



## Boraginales Juss. ex Bercht. & J.Presl in the Ecoregion Raso da Catarina, Bahia, Brazil

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**Abstract:** Raso da Catarina is one of the eight Ecoregions recognized for the Caatinga biome. This work includes the taxonomic study of Boraginales Juss. ex Bercht. & J.Presl in the Ecoregion Raso da Catarina, Bahia state, Brazil. The samples analyzed were collected from March 2009 to July 2013. The analyses were supplemented with dried collections kept in the herbaria: ALCB, IPA, HRB, HST, HTSA, HUEFS, HVASF, PEUFR and UFP. Two families, five genera and 16 species were recorded. The Cordiaceae family was represented by genera *Cordia* L. [*C. glabrata* (Mart.) A.DC., *C. rufescens* A.DC., *C. superba* Cham. and *C. trichotoma* (Vell.) Arráb. ex Steud.] and *Varronia* P.Browne [*V. curassavica* Jacq., *V. globosa* Jacq., *V. leucocephala* (Moric.) J.S.Mill. and *V. leucomalloides* (Taroda) J.S.Mill.] and Heliotropiaceae with the genera *Euploca* Nutt. [*E. paradoxa* (Mart.) J.I.M.Melo & Semir and *E. procumbens* (Mill.) Diane & Hilger], *Heliotropium* L. [*H. angiospermum* Murray, *H. elongatum* (Lehm.) I.M.Johnst. and *H. indicum* L.] and *Myriopus* Small [*M. candidulus* (Miers) Feuillet, *M. rubicundus* (Salzm. ex DC.) Luebert and *M. salzmannii* (DC.) Diane & Hilger]. The species most commonly found were *Cordia glabrata*, *Varronia globosa*, *V. leucocephala*, *Euploca procumbens*, *Heliotropium angiospermum* and *H. elongatum*, associated with sandy soils. *Cordia superba* and *C. trichotoma* were found in moist environments, higher altitudes, clay or sandy-clayey soils. *Euploca paradoxa* was collected on the banks of the São Francisco River, and *Varronia leucomalloides* occurs in the hiperxerophytic Caatinga associated with rocky or sandy soils and in areas of contact between Caatinga and Cerrado, these species were more restricted in the area. Comments are made on the morphology and taxonomy, illustrations, and data on geographical distribution and phenology, besides a key for the taxa studied.

**Keywords:** floristic, taxonomy, semiarid, Caatinga, diversity.

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**Resumo:** O Raso da Catarina é uma das oito Ecorregiões reconhecidas para o bioma Caatinga. Os espécimes analisados foram coletados no período de março/2009 a julho/2013, as análises foram complementadas com coleções herborizadas depositadas nos herbários: ALCB, IPA, HRB, HST, HTSA, HUEFS, HVASF, PEUFR e UFP. Foram registradas duas famílias, cinco gêneros e 16 espécies. A família Cordiaceae foi representada pelos gêneros *Cordia* L. [*C. glabrata* (Mart.) A.DC., *C. rufescens* A.DC., *C. superba* Cham. e *C. trichotoma* (Vell.) Arráb. ex Steud.] e *Varronia* P.Browne [*V. curassavica* Jacq., *V. globosa* Jacq., *V. leucocephala* (Moric.) J.S.Mill. e *V. leucomalloides* (Taroda) J.S.Mill.] e Heliotropiaceae com os gêneros *Euploca* Nutt. [*E. paradoxa* (Mart.) J.I.M.Melo & Semir e *E. procumbens* (Mill.) Diane & Hilger], *Heliotropium* L. [*H. angiospermum* Murray, *H. elongatum* (Lehm.) I.M.Johnst. e *H. indicum* L.] e *Myriopus* Small [*M. candidulus* (Miers) Feuillet, *M. rubicundus* (Salzm. ex DC.) Luebert and *M. salzmannii* (DC.) Diane & Hilger]. As espécies mais comumente encontradas foram *Cordia glabrata*, *Varronia globosa*, *V. leucocephala*, *Euploca procumbens*, *Heliotropium angiospermum* e *H. elongatum*, associadas aos solos arenosos. *Cordia superba* e *C. trichotoma* encontradas em ambientes mais úmidos, sobre altitudes mais elevadas, solos argilosos ou areno-argilosos. *Euploca paradoxa* coletada nas margens do rio São Francisco e, *Varronia leucomalloides* ocorrendo em Caatinga hiper-xerófila, associada a solos pedregosos ou arenosos, e em áreas de contato entre Caatinga e Cerrado, foram às espécies mais restritas na área. São apresentados comentários sobre morfologia e taxonomia, ilustrações, e dados sobre distribuição geográfica e fenologia, além de uma chave para os táxons estudados.

