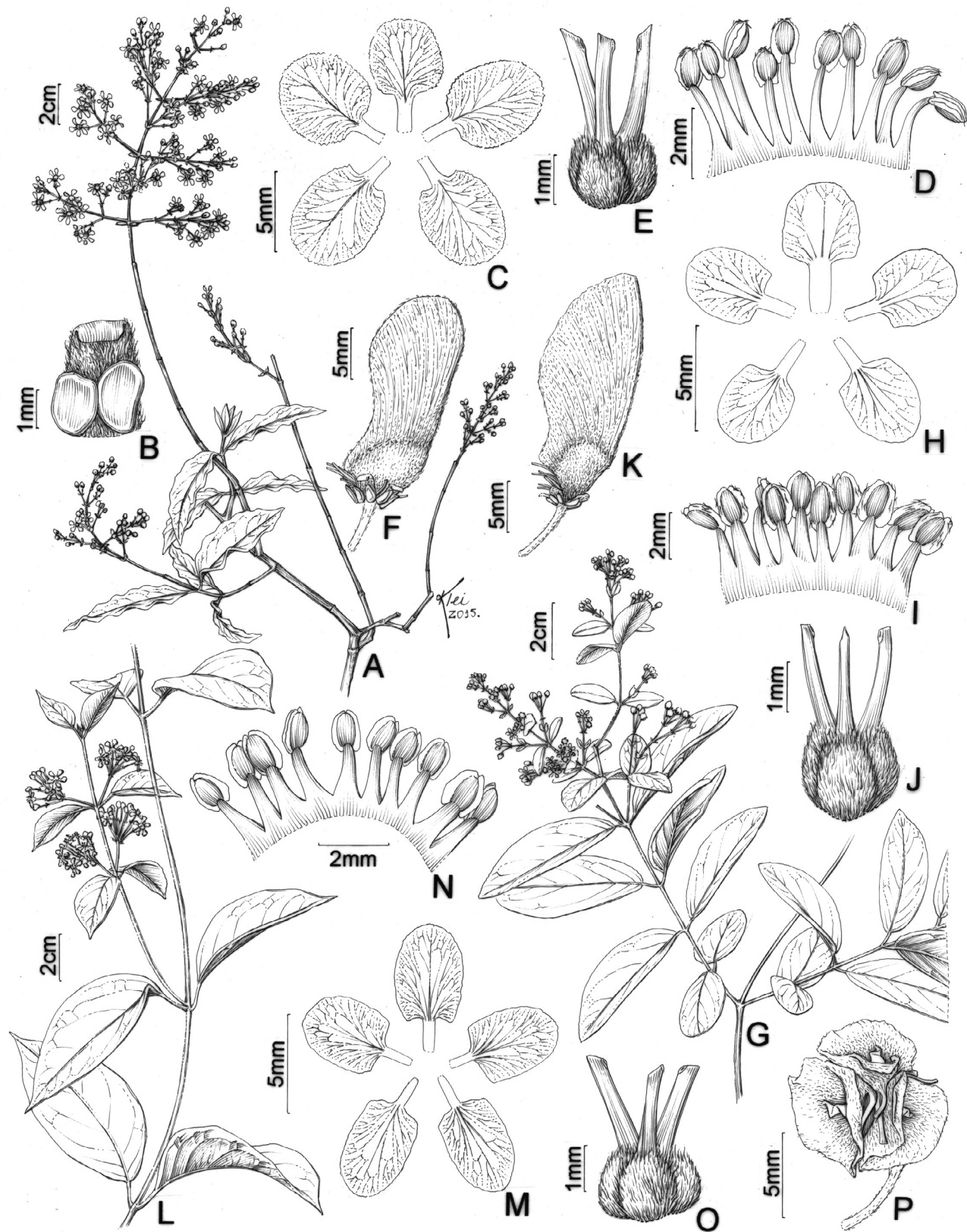
**Distribution, ecology and phenology:** According to Mamede et al. (2017), the species is endemic to Brazil, being distributed in the Northeast and Midwest regions in the Caatinga and the Cerrado. In the study area, the species is found on sandy soils in preserved areas of the RCE. It was collected in April with flowers and in November with flowers and fruit.

**Taxonomy:** *Heteropterys grandiflora* can be recognized by leaves with undulate margins and sepals with revolute apex.

**18. *Heteropterys trichanthera*** A.Juss., Ann. Sci. Nat., Bot. II, 13: 273. 1840. Figure 5F; 6G-K

Scandent shrubs 1.5–4 m tall or lianas. Leaves chartaceous, opposite; stipules deciduous; petiole 3–8 mm long, sericeous, 1–2 glands at the middle or apex, or eglandular; lamina 2.3–7 × 1.4–4 cm, elliptic, oblong or ovate, apex acute or obtuse, base acute, subcordate or cuneate, margin entire or slightly revolute, adaxial surface tomentose or glabrescent, abaxial surface tomentose, 1–4 glands or eglandular. Inflorescence in umbels or corymbs; bracts 1–2.1 mm long, ovate; peduncle 4–9 mm long; bracteoles 0.9–1.5 mm long, ovate; pedicel 3–6 mm long. Flowers 3–8; sepals 2.9–3.2 × 1.5–2.2 mm, apex erect, obtuse to rounded, adaxial surface glabrous, abaxial surface sericeous-ferruginous; elaiophores 8, 1.5–1.8 mm long; petals yellow, adaxial surface glabrous, abaxial surface glabrous or sparsely sericeous, margin erose, lateral petals subreflexed to reflexed, limb 3.2–4 × 3–3.6 mm, claw 2–2.2 mm long, latero-anterior petals entirely expanded, free, posterior petal erect-patent to patent, limb 3.5–3.7 × 3–3.8 mm, claw 2.5–3 mm long; stamens 10, fertile, heteromorphic; filaments 1–2 mm long, yellow or vinaceous, glabrous; anthers ca. 1.5–1.8 mm long, thecae pilose along its entire length, connectives eglandular; staminodes absent. Ovary ca. 2 mm long, densely sericeous, wings absent; styles heteromorphic, 2.2–2.6 mm long, erect, divergent distally, glabrous, apex dorsally apiculate or obtuse-apiculate; stigmas lateral. Samaras green when immature and brown when mature, dorsal wings developed, thickened along the lower margin, 1.5–3 × 0.9–1.6 cm, sericeous, hairs not irritating at the touch; nut ca. 4–6 × 4–7 mm, with lateral veins conspicuous; carpophore absent.





**Figure 6.** A–F. *Heteropterys grandiflora*. A. flowering branch; B. sepal with revolute apex; C. petals; D. androecium; E. gynoecium; F. fruit. G–K. *Heteropterys trichanthera*: G. flowering branch; H. petals; I. androecium; J. gynoecium; K. fruit. L–P. *Mascagnia sepium*: L. flowering branch; M. petals; N. androecium; O. gynoecium; P. fruit. A–F from J.V. Santos 472; G–K from J.V. Santos 216; L–P from J.V. Santos 133.

**Specimens examined:** BRAZIL, BAHIA: Canudos, Estação Biológica de Canudos, caminho em direção à lagoa de Menezão, 09°56'47.7"S, 39°00'43.2"W, 421 m, 13.V.2014, fl.; fr., J.V. Santos 326 (HUNEB); Jeremoabo, Olho D'Água dos Negros, próximo a placa de identificação da comunidade, 10°01'11.7"S, 38°22'08.7"W, 432 m, 05.VI.2014, fl.; fr., J.V. Santos 336 (HUNEB); Paulo Afonso, Estação Ecológica Raso da Catarina, estrada em direção à Base I do ICMBio, 09°56'46.4"S, 38°00'42.7"W, 433 m, 26.III.2014, fl.; fr., J.V. Santos 216 (HUNEB).