**Palavras-chave:** florística, taxonomia, semiárido, Caatinga, diversidade

## Introduction

Gürke (1893) subdivided Boraginaceae *s.l.* into four subfamilies: Boraginoideae, Cordioideae, Ehretioideae and Heliotropioideae, a traditional treatment adopted by many taxonomists of the family. However, phylogenetic studies using morphological and molecular data recognized that Boraginaceae *s.l.* is not monophyletic. These studies has suggested the elevation of the subfamilies to the family rank (Böhle & Hilger 1997, Gottschling et al. 2001, Diane et al. 2002, Hilger & Diane 2003, Gottschling 2003, Gottschling et al. 2005, Weigend & Hilger 2010, Miller 2013).

All phylogenetic studies based on morphological and molecular data supported the circumscription of Boraginales including seven families, 130 genera and 2.700 species (Gottschling 2003, Weigend & Hilger 2010, Refulio-Rodriguez & Olmstead 2014). Their representatives are distributed in the Tropical, Subtropical and temperate regions of the world, with centers of diversity in Central America and the Northwestern and central regions of South America, East Asia and Mediterranean habitats of the Old and New World (Al-Shehbaz 1991).

Despite Boraginales being strongly supported in phylogenetic studies, in the Brazilian Check list of the Flora the classification adopted was a traditional treatment (Melo et al. 2014). In Brazil, the order includes ten genera and 132 species, distributed among the families Cordiaceae (2 gen./79 spp.), Heliotropiaceae (3 gen./45 spp.), Boraginaceae *s.s.* (3 gen./5 spp.) and Ehretiaceae (2 gen./3 spp.). In the Caatinga biome, two families, seven genera and 41 species were recorded for Boraginales.

The first and more comprehensive taxonomic treatment for the Boraginales in Brazil was carried out by Fresenius (1857) in *Flora Brasiliensis* (as Boraginaceae *s.l.*), which is still one of the most complete works for the group in this country. The most recent contributions on the taxonomy of this order in Brazil are generally local floristic surveys such as the works conducted by Smith (1970), Santa Catarina; Guimarães et al. (1971), Guanabara (São Paulo); Taroda & Silva (2002), Ilha de Cardoso (São Paulo); Cavalheiro et al. (2003), Picinguaba (São Paulo); Melo & França (2003), Grão-Mogol (Minas Gerais); Melo & Sales (2004, 2005), Xingó (Alagoas and Sergipe); Conceição (2007), Bahia; Melo & Andrade (2007), in an area of Ecological Station Raso da Catarina (Bahia); Melo et al. (2007), Serra Talhada (Pernambuco); Freitas et al. (2008), Fernando de Noronha (Pernambuco); Melo & Lyra-Lemos (2008), Alagoas; Melo (2009), Mirandiba (Pernambuco); Melo et al. (2009a), in an area of seasonal forest (Pernambuco); Melo et al. (2011), APA das Onças (Paraíba); Melo (2012), National Park of Catimbau (Pernambuco); Ranga et al. (2012), São Paulo; Melo et al. (2013), Goiás and Tocantins and Vieira et al. (2013), APA Serra Branca (Bahia). Besides the floristic surveys, taxonomic revisions of genera were also carried out. One can highlight the works of: Taroda & Gibbs (1986b), *Cordia* subgenus *Varronia* (Brazil); Taroda & Gibbs (1987), *Cordia* subgenus *Myxa* (Brazil); Stapf (2007), *Cordia* section *Pilicordia* (Brazil); Melo & Semir (2008), *Heliotropium* (Brazil); Melo & Semir (2010), *Euploca* (Brazil) and Cavalheiro et al. (2011), *Tournefortia* extra-Amazon (Brazil).