**Distribution, ecology and phenology:** *Heteropterys trichanthera* is endemic to Brazil and distributed in the Northeast and Southeast regions where it occurs only in the Caatinga phytogeographic dominion (Mamede et al. 2017). In the study area, the species is associated with sandy soils in preserved or roadside environments with dense vegetation. It was collected in RCE with flowers and fruits in March, May and June.

**Taxonomy:** It is differentiated from its congeners by possessing flowers with yellow petals, yellow or vinaceous filaments, and anthers with pilose thecae along its entire length.

**19. *Heteropterys trigoniifolia*** A.Juss., Fl. Bras. Merid. 3. 33. 1833. Iconography: Pessoa et al. (2014: 35). Figure 5G

Scandent shrubs ca. 2 m tall or lianas. Leaves chartaceous, opposite; stipules deciduous; petiole 3–8 mm long, tomentose or glabrescent, eglandular; lamina 2.9–6 × 2–4 cm, oblong, elliptic, ovate or suborbicular, apex acute, apiculate or rounded, base rounded to obtuse, margin revolute, adaxial surface tomentose to glabrescent, abaxial surface densely tomentose, with 1–3 glands or eglandular. Inflorescence in umbels or corymbs disposed in panicles; bracts 1.5–2 mm long, ovate; peduncle 1.5–2.5 mm long; bracteoles 1–1.4 mm long, ovate; pedicel 1.7–3 mm long. Flowers 4–8; sepals 2–2.7 × 1–2 mm, apex erect, rounded, adaxial surface glabrous, abaxial surface sericeous-ferruginous; elaiophores (7)–8, 0.6–1 mm long; lateral petals white, posterior petal white with lines pink, margin erose, lateral petals reflexed, limb 2.3–3 × 1.5–2 mm, claw ca. 1.3 mm long, latero-anterior petals entirely expanded, free, posterior petal erect, with limb 2–2.5 × 2–2.5 mm, claw 1.4–1.7 mm long; stamens 10, fertile, heteromorphic; filaments 1.2–2.2 mm long, glabrous; anthers ca. 1.5 mm long, thecae glabrous, connectives eglandular; staminodes absent. Ovary ca. 1.5 mm long, sericeous, wings absent; styles heteromorphic, 1.9–2.2 mm long, erect, distally divergent, glabrous, apex dorsally apiculate or obtuse-apiculate; stigmas lateral. Samaras entirely vinaceous when immature and brown when mature, dorsal wing well developed, thickened along the lower margin, 1.5–2.5 × 0.7–1.2 cm, sericeous, hairs not irritating at the touch; nut ca. 4 × 3.5 mm, rugose, sometimes with lateral crests inconspicuous; carpophore absent.

**Specimens examined:** BRAZIL, BAHIA: Jeremoabo, estrada após a Comunidade Olho D'Água dos Negros, 10°01'00.7"S, 38°22'30"W, 488 m, 05.VI.2014, fl., J.V. Santos 339 (HUNEB); *ibid.*, fim da trilha secundária, 09°56'32.1"S, 38°27'07.2"W, 532 m, 31.VII.2014, fl.; fr., J.B. Lima 470 (HUNEB); Paulo Afonso, Estação Ecológica Raso da Catarina (ESEC), estrada em direção à Mata da Pororoca, 09°47'16.9"S, 38°29'29.7"W, 561 m, 01.IX.2014, fr., J.V. Santos 421 (HUNEB); *ibid.*, 09°47'16.7"S, 38°29'30.2"W, 685 m, 21.VII.2014, fr., J.B. Lima 437 (HUNEB).

**Distribution, ecology and phenology:** Endemic to Brazil, the species occurs in the Northeast, Southeast and Midwest regions in the phytogeographic dominions of Atlantic Forest and Caatinga (Pessoa et al. 2014, Mamede et al. 2017). *Heteropterys trigoniifolia* is found on sandy soils in preserved areas, or along trails, with dense vegetation. In the study area it was collected with flowers in June, fruits in September and flowers and fruits in July.

**Taxonomy:** The species is recognized by the presence of leaves with revolute margins, flowers with white lateral petals and white posterior petal with pink lines. Samaras are entirely vinaceous when immature.

**20. *Janusia anisandra*** (A.Juss.) Griseb., Fl. Bras. 12 (1): 103. 1858. Iconography: Sebastiani (2010: 49). Figure 5H

Lianas. Leaves chartaceous, opposite; stipules ca. 0.8 mm long, persistent; petiole 2–6 mm long, densely tomentose, eglandular; lamina 2.5–6 × 1.2–3 cm, elliptic to ovate, apex acute to cuspidate, base obtuse, sometimes slightly cordate, 1 pair of stipitate glands, patelliform, margin entire, adaxial surface sparsely tomentose or glabrous with age, abaxial surface densely tomentose. Inflorescence of umbelliform corymbs disposed in panicles; bracts ca. 2 mm long, lanceolate to ovate; peduncle 1.5–5 mm long; bracteoles ca. 2 mm long, lanceolate to ovate, eglandular; pedicel 3–7 mm long. Flowers with sepals ca. 3–4 × 2–2.2 mm, apex acute to obtuse, adaxial surface densely sericeous to tomentose, abaxial surface sparsely tomentose, elaiophores 8–10, ca. 2 mm long; petals orange-yellow, glabrous, margin fimbriate, lateral petals with limb 6.5–8 × 7–7.5 mm, claw 2 mm long, latero-anterior petals entirely expanded, free, posterior petal with limb 5 × 6 mm, claw ca. 3 mm long; stamens 6, fertile, 2 larger and 4 smaller, heteromorphic; filaments 2–6 mm long, glabrous; anthers ca. 1 mm long, thecae pilose, connectives eglandular; staminodes absent. Ovary ca. 2 mm long, tomentose; style 1, ca. 6 mm long, glabrous, apex curved; stigma apical. Samaras green to vinaceous when immature, dorsal wings developed 1.5–2 × 0.5–1.1 cm, sparsely sericeous, hairs not irritating at the touch; nut 3–6 × 2–4 mm, densely sericeous, one pair of winglets 2–3 mm long; carpophore present.

**Specimens examined:** BRAZIL, BAHIA: Jeremoabo, estrada em direção ao Povoado Quelés, antes da Comunidade Olho D'Água dos Negros, 10°00'03.4"S, 38°23'41.1"W, 618 m, 12.IX.2013, fl., J.V. Santos 95 (HUNEB); *ibid.*, APA Serra Branca, estrada secundária do Povoado Quelés sentido a ESEC, 09°56'36.2"S, 38°27'15.3"W, 541 m, 20.XII.2013, fl.; fr., J.V. Santos 119 (HUNEB); *ibid.*, APA Serra Branca, final da estrada secundária, 09°56'36.4"S, 38°27'14.6"W, 538 m, 05.VI.2014, fl.; fr., J.V. Santos 344 (HUNEB); Tucano, Buraco do Vento, 10°57'23.0"S, 38°44'01.0"W, 354 m, 08.VIII.2014, fl., J.V. Santos 392 (HUNEB); *ibid.*, Baixa da Forra, 09°59'43.4"S, 38°23'48.4"W, 596 m, 26.V.2015, fl., J.V. Santos 543 (HUNEB).

**Distribution, ecology and phenology:** *Janusia anisandra* is endemic to Brazil and occurs in the Northeast and Southeast regions in the dominions of Caatinga, Cerrado and Atlantic Forest (Mamede et al. 2017). In the RCE, the species can be found in preserved areas and in dense vegetation along trails. It was collected only with flowers in May, August and November and with flowers and fruits in June and December.

**Taxonomy:** *Janusia anisandra* is easily recognized in the RCE by being the only species that has an androecium comprising of six fertile stamens, 2 larger and 4 smaller, and gynoecium with one style.

**21. *Mascagnia cordifolia*** (A.Juss.) Griseb., Fl. Bras. 12 (1): 95. 1858. Iconography: Niedenzu (1928: 41), Anderson & Davis (2005: 41). Figure 5I

Lianas. Leaves chartaceous to coriaceous, opposite; stipules 2–3 mm long, persistent; petiole 5–11 mm long, tomentose to velutinous, eglandular, rare 1 gland at apex; lamina 5.3–10 × 2.7–4.6, elliptic, apex acuminate, base obtuse, margin revolute, both surfaces tomentose to velutinous young, glabrous or with sparse hairs at veins with age, abaxial surface with 2–7 glands sessile. Flowers not observed. Samaras cream to greenish when immature, lateral wings well developed, fused into a single orbicular wing, 2.3–2.6 cm in diameter, membranous, sparsely sericeous; nut ca. 3 × 2 mm, glabrous or with sparse hairs, hairs not irritating at the touch; carpophore absent.

**Specimens examined:** BRAZIL, BAHIA: Jeremoabo, APA Serra Branca, estrada secundária sentido à ESEC, 09°56'36.2"S, 38°27'15.3"W, 541 m, 20.XII.2013, fr., J.V. Santos 122 (HUNEB).

**Distribution, ecology and phenology:** The species occurs in Bolivia and Brazil where it is distributed in the North and Southeast regions (Anderson & Davis 2005). It is treated here as a new occurrence for the Caatinga. In the study area, *Mascagnia cordifolia* is associated with sandy soils of open trails. It was collected only one time with fruits in December.

**Taxonomy:** It can be recognized by its chartaceous to coriaceous leaves, and samaras with orbicular wing of 2.3–2.6 cm in diameter, sparsely sericeous.

**22. *Mascagnia sepium*** (A.Juss.) Griseb., Fl. Bras. 12(1): 96. 1858. Figure 5J; 6L-P

Lianas. Leaves chartaceous, opposite; stipules ca. 2 mm long, persistent, epipetiole; petiole 5–9 mm long, tomentose, eglandular; lamina 4–9 × 1.4–4.8 cm, elliptic to ovate, apex acuminate, base rounded, margin entire, adaxial surface entirely glabrous or with sparse hairs at midrib, abaxial surface sparsely tomentose to glabrescent, 3 or more glands spreading on the lamina. Inflorescence of corymbs; bracts 2.5–3.5 mm long, triangular to linear; peduncle 5–7.5 mm long; bracteoles 1–1.5 mm long, triangular to linear, 1 sessile or stipitate capitate gland at base or absent; pedicel 6–8 mm long. Flowers 10–15; sepals 3–3.5 × 1.5–2 mm, apex rounded to emarginate, erect, adaxial surface glabrous, abaxial surface sparsely tomentose to glabrescent; elaiophores 8 (–9), 2.2–3.2 mm long; petals yellow, glabrous, margin erose, lateral petals sub-reflexed, limb 2.3–4.8 × 2.5–3 mm, claw 1.1–1.5 mm long, latero-anterior petals entirely expanded, free, posterior petal erect, limb 2.2–4.3 × 2.5–3 mm, claw 1.5–1.8 mm long; stamens 10, monomorphic or heteromorphic; filaments 1.7–2.2 mm long, glabrous; anthers 1–1.5 mm long, thecae glabrous, connectives eglandular; staminodes absent. Ovary 1.7–2 mm long, sericeous; styles 2–2.3 mm long, erect, divergent distally, glabrous, apex dorsally truncate and apiculate; stigmas lateral. Samaras immature green or green brownish, with lateral wings well developed, fused into a single orbicular wing, ca. 6 mm in diameter, membranous, densely sericeous, hairs not irritating at the touch; nut ca. 2 mm long, densely sericeous; carpophore absent.

**Specimens examined:** BRAZIL, BAHIA: Jeremoabo, APA Serra Branca, estrada secundária sentido ESEC, 09°56'34.9"S, 38°27'19.2"W, 544 m, 21.XII.2013, fl., J.V. Santos 133 (HUNEB); *ibid.*, APA Serra Branca, estrada principal sentido ESEC, 09°57'16.1"S, 38°26'23.2"W, 505 m, 20.XII.2013, fl.; fr., J.V. Santos 114 (HUNEB).

**Distribution, ecology and phenology:** *Mascagnia sepium* occurs in Argentina, Brazil, and Paraguay (Niedenzu 1928). In Brazil the species is widely distributed in the North, Northeast, Midwest, Southeast and South regions in the dominions of Caatinga, Cerrado and Atlantic Forest (Mamede et al. 2017). In the RCE, the species can be found in anthropized environments on sandy soils. It was collected with flowers and fruits only in December.

**Taxonomy:** It is differentiated from its congeners by chartaceous leaves and samaras with orbicular wings well developed, ca. 6 mm in diameter, densely sericeous.

**23. *Mcvaughia bahiana*** W.R.Anderson, Taxon 28(1-3): 159. 1979. Iconography: Anderson, W. (1979: 158). Figure 5K

Erect shrubs 0.40–1.80 m tall. Leaves chartaceous to coriaceous, decussate; stipules 2.5–4 mm long, persistent; petiole 3–5 mm long, sericeous, eglandular; lamina 3.5–7 × 1.2–3 cm, obovate, spatulate or elliptic, apex rounded, obtuse or acute to apiculae, base cuneate, margin entire, adaxial surface sparsely tomentose to glabrescent, abaxial surface densely tomentose, 1 pair of glands at base or absent. Inflorescence of pseudoracemes, rachis ca. 5.5 cm long; bracts 2–3.7 mm long, triangular, eglandular, persistent; peduncle 2–3 mm de long; bracteoles 1.5–2.5 mm long, 1 gland patelliform present at bracteole; pedicel 2–3 mm long. Flowers with sepals ca. 3–3.6 × 1.2–2 mm, apex acute a rounded, adaxial surface glabrous, abaxial surface sericeous, elaiophores 8, 2–2.5 mm long; petals yellow, glabrous, latero-anterior petals not entirely expanded, cucullate, nested one inside the other, margin denticulate, limb ca. 4.5 × 5 mm, claw 2–2.5 mm long, latero-posterior petals with margin sub-erose, limb 7–8 × 7.5–8 mm, claw ca. 2 mm long, posterior petal with margin erose, limb ca. 10 × 10.5 mm, glands at base, claw ca. 4 mm long; stamens 7, fertile, heteromorphic; filaments 3–4 mm long, glabrous; anthers ca. 1 mm long, thecae glabrous, connectives eglandular; staminodes 3, heteromorphic, 2–3 mm long, glabrous. Ovary ca. 1.5 mm long, densely sericeous; styles 3, 2.5–2.8 mm long, erect and curved at apex, divergent distally, glabrous, apex acute; stigmas apical. Nuts green when immature, ca. 7–10 × 4–5 mm long, sericeous to glabrescent, slightly twisted, base apiculate laterally ca. 2 mm long.

**Specimens examined:** BRAZIL, BAHIA: Quijingue, Povoado Tanque de Rumo, 10°43'52.2"S, 38°54'13.2"W, 343 m, 06.VIII.2014, fl.; fr., J.V. Santos 377 (HUNEB); Tucano, Buraco do Vento, 10°57'22.0"S, 38°44'02.5"W, 367 m, 08.VIII.2014, fl.; fr., J.V. Santos 390 (HUNEB).

**Distribution, ecology and phenology:** *Mcvaughia bahiana* is endemic to Brazil and has a geographic distribution restricted to the state of Bahia and Piauí, occurring only in the Caatinga biome (Mamede et al. 2017, Amorim pers. comm.). In the RCE, the species can be found on sandy soils in environments with preserved vegetation. It was collected with flowers and fruits only in August.

**Taxonomy:** *Mcvaughia bahiana* possesses characters unique among the species cataloged at RCE, and can be recognized by having flowers not entirely expanded lateral-anterior petals, that are cucullate and nested one inside the other, androecium comprising of seven fertile stamens and three staminodes, and nuts slightly twisted with apiculate laterally base.