Despite the existence of studies on Boraginales for the semiarid of northeastern Brazil, specific works for the state of Bahia are scarce, especially those that include identification keys and taxonomic descriptions. Given the importance of Boraginales in the Caatinga vegetation, this work had as a goal carry out the survey of the species of the order in the Ecoregion Raso da Catarina in order to contribute to knowledge about

the flora of the semiarid region of Bahia, as well as provide support for the development of plans to manage the existing conservation units that exist in this Ecoregion.

## Material and Methods

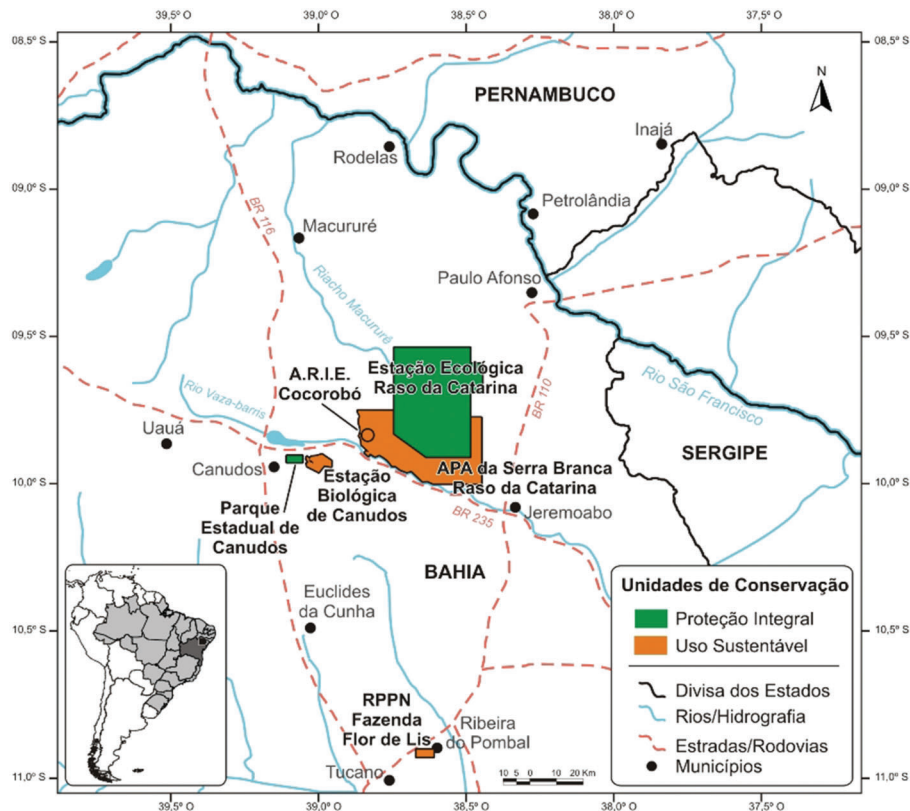
The Raso da Catarina Ecoregion comprises 30.800 km<sup>2</sup> and is one of the eight Ecoregions recognized for the Caatinga. In the North-south direction it is narrow and elongated. In the North, West and East it is limited to the southern hinterland depression. The northeastern portion has limits with the Borborema Plateau and the southern part of the Bahia hinterland, in the Zona da Mata. The Ecoregion is a basin with soils that are very sandy, deep and little fertile. Its relief is usually flat, but with canyons in the western part (formed by sandstone outcrops). The altitudes above sea level vary from 400 to 600 m in the southern part (Bahia) and from 350 to 700 m in the northern part (Jatobá basin, Pernambuco). In the southern part (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) sands soils prevail. There exists little surface water in the region except in the areas of the canyons. The predominant vegetation is the sandy, bushy Caatinga, very dense and less thorny than the Caatinga of crystalline soils (Velloso et al. 2002).

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

The expeditions concentrated in the conservation units (Figure 1) located in the southern part of the Ecoregion, portion Bahia; APA 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 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).