**24. *Peixotoa hispidula*** A.Juss., Ann. Sci. Nat., Bot. II, 13: 279. 1840. Iconography: Anderson, C. (1982: 86), Almeida (2013: 131). Figure 5L

Scandent shrubs to 2 m tall or lianas. Leaves chartaceous to coriaceous, opposite; large stipules 5–15.5 × 4–8.5 mm, persistent or



deciduous, interpetiolar, connate; petiole 7–9 mm long, velutinous, eglandular; lamina 6–15.5 × 3–6.7 cm, elliptic, ovate, sometimes lanceolate or suborbicular, apex acute, acuminate, rounded to apiculate, base cordate, rounded, sometimes truncate, margin slightly revolute, adaxial surface velutinous, glabrescent or glabrous, abaxial surface densely tomentose to velutinous, 1 pair of glands sessile patelliform at base or midrib. Inflorescence of umbelliform corymbs; bracts 1–1.5 mm long, triangular to linear; peduncle absent; bracteoles 1–1.5 mm long, triangular to linear, eglandular; pedicel 11–26 mm long. Flowers 4; sepals 6.5–7.5 × 3–4 mm, apex acute, revolute, adaxial surface sparsely velutinous to glabrescent, abaxial surface densely velutinous; elaiophores 8, 1–2 mm long; petals yellow, orbicular, margin denticulate to fimbriate, lateral petals with limb 13–21 × 12–18 mm, margin glandular, claw 2–3 mm long, latero-anterior petals entirely expanded, free, posterior petal with limb 8–10 × 5–5.5 mm, margin with glands capitate, claw ca. 5 mm long; stamens 5, fertile, heteromorphic; filaments 4–5 mm long, glabrous; anthers ca. 1 mm long, thecae glabrous, connectives glandular; staminodes 5, heteromorphic, alternating with 5 stamens, 3.5–4 mm long, glands ca. 0.2–1 mm long. Ovary 2–2.5 mm long, densely velutinous; styles 3, heteromorphic, 3.8–4.2 mm long, erect to curved, divergent, velutinous at base and glabrous at portion median and apical; stigmas apical or subapical, capitate. Samaras green to vinaceous when immature and brown when mature, dorsal wings developed, 1.5–2.4 × 0.7–1.3 cm, velutinous, hairs not irritating at the touch; nut ca. 6 × 3 mm, densely velutinous, 1 pair of lateral winglets, velutinous; carpophore present.

**Specimens examined:** BRAZIL, BAHIA: Banzaê, Engenho Velho, estrada sentido Banzaê, 10°33'02.6"S, 38°39'13.9"W, 354 m, 15.I.2014, fl., J.V. Santos 151 (HUNEB); Jeremoabo, APA Serra Branca, estrada secundária, do povoado Quelés sentido à ESEC, 09°56'36.2"S, 38°27'15.3"W, 541 m, 20.XII.2013, fl., J.V. Santos 124 (HUNEB); *ibid.*, 09°56'36.2"S, 38°27'16"W, 542 m, 05.VI.2014, fl.; fr., J.V. Santos 345 (HUNEB).

**Distribution, ecology and phenology:** According to Mamede et al. (2017), the species is endemic to Brazil, being distributed in the Northeast and Southeast regions in the Atlantic Forest, thus it is treated here as a new occurrence for the Caatinga in the semiarid region of Brazil. *Peixotoa hispidula* can be found in open areas along trails with remnant vegetation. It was collected in January and December with flowers and June with flowers and fruits.

**Taxonomy:** It is recognized in the RCE by being the only species with large interpetiolar stipules (5–15.5 × 4–8.5 mm), and flowers with an androecium of five fertile stamens alternating with five staminodes.

**25. *Ptilochaeta bahiensis*** Turcz., Bull. Soc. Imp. Naturalistes Moscou 16: 52. 1843. Figure 7A; 8A-E

Erect shrubs 1.6–2 m tall. Leaves membranous to chartaceous, opposite; stipules absent; petiole 1.5–2.5 mm long, densely velutinous to tomentose, eglandular; lamina 2–3.5 × 0.8–2 cm, elliptic, oblong or oblanceolate, apex acute or rounded, base acute, cuneate or rounded, margin entire, adaxial surface sparsely sericeous or glabrescent, abaxial surface sparsely velutinous to tomentose or glabrescent. Inflorescence of umbelliform corymbs; bracts 2–3.2 × 1–3.4 mm long, triangular, linear or ovate, abaxial surface densely sericeous; peduncle absent or ca. 1 mm long; bracteoles 2–3.2 × 1–3.4 mm long, triangular, linear or ovate, adaxial surface glabrous, abaxial surface densely sericeous,

eglandular; pedicel 8–13 mm long. Flowers 6 (–7); sepals 2–3 × 1.1–2 mm, apex acute to rounded, erect, adaxial surface glabrous, abaxial surface sericeous; elaiophores absent; petals yellow, glabrous, orbicular, margin erose to denticulate, latero-anterior petals entirely expanded, free, limb 4–5 × 3–4.8 mm, claw 1.5–2 mm long; stamens 10, monomorphic or heteromorphic; filaments 3–4 mm long, glabrous, base sericeous; anthers ca. 1 mm long, thecae glabrous, connectives eglandular; staminodes absent. Ovary 1.2–2 mm long, sericeous; styles 4–4.2 mm long, apex acute, erect to curved, divergent, glabrous; stigmas apical. Fruit not observed.

**Specimens examined:** BRAZIL, BAHIA: Jeremoabo, APA Serra Branca, estrada em direção à Serra do Navio, 09°53'05.5"S, 38°39'55.9"W, 414 m, 25.IX.2014, fl., J.V. Santos 466 (HUNEB); Paulo Afonso, Estação Ecológica Raso da Catarina, Base Velha, 09°43'54.2"S, 38°40'56.3"W, 605 m, 24.IX.2014, fl., J.V. Santos 464 (HUNEB); *ibid.*, estrada em direção à Mata da Pororoça, 09°39'02.5"S, 38°28'28.4"W, 600 m, 24.IX.2014, fl., J.V. Santos 458 (HUNEB).

**Distribution, ecology and phenology:** The species is endemic to Brazil, and is distributed in the Northeast, Midwest and Southeast regions, occurring in the phytogeographic dominions of Caatinga and Cerrado (Mamede et al. 2017). *Ptilochaeta bahiensis* is associated with sandy soils and preserved vegetation in two conservation units (EPASB and ESRC). In the study area it was collected only in November with flowers.