The study was based on fieldwork carried out in the period between March 2009 and July 2013, besides information complemented by the analysis of species deposited in the herbaria ALCB, IPA, HRB, HUEFS, HVASF, PEUFR and UFP, acronyms according to Thiers 2013 (continuously updated), and in the herbaria HST and HTSA, acronyms according to the Brazilian network of herbaria (SBB 2013). Field collections and observations were performed during random walks exploring most of the study area. Herborization and material processing followed the methodology by Fosberg & Sachet (1965) and Mori et al. (1989), with collection of fertile material having flowers and/or fruit. Observations were made about the distribution of the

## Boraginales Ecoregion Raso da Catarina, Bahia



**Figure 1.** Location of conservation units of the Ecoregion Raso da Catarina, state of Bahia, Brazil.

species and the type of soil (Tricart 1972, Sampaio 1995). Specimens were deposited in the herbarium of the State University of Bahia (HUNEB – Collection Paulo Afonso) and duplicates were sent to the main herbaria in the state of Bahia.

Identifications were made based mainly on specialized bibliography (e.g., Johnston 1928, 1930, Taroda & Gibbs 1986a, 1986b, Diane et al. 2002, Melo & Sales 2004, 2005, Melo & Andrade 2007, Miller & Gottschling 2007, Freitas et al. 2008, Melo & Semir 2008, Melo et al. 2009a and Melo & Semir 2010), protologues, photos of type collections and consulting of the collections in the visited herbaria. For taxonomic descriptions, the terminologies proposed by Radford et al. (1974), Ribeiro et al. (1999) and Harris & Harris (2001) were adopted. Taxonomic treatment includes a key for the identification of taxa, descriptions, illustrations, and data of the geographical distribution and reproductive phenology of the species.

## Results and Discussion

### Boraginales Juss. ex Bercht. & J.Presl, *Prir. Rostlin*: 244. 1820.

Herbs, subshrubs, shrubs or trees, less frequently lianas, rare root parasites; glabrous or with trichomes presenting cystoliths or bodies similar to basal cystoliths and/or calcified walls. Leaves alternate, sub-opposite or more rarely opposite or verticillate, simple, without stipules, petiolate or sessile with different shapes. Inflorescences paniculate, glomerulate-globose, spicate, scorpioid or helicoid, terminal, falsely terminal or axillary or internodal; with or without bracts. Flowers regular, pentamerous, calyx dialisepalous or gamosepalous, corolla gamopetalous. Stamens 5, epipetalous, alternate to the corolla lobes, generally inserted

in the height of the lower half of the tube or in the corolla mouth; anthers free or coherent with each other, introrse or extrorse, appendiculate or devoid of appendages, with longitudinal dehiscence. Gynoecium superior, syncarpous, 2-(6-14) carpels; ovary 2 or 4 locular by intrusion of a false septum, nectariferous disk generally present, fine or thickened; style entire to bipartite with 1-(2-4) stigmas. Placentation axial, parietal or basal; ovule 1 to many per locule, anatropous or hemianatropous. Fruit dry or fleshy, dehiscent or indehiscent, capsules, schizocarps or drupes. Seed 1 to many, embryo straight or curved.

In the Ecoregion Raso da Catarina, Bahia, two families, five genera and 16 species were found. Cordiaceae is represented by two genera: *Varronia* P.Browne and *Cordia* L., both with four species. Heliotropiaceae comprehends three genera: *Heliotropium* L. and *Myriopus* L., with three species each, and *Euploca* Nutt., with two species.

*Cordia rufescens* A.DC., *Euploca paradoxa* (Mart.) J.I.M.Melo & Semir, *Varronia leucocephala* (Moric.) J.S.Mill. and *V. leucomalloides* (Taroda) J.S.Mill. are endemic to Brazil. *Varronia leucocephala* and *V. leucomalloides* have a distribution restricted to the northeast region, being the first species endemic to the Caatinga and the second occurring in the Caatinga and Cerrado. *Varronia globosa* Jacq. is found from the south of the United States to the northeast of South America. However, in Brazil it occurs exclusively in the Caatinga vegetation from Ceará to Bahia. The remaining species have a large distribution on the Brazilian territory (Taroda & Gibbs 1986b, Melo et al. 2014).