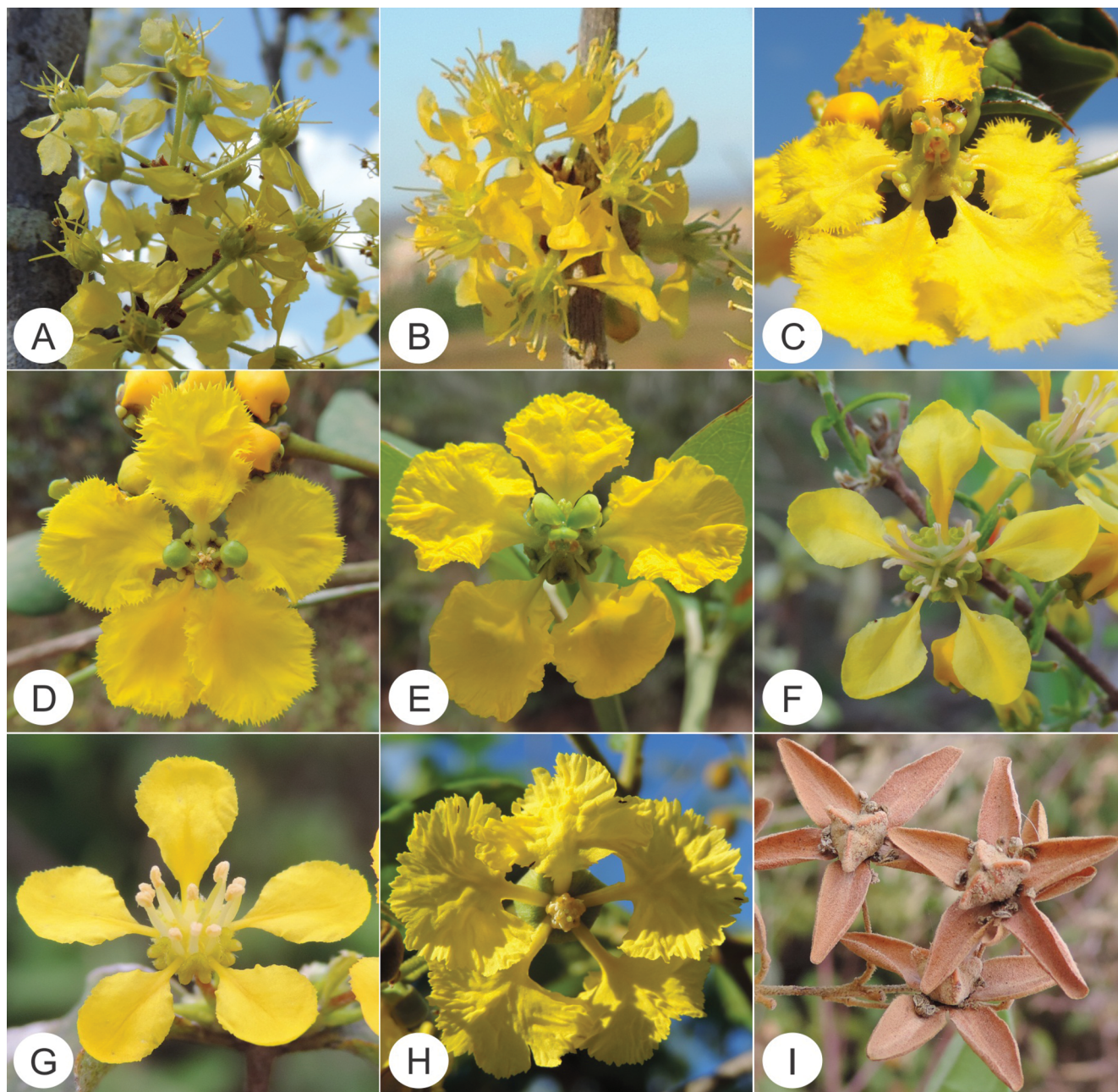
**Taxonomy:** The species can be recognized by shrubby habit with membranous to chartaceous leaves and pedicel of flowers with 8–13 mm in long.

**26. *Ptilochaeta cf. densiflora*** Nied., Bull. Herb. Boissier II, 7: 293. 1907. Figure 7B; 8F-J

Erect shrubs ca. 2 m tall. Leaves chartaceous to coriaceous, opposite; stipules absent; petiole 1–2.2 mm long, densely velutinous, eglandular; lamina 2–5 × 0.9–2.1 cm, elliptic to lanceolate, apex acute to acuminate, base acute to rounded, margin entire, adaxial surface sparsely velutinous or glabrescent, abaxial surface densely velutinous to tomentose. Inflorescence of umbelliform corymbs; bracts 2.7–3.2 × 2–2.6 mm long, triangular to ovate, adaxial surface glabrous, abaxial surface densely sericeous; peduncle absent; bracteoles 2.7–3.2 × 2–2.6 mm, triangular to ovate, adaxial surface glabrous, abaxial surface densely sericeous, eglandular; pedicel 3–6 mm long. Flowers 6–8; sepals 2.2–3 × 1.1–2 mm, apex acute to rounded, erect, adaxial surface glabrous, abaxial surface sericeous; elaiophores absent; petals yellow, glabrous, orbicular, margin erose to denticulate, latero-anterior petals entirely expanded, free, limb 4–5 × 3–4.8 mm, claw 1.6–2 mm long; stamens 10, heteromorphic; filaments 3–4 mm long, glabrous, with base sericeous; anthers ca. 1 mm long, thecae glabrous, connectives eglandular; staminodes absent. Ovary 1–2 mm long, sericeous; styles 3.8–4.2 mm long, apex acute, erect to curved, divergent, glabrous; stigmas apical. Fruit not observed.

**Specimens examined:** BRAZIL, BAHIA: Canudos, Mirante de Antônio Conselheiro, 09°54'S, 39°02'W, 414 m, 16.IX.2014, fl., J.V. Santos 434 (HUNEB).

**Distribution, ecology and phenology:** According to Mamede et al. (2017), the species is endemic to Brazil, and is distributed in the Northeast, Midwest and Southeast regions, occurring in the phytogeographic dominions of Caatinga, Cerrado and Pantanal. The



**Figure 7.** Representatives of the Malpighiaceae in the Raso da Catarina Ecoregion. A. *Ptilochaeta bahiensis*; B. *P. cf. densiflora*; C. *Stigmaphyllon auriculatum*; D. *S. blanchetii*; E. *S. paralias*; F. *Tetrapterys paludosa*; G. *T. ramiflora*; H-I. *Thryallis longifolia*. Photos by J.V. Santos.

species was collect only once in sandy-loamy soil in open area of the RCE. It was collected only with flowers in November.

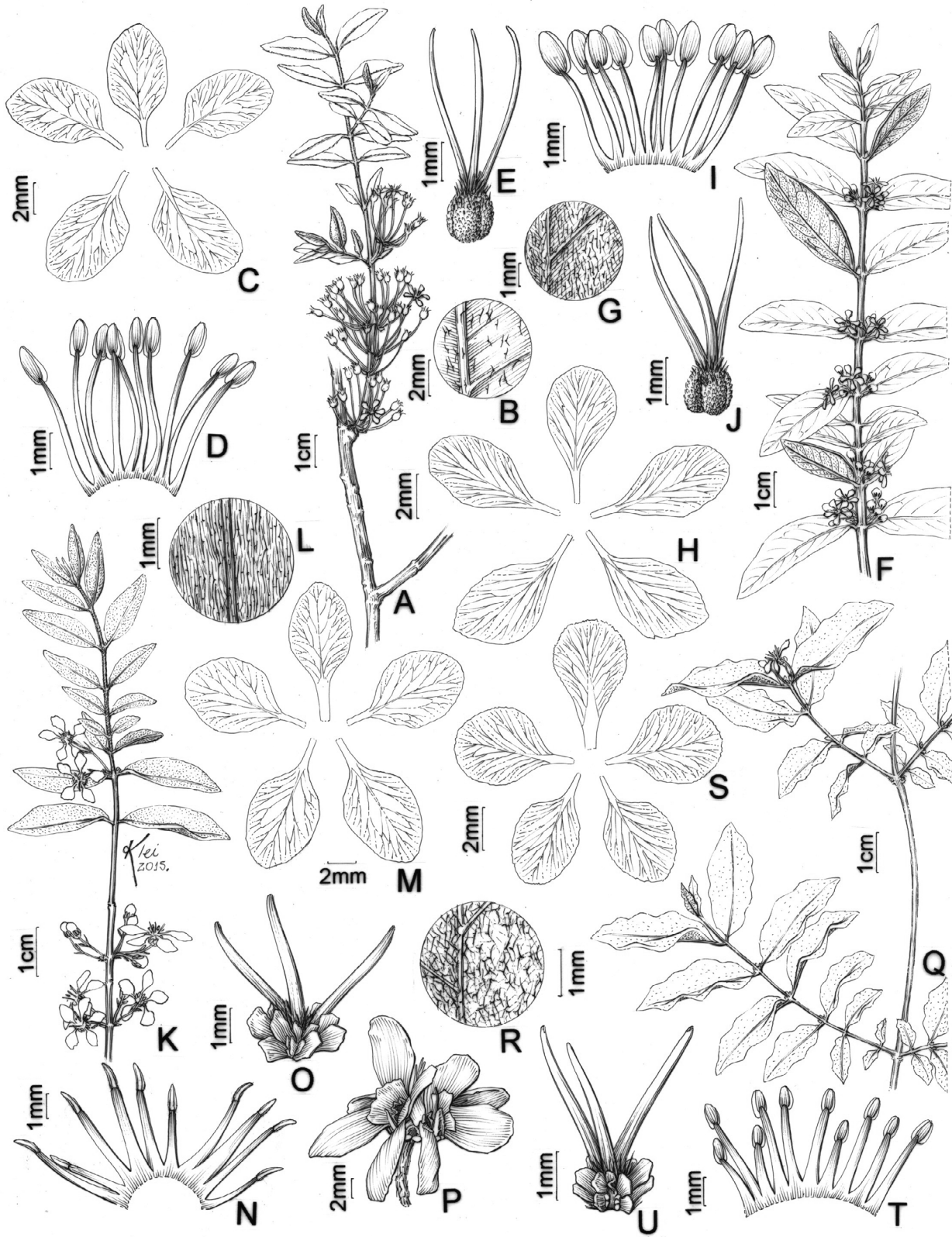
**Taxonomy:** In the study area, it differs from its congeners by chartaceous to coriaceous leaves and short pedicel of flowers with 3–6 mm long. This species was maintained with cf. due to the need for better representation and studies in this group.