*Cordia glabrata* (Mart.) A.DC., *V. globosa*, *V. leucocephala*, *E. procumbens* (Mill.) Diane & Hilger, *H. angiospermum* Murray and *H. elongatum* (Lehm.) I.M.Johnst., were species

predominant in the studied area, being directly related to sandy soils common in the region. However, *Cordia superba* Cham. and *C. trichotoma* (Vell.) Arráb. ex Steud are found in environments that are more humid, at higher altitudes, clayey or sandy-clayey soils. *Euploca paradoxa*, collected at the banks of the São Francisco River, and *V. leucomalloides*, occurring in hiperxerophytic Caatinga associated with stony or sandy soils and in areas of contact between Caatinga and Cerrado, were the species more restricted in the studied area.

### Identification key for the families and species

1. Inflorescences paniculate, spicate or glomerulate-globose; style bipartite ..... **Cordiaceae**
2. Leaves with margin entire or irregularly dentate in apical portion; inflorescences paniculate.
  3. Calyx smooth; corolla 3.5–5 cm long, deciduous.
    - Young twigs nut-brown to brown.
    4. Young twigs generally reddish, glabrous, villous to tomentose; abaxial surface tomentose; calyx reddish, externally tomentose ..... **2. C. rufescens**
    4. Young twigs nut-brown to brown, scabrous to strigose; abaxial surface puberulous to glabrescent, hispid to strigose on nerves; calyx nut-brown to green-vinaceous, externally scabrous ..... **3. C. superba**
  3. Calyx costate; corolla 1.2–3.2 cm long, marcescent.
    5. Leaf blade oval, oboval to elliptical, abaxial surface with stellate trichomes; flowers 1.4–1.9 cm long; corolla lobes with subtruncate apex ..... **4. C. trichotoma**
    5. Leaf blade oval to orbicular, abaxial surface with simple trichomes; flowers 2.5–3.5 cm long; corolla lobes with obtuse to rounded apex .... **1. C. glabrata**
2. Leaves with margin serrate; inflorescence spicate or glomerulate-globose.
  6. Leaf blade with attenuate base; inflorescence spicate ..... **5. V. curassavica**
  6. Leaf blade with cuneate to truncate or cuneate to obtuse base; inflorescence glomerulate-globose.
    7. Branches hirsute intermingled by smaller floccose or densely floccose trichomes; inflorescence terminal and axillary ..... **8. V. leucomalloides**
    7. Branches scabrous to strigose or velvety intermingled by larger hirsute trichomes; inflorescence terminal and/or internodal.
      8. Calyx with filiform lobes at apex; corolla 2.5–7 mm long ..... **6. V. globosa**
      8. Calyx with acute lobes at apex; corolla 20–35 mm long ..... **7. V. leucocephala**
1. Inflorescences scorpioid, rare flowers solitary and axillary; style entire ..... **Heliotropiaceae**
9. Fruit schizocarpic with 2 to 4 nutlets.
  10. Anthers coherent at apex; fruit 4 nutlets with 1 seed each.
    11. Leaf blade lanceolate; flowers solitary, pedicellate, bracteate, corolla entirely yellow, lobes alternated by appendages; fruit depressed-pyriform, pubescent to strigose ..... **9. E. paradoxa**
    11. Leaf blade elliptical to oboval; flowers inserted in inflorescences, subsessile, ebracteate, corolla white, mouth yellow, lobes not alternated by appendages; fruit sub-globose, sericeous .... **10. E. procumbens**
  10. Anthers free; fruit 2 nutlets with 2 seeds each.
    12. Petiole wingless; fruit depressed-globose, verrucose ..... **11. H. angiospermum**
    12. Petiole winged; fruit mitriform, costate.
      13. Leaf blade with adaxial surface bullate; stigma clavate; fruit with juxtapose nutlets ..... **12. H. elongatum**
      13. Leaf blade with adaxial surface flat; stigma sub-capitate; fruit with divergent nutlets ..... **13. H. indicum**
9. Fruit drupaceous with 4 pyrenes.
  14. Branches grayish to whitish devoid of lenticels; inflorescences congested, pyramidal; fruit villous to tomentose ..... **14. M. candidulus**
  14. Branches brown to brown-grayish, with lenticels; inflorescences lax, secundiflorous; fruit glabrous to hirsute.
    15. Trichomes foliar with sharply discoid base; ovary obclavate; stigma short ..... **15. M. rubicundus**
    15. Trichomes foliar without discoid base; ovary conic-pyramidal; stigma elongated ..... **16. M. salzmännii**