**27. *Stigmaphyllon auriculatum*** (Cav.) A.Juss., Fl. Bras. Merid. 3: 48, pl. 171. 1833 [‘1832’]. Iconography: Niendenzu (1928: 487). Figure 7C

Lianas; branches cylindric. Leaves membranous, opposite; stipules ca. 2 mm long, deciduous; petiole 7–16 mm long, glabrous or glabrescent, 1 pair of glands acropetiolar, patelliform; lamina 3.5–6 ×

1.5–4.5 cm, ovate, apex acute or cuspidate, base rounded, cordate or auriculate, margin slightly erose to crenate, stipitate and filiform glands marginal, glabrous or glabrescent on both surfaces, abaxial surface with glands sessile or absent. Inflorescence of umbels disposed in dichasia; bracts 1–1.5 mm long, triangular; peduncle 2–7 mm long; bracteoles ca. 1 mm long, triangular, eglandular; pedicel 5–6 mm long. Flowers 4–10; sepals 3–3.5 × 2.2–2.8 mm, apex rounded, erect or slightly recurved, adaxial surface and abaxial surface glabrous; elaiophores 8, 1–2 mm long; petals yellow, glabrous, orbicular, margin fimbriate, lateral petals with limb 11–13.5 × 12–14 mm, claw 2–2.5 mm long, latero-anterior petals entirely expanded, free, posterior petal with limb ca. 10 × 10–11 mm, eglandular, claw ca. 4 mm long; stamens 10, fertile, heteromorphic; filaments 2–4 mm long, glabrous; anthers ca. 0.8–2 mm long, thecae





**Figure 8.** A–E. *Ptilochaeta bahiensis*. A. flowering branch; B. abaxial surface leaf; C. petals; D. androecium; E. gynoecium; F–J. *P. cf. densiflora*: F. flowering branch; G. abaxial surface leaf; H. petals; I. androecium; J. gynoecium. K–P. *Tetrapterys paludosa*: K. flowering branch; L. adaxial surface leaf; M. petals; N. androecium; O. gynoecium; P. fruit. Q–U. *T. ramiflora*: Q. flowering branch; R. adaxial surface leaf; S. petals; T. androecium; U. gynoecium. A–E from J.V. Santos 464; F–J from J.V. Santos 434; K–P from J.V. Santos 467; Q–U from J.V. Santos 374.

glabrous, connectives glandular; staminodes absent. Ovary ca. 1.5–2 mm long, sericeous; posterior styles ca. 4 mm long, apex foliaceous ca. 1.7 × 2, anterior style ca. 4 mm long, apex foliaceous ca. 1.8 × 3.2 mm, erect or slightly recurved, divergent, glabrous; stigmas lateral. Samaras green when immature, dorsal wings developed, 1.7–3 × 1–1.7 mm, sparsely sericeous to glabrescent, hairs not irritating at the touch; nut ca. 8–10 × 6–7 mm, lateral winglets absent, sericeous to glabrescent; carpophore not seen.

**Specimens examined:** BRAZIL, BAHIA: Banaçã, estrada da Baixa da Cangalha, 10°42'15.1"S, 38°37'52.9"W, 287 m, 15.I.2014, fl.; fr., J.V. Santos 146 (HUNEB); Jeremoabo, APA Serra Branca, estrada em direção à ESEC, depois da Casa de Antônio Roxinho, 09°57'16.1"S, 38°26'23.2"W, 505 m, 20.XII.2013, fl., J.V. Santos 113 (HUNEB); Paulo Afonso, Estação Ecológica Raso da Catarina (ESEC), estrada após a Mata da Pororoca, 09°48'46.3"S, 38°29'31.0"W, 698 m, 18.III.2014, fl., J.V. Santos 182 (HUNEB); *ibid.*, estrada em direção a Mata da Pororoca, 09°45'12.5"S, 38°29'29.2"W, 655 m, 15.IV.2014, fl.; fr., J.V. Santos 260 (HUNEB); *ibid.*, próximo a Mata da Pororoca, 09°44'23.0"S, 38°29'28.7"W, 648 m, 07.V.2014, fl., J.V. Santos 298 (HUNEB); *ibid.*, início da estrada em direção a Mata da Pororoca, 09°39'54.6"S, 38°29'26.9"W, 618 m, 09.VI.2014, fl.; fr., J.V. Santos 351 (HUNEB); *ibid.*, início da estrada em direção a Mata da Pororoca, 09°40'53.6"S, 38°37'00.4"W, 619 m, 01.IX.2014, fl.; fr., J.V. Santos 420 (HUNEB).

**Distribution, ecology and phenology:** *Stigmaphyllon auriculatum* is endemic to Brazil and is distributed in the Northeast and Southeast regions where it is associated with the Caatinga and Atlantic Forest (Mamede et al. 2017). The species can be found on sandy soils in conserved areas or on trails with dense vegetation. It was collected with flowers and/or fruits in almost all of the months of the year.

**Taxonomy:** In the study area, the species is recognized by being a liana with leaves having both surfaces glabrous or glabrescent and their margins slightly erose to crenate with stipitate and filiform glands marginal.

**28. *Stigmaphyllon blanchetii*** C.E.Anderson, Syst. Bot. 14(4): 511. 1989. Iconography: Anderson, C. (1997: 260). Figure 7D

Lianas; branches cylindrical. Leaves chartaceous or membranous to chartaceous, opposite; stipules deciduous; petiole 5–30 mm long, tomentose, 1 pair of glands acropetolar, patelliform; lamina 3.5–14 × 2.2–8 cm, ovate, elliptic to lanceolate, apex acuminate to apiculate, base rounded, truncate to cordate, margin entire, adaxial surface tomentose to glabrescent, abaxial surface densely tomentose, marginal glands stipitate. Inflorescence umbels disposed in dichasia; bracts 1–2 mm long, oblong; peduncle 5–10 mm long; bracteoles 1–1.5 mm long, oblong, eglandular; pedicel 3–6 mm long. Flowers 10–25; sepals 2.5–3.8 × 2–2.5 mm, apex obtuse, plane, adaxial surface glabrous, abaxial surface sericeous; elaiophores (6–7) 8, 2–2.2 mm long; petals yellow, glabrous, orbicular, margin fimbriate, lateral petals with limb 12–14 × 11–13 mm, claw ca. 2 mm long, latero-anterior petals entirely expanded, free, posterior petal with limb ca. 11 × 10 mm, eglandular, claw ca. 3 mm long; stamens 10, fertile, heteromorphic; filaments 1.5–3 mm long, glabrous; anthers ca. 1–1.7 mm long, thecae pilose, connectives glandular; staminodes absent. Ovary ca. 2 mm long, sericeous; posterior styles 2.3–4 mm long, apex foliaceous 2–3 × 3–3.5 mm, anterior style ca. 2 mm long, apex foliaceous 2–3 × 3–3 mm, erect or slightly recurved, divergent, glabrous; stigmas lateral. Samaras green when immature and

brown when mature, dorsal wings developed 2–3 cm long, sericeous, hairs not irritating at the touch; nut ca. 8–12 × 7–8 mm, 1 pair of lateral winglets, sericeous; carpophore not seen.

**Specimens examined:** BRAZIL, BAHIA: Jeremoabo, estrada em direção ao Povoado Quelés, 09°58'40.1"S, 38°26'00.3"W, 399 m, 10.II.2014, fl., J.V. Santos 173 (HUNEB); *ibid.*, estrada em direção ao Povoado Quelés, após a casa do mel, 09°58'40.1"S, 38°26'00.3"W, 399 m, 10.II.2014, fl., J.V. Santos 174 (HUNEB).

**Distribution, ecology and phenology:** Endemic to Brazil, *Stigmaphyllon blanchetii* is widely distributed in the Northeast and Southeast regions in the phytogeographic dominions of Caatinga, Cerrado and Atlantic Forest (Mamede et al. 2017). In the study area, *Stigmaphyllon blanchetii* can be found on sandy soils in open areas of trails. It was collected with flowers only in February.

**Taxonomy:** It is differentiated from its congeners by leaves with a tomentose to glabrescent adaxial surface and densely tomentose abaxial surface, and samaras with the nut bearing a pair of the lateral winglets.

**29. *Stigmaphyllon paralias*** A.Juss., Fl. Bras. Merid. 3: 59. 1833. Iconography: Anderson, C. (1997: 186). Figure 7E

Erect subshrubs 0.30–1 m tall; branches flattened. Leaves chartaceous, decussate, sometimes verticillate; stipules deciduous; petiole 4–10 mm long, sericeous, 1 pair of glands acropetolar, patelliform; lamina 4–9 × 2.5–6.2 cm, ovate, elliptic to oblong or orbicular, apex obtuse, rounded or acute, base acute, rounded or slightly cordate, margin entire, adaxial surface glabrous to glabrescent, abaxial surface sericeous, glands present or absent. Inflorescence of umbels disposed in dichasia; bracts 1.5–2 mm long, triangular; peduncle absent or ca. 2 mm long; bracteoles 1.5–2 mm long, triangular, eglandular; pedicel 13–20 mm long. Flowers 4–10; sepals 3.5–5 × 2.5–3.5 mm, apex obtuse, erect, adaxial surface glabrous, abaxial surface sericeous; elaiophores (7–) 8, 1–2.2 mm long; petals yellow, orbicular, margin denticulate, lateral petals with limb 12–16 × 13–17 mm, claw 2–3 mm long, latero-anterior petals entirely expanded, free, posterior petal with limb ca. 11 × 12 mm, 1 pair of glands at base, claw 4–5 mm long; stamens 10, fertile, heteromorphic; filaments 2.5–4.5 mm long, glabrous; anthers ca. 1–2.2 mm long, thecae glabrous, connectives glandular; staminodes absent. Ovary ca. 2 mm long, sericeous; posterior styles 3.5–4 mm long, apex foliaceous ca. 3 × 3.5, anterior style 3.5–4 mm long, apex foliaceous ca. 2 × 3 mm, erect or slightly recurved, divergent, glabrous; stigmas lateral. Samaras green when immature, dorsal wing reduced to a crest, 2–3 mm long, sparsely sericeous, hairs not irritating at the touch; nut globose, ca. 7 × 6 mm, sparsely sericeous; carpophore absent.

**Specimens examined:** BRAZIL, BAHIA: Canudos, Estação Biológica de Canudos, estrada em direção ao Saco I e Saco II das Araras, 09°58'40.5"S, 39°00'08.9"W, 562 m, 13.III.2014, fl.; fr., J.V. Santos 316 (HUNEB); Euclides da Cunha, Sucupira do Galo, 10°21'01.0"S, 38°41'11.6"W, 544 m, 16.I.2014, fl., J.V. Santos 154 (HUNEB); Glória, Serra do Retiro, depois da Estação XIII, 09°20'05.0"S, 38°18'44.7"W, 598 m, 22.IV.2014, fl., J.V. Santos 288 (HUNEB); Jeremoabo, Olho D'água dos Negros, 10°01'09.3"S, 38°22'19.7"W, 473 m, 20.XII.2013, fl., J.V. Santos 103 (HUNEB); *ibid.*, início da estrada secundária, 09°56'36.5"S, 38°27'13.8"W, 533 m, 21.XII.2013, fl.; fr., J.V. Santos 143 (HUNEB); Paulo Afonso, estrada entre o povoado Serrota e Juá, 09°24'28.3"S, 38°26'31.1"W, 404 m, 23.IV.2014, fl.; fr., J.V. Santos 293



(HUNEB); *ibid.*, Estação Ecológica Raso da Catarina (ESEC), próximo a Mata da Pororoca, 09°47'59.6"S, 38°29'30.7"W, 691 m, 07.III.2014, fl.; fr., J.V. Santos 297 (HUNEB); *ibid.*, estrada em direção a Mata da Pororoca, 09°39'12.9"S, 38°29'26.8"W, 619 m, 14.XII.2014, fl., J.V. Santos 480 (HUNEB); *ibid.*, início da estrada em direção a Mata da Pororoca, 09°44'11.5"S, 38°29'28.7"W, 620 m, 21.VII.2014, fl., J.B. Lima 434 (HUNEB).

**Distribution, ecology and phenology:** *Stigmaphyllon paralias* is endemic to Brazil and is distributed in nine states of the Northeast Region, in addition to the Midwest and Southeast regions. It occurs in the phytogeographic dominions of Caatinga, Cerrado and Atlantic Forest (Mamede et al. 2017). The species is very abundant in the RCE, and can be found on sandy soils in preserved or anthropized areas, as well as open environments of the roadside. It was collected only with flowers in January and July and with flowers and fruits in March, April and December.

**Taxonomy:** It is easily recognized in the RCE by being a subshrub with flattened branches and decussate leaves.

**30. *Tetrapterys paludosa*** A.Juss., Arch. Mus. Hist. Nat. 3: 540. 1843. Figure 7F; 8K-P

Scandent shrubs ca. 2 m alt or lianas. Leaves chartaceous, opposite; stipules ca. 0.1 mm long, persistent or deciduous; petiole 1–1.2 mm long, tomentose, eglandular; lamina 1.5–2 × 0.7–1.5 mm, elliptic, lanceolate or ovate to lanceolate, apex acute or rounded, apiculate, base acute, cuneate or slightly rounded, margin entire, adaxial surface sericeous, abaxial surface densely sericeous to tomentose. Inflorescence of pseudoracemes; bracts 1.8–3 × 1.8–2 mm, ovate; peduncle 5–7 mm long; bracteoles 3–7 × 1–1.5 mm long, lanceolate to linear; pedicel 1.5–2.5 mm long. Flowers 2–4; sepals 2.2–3.5 × 1.1–2 mm, apex obtuse, erect, adaxial surface sparsely sericeous at base or glabrous, abaxial surface sericeous to tomentose; elaiophores 1–2.5 mm long; petals yellow, glabrous, orbicular, margin slightly denticulate, lateral petals with limb 6–7 × 5–5.6 mm, claw 2–2.5 mm long, latero-anterior petals entirely expanded, free, posterior petal with limb ca. 5 × 4 mm, eglandular, claw 2–2.5 mm long; stamens 10, heteromorphic; filaments 2–4 mm long, glabrous; anthers ca. 1 mm long, thecae glabrous, connectives eglandular; staminodes absent. Ovary 1–2 mm long, sericeous, with lateral wings; styles 3.5–4.2 mm long, erect, apex obtuse, divergent, glabrous; stigmas lateral and subapical. Samaras green when immature, X-shaped, upper lateral wings 8–11 × 5.5–7 mm, lower lateral wings 3–3.7 × 1–2 mm, dorsal wing 1–1.6 mm long, glabrous; nut ca. 2.5–3 × 2–2.5 mm, sparsely sericeous; carpophore absent.