**Cordiaceae** R.Br. ex Dumort., Anal. Fam. Pl.: 25. 1829.

Trees, shrubs, rarely subshrubs, lianas or herbs. Leaves simple, alternate, rarely subopposed, petiolate or sessile with entire or serrate margin, persistent or deciduous. Inflorescences paniculate, spicate or glomerulate-globose, terminal, axillary and internodal, lax or congested, rare solitary flowers generally without bracts. Flowers dichlamydeous, actinomorphic, androgynous or functionally unisexual, many times presenting heterostyly of the distyly type; calyx 5-lobed, gamosepalous, rarely dialisepalous (*Coldenia*), tubular to campanulate, persistent, sometimes accrescent; corolla 5-lobed, gamopetalous, tubular (e.g., infundibuliform, hippocrateriform or salverform) often pale, rarely yellow, orange or red-orange, lobes patent or reflexed, alternate to the sepals. Stamens 5, with developed filaments, epipetalous, frequently pubescent at point of insertion; anthers free, introrse or extrorse, dorsifixed. Gynoecium bicarpelar, ovary falsely tetralocular by the intrusion of a septum, 2 ovules per locule, orthotropous or anatropous; style terminal bipartite; 4 stigmas, clavate to filiform. Fruit indehiscent, drupe, endocarp bony or fibrous, undivided. Seed 1, testa with transfer cells, endosperm abundant or absent, embryo straight or curved; cotyledons plicate.

Cordiaceae includes the genera *Coldenia* (monospecific), *Cordia* L. (ca. 250 spp.) and *Varronia* P.Browne (ca. 100 spp.). Their representatives are distributed in the Tropical and Subtropical regions, registered from the New World with centers of diversity in Central America and in northern South America with few species in temperate regions. Phylogenetic studies using morphological and molecular data supported the family as monophyletic. The main morphological characters that supported the family were: endocarp undivided, stigma with four lobes and plicate cotyledons (Gottschling 2003, Miller & Gottschling 2007, Stapf 2007). In Brazil the family is represented by *Cordia* (48 spp.) and *Varronia* (28 spp.). In the Caatinga vegetation there are 19 species of the family, among these 11 belonging to *Cordia* and eight to *Varronia*.

**1. Cordia glabrata** (Mart.) A.DC., Prodr. 9: 473. 1845. Figure 2a-f

Tree, 4–6 m tall; branches cylindrical, brown-grayish with longitudinal fissure, pubescent to tomentose or glabrous, lenticels whitish. Leaf with blade 6.2–5.5 × 4.5–14 cm, semi-coriaceous to

coriaceous, discolorous, oval to orbicular, apex acute to rounded, margin entire, base obtuse, truncate to subcordate, adaxial surface glabrescent, abaxial surface tomentose, trichomes simple; petiole 0.8–4 cm long, cylindrical, not sulcate, pubescent to tomentose; venation brochidodromous reticulate. Inflorescence 4–16 cm long, panicle, terminal and internodal, tomentose; peduncle 2–7 cm long, tomentose. Flowers 2.5–3.5 cm long, sessile; calyx 1.7–2 cm long, tubular, costate, green, externally tomentose, internally strigose to sericeous, lobes 2.5–3.5 × 1.8–2 mm, oval, apex acute; corolla 2–3.2 cm long, salverform, white, brown when old, marcescent, glabrous, tube 1.8–2.5 cm long, cylindrical, lobes 0.9–1.2 × 1–1.2 cm, orbicular, patent, smooth, apex obtuse to rounded; stamens 5(–6), free, inserted 1–1.6 cm from base, filaments 1.2–2.4 cm long, brown, pubescent at base, anthers 4–6 × 2–2.8 mm, oblong to lanceolate, apex acute; ovary 1.5–2 cm long, globose, glabrous, nectariferous disk 1–2 mm long; style ca. 1.7 cm long to the brevistyle flowers, 2.4–3 cm long to longistyle flowers, stigmas 1–2 mm long, filiform, erect or recurved, glabrous. Drupes ca. 0.7 × 3–4.2 mm, ovoid, brown at maturity, glabrous to pubescent. Seed 1, ca. 4 × 3 mm, globose, green.