**Specimens examined:** BRAZIL, BAHIA: Jeremoabo, APA Serra Branca, estrada em direção à Serra do Navio, 09°53'02.4"S, 38°39'48.5"W, 457 m, 25.IX.2014, fl., J.V. Santos 467 (HUNEB); *ibid.*, estrada sentido Serra Branca, 09°53'56.0"S, 38°40'50.7"W, 10.XII.2008, fl., M.V. Romão 422 (HUNEB).

**Distribution, ecology and phenology:** *Tetrapterys paludosa* is endemic to Brazil, is distributed in the Northeast and Southeast regions and occurs only in the phytogeographic dominions of Cerrado and Atlantic Forest (Mamede et al. 2017). This species is treated here as a new occurrence for the Caatinga. In the RCE, it can be found on sandy soils in preserved vegetation in the EPASB. It was collected in November and December only with flowers.

**Taxonomy:** The species is easily recognized by its liana habit, leaves with the laminas sericeous to tomentose abaxially, and X-shaped samaras with the upper lateral wings larger than the lower two and with a dorsal wing.

**31. *Tetrapterys ramiflora*** A.Juss., A. St-Hil. Fl. Bras. Mer. 3: 8. 1832. Figure 7G; 8Q-U

Decumbent shrubs ca. 1.70 m tall. Leaves chartaceous, opposite; stipules ca. 0.2 mm long, persistent or deciduous; petiole 1–3 mm long, sparsely tomentose, eglandular; lamina 2.5–3 × 1.5–2 cm, elliptic, ovate to lanceolate, apex acute or rounded, apiculate, rarely emarginate, base acute or rounded, margin undulate, tomentose on both surfaces. Inflorescence of umbelliform corymbs; bracts ca. 2–2.5 × 1.5–2 mm, ovate; peduncle 2.5–4 mm long; bracteoles ca. 3–3.5 × 1–1.5 mm, oblong; pedicel 2–2.5 mm long. Flowers with sepals 2–2.2 × 1–1.5 mm, apex obtuse, erect, adaxial surface sparsely sericeous or glabrous, abaxial surface sericeous to tomentose; elaiophores 8, 1–1.5 mm long; petals yellow, glabrous, orbicular, margin slightly denticulate, lateral petals with limb 4–4.2 × 3–3.5 mm, claw 1.1–1.5 mm long; latero-anterior petals entirely expanded, free, posterior petal with limb ca. 4.5 × 3.5 mm, eglandular, claw ca. 2 mm long; stamens 10, heteromorphic; filaments 1.2–3 mm long, glabrous; anthers ca. 0.7–1 mm long, thecae glabrous, connectives eglandular; staminodes absent. Ovary ca. 1 mm long, sparsely sericeous, with lateral wings; styles ca. 3 mm long, erect, apex obtuse, divergent, glabrous; stigmas lateral and subapical. Fruit not observed.

**Specimens examined:** BRAZIL, BAHIA: Ribeira do Pombal, Pedrinhas, 10°56'S, 38°29'W, 223 m, 06.VIII.2014, fl., J.V. Santos 374 (HUNEB).

**Distribution, ecology and phenology:** *Tetrapterys ramiflora* is endemic to Brazil and is distributed in the North, Northeast, Midwest and Southeast regions in the Caatinga, Cerrado and Atlantic Forest (Mamede et al. 2017). In the RCE this species can be found in open vegetation along trails on sandy soils. It was collected only in August bearing flowers.

**Taxonomy:** It is differentiated from its congeners by having a shrubby habit, leaves with both surfaces tomentose and undulate margins.

**32. *Thryallis longifolia*** Mart., Nov. Gen. Sp. Pl. 3(1): 78. 1829. Iconography: Anderson, C. (1995: 5). Figure 7H-I

Errect or scandent shrubs to 1.70 m tall. Leaves chartaceous, opposite; stipules 1–2 mm long, persistent; petiole 5–10 mm long, densely stellate, a pair of glands prominently raised in region median to apical, 1–2 mm long; lamina 4–10 × 2–5.9 cm, elliptic or ovate, apex obtuse, apiculate or emarginate, apiculate or acuminate, base rounded, slightly cordate or cuneate, margin slightly revolute, adaxial surface glabrous or sparsely stellate-pubescent, abaxial surface densely stellate-pubescent, 1 pair of glands at base or absent. Inflorescence of thyrses; bracts 2–2.5 mm long, triangular; peduncle ca. 2–3 mm long; bracteoles 1–2 mm long, triangular, eglandular; pedicel 5–13 mm long. Flowers decussate; sepals 7–7.5 × 5–5.2 mm, apex acute to rounded, revolute, adaxial surface and abaxial surface with hairs stellate; elaiophores absent; petals yellow, glabrous, reniform, margin erose to crenate, lateral petals with limb 10–12 × 14–17 mm, claw

4–5 mm long, latero-anterior petals entirely expanded, free, posterior petal with limb ca.  $10 \times 15$  mm, claw ca. 4 mm long; stamens 10, fertile, monomorphic; filaments ca. 2 mm long, glabrous; anthers 1.8–2.2 mm long, thecae glabrous, connectives eglandular; staminodes absent. Ovary ca. 2 mm long, with hairs stellate; styles 3, posterior styles 2–2.2 mm long, anterior style ca. 3 mm long, apex acute or obtuse, erect, glabrous; stigmas apical or subapical. Cocci, three, green when immature and brown when mature, ca. 3 mm high, with crest reduced, 2–3 mm long, hairs stellate, not irritating at the touch, sepals persistent, straight, stiff and spreading on the fruit.

**Specimens examined:** BRAZIL, BAHIA: Euclides da Cunha, Sucupira do Galo,  $10^{\circ}21'01.0''S$ ,  $38^{\circ}41'11.6''W$ , 544 m, 16.I.2014, fl., J.V. Santos 154 (HUNEB); Jeremoabo, início da estrada secundária,  $09^{\circ}56'36.5''S$ ,  $38^{\circ}27'13.8''W$ , 533 m, 21.XII.2013, fl.; fr., J.V. Santos 143 (HUNEB).

**Distribution, ecology and phenology:** According to Mamede et al. (2017), *Thryallis longifolia* is endemic to Brazil and is distributed in the Northeast and Southeast regions in the Caatinga and Cerrado. In the RCE, the species is found on sandy soils in conserved or anthropized environments. It was collected in the RCE with flowers and fruits in December and only with flowers in January.

**Taxonomy:** It is easily recognized in the RCE for being the only species with stellate hairs. The eglandular sepals become straight, stiff and spreading on the fruit.

## Supplementary material

The following online material is available for this article:  
Appendix 1 - List of additional material examined

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## Author Contributions

Jéssica Vieira dos Santos: Contribution to the acquisition of data; analysis and interpretation of data; work of writing and conception and design work.

André Márcio Amorim: Contribution to the interpretation of data and critical review adding intellectual content.

Adilva de Souza Conceição: Contribution to the acquisition of data; analysis and interpretation of data; work of writing; critical review adding intellectual content and conception and design work.

## Conflicts of interest

The authors declare that they have no conflict of interest related to the publication of this manuscript.

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