**Material examined:** BRAZIL, BAHIA: Canudos, ca. 5 km de Canudos, 09°14'44" S e 39°06'11" O, 397 m, 12.VIII.2004, fr., A.A. Santos et al. 2442 (HUEFS); Glória, Reserva Indígena Pankararé, 09°20' S e 38°15' O, 16.I.1993, fl. e fr., F.P. Bandeira 148 (ALCB); Serra de Itaparica, 09°10'22" S e 38°32'16" O, 323 m, 16.VII.2007, fl. e fr., A.S. Conceição 1066 (HUEFS); Serra do Salgado, 09°14'22" S e 38°36'38" O, 337 m, 08.IX.2007, fl., A.S. Conceição 1182 (HUEFS); Jeremoabo, estrada entre Jeremoabo e Canudos, 10°01'32" S e 38°31'38" O, 298 m, 13.VII.2012, fl., D.D. Vieira 333 (HUNEB); fl., D.D. Vieira 334 (HUNEB); Estrada 30 km antes de Paulo Afonso, 10°04' S e 38°28' O, 08.X.1961, fl., A. Lima 78236 (HUEFS); Fazenda Serra Branca, Trilha em direção ao Tanque de Coleta, 09°54'01" S e 38°41'01" O, 399 m, 05.XI.2010, fl. e fr., L.R. Silva 12 (HUNEB); 09°54'09" S e 38°41'41" O, 370 m, 04.IX.2012, fl., D.D. Vieira 388 (HUNEB); Santa Brígida, Estação Ecológica Raso da Catarina, 09°44' S e 38°07' O, 24.X.1982, fl., M.L. Guedes 550 (ALCB).

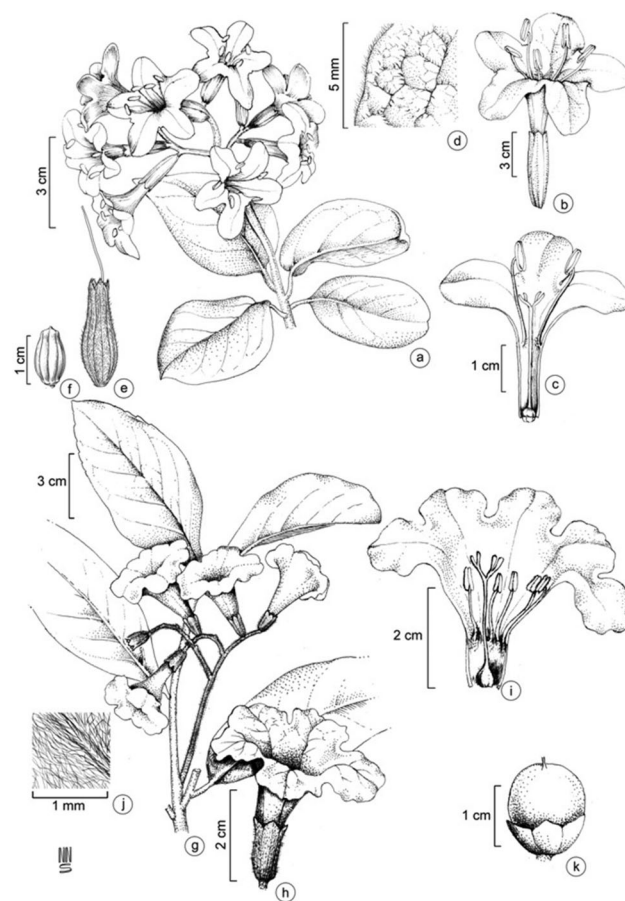
*Cordia glabrata* occurs in Bolivia, Paraguay and Brazil (Miller 2013). Widely distributed in Brazil, it has been registered from Bahia, Goiás, Mato Grosso, Mato Grosso do Sul, Minas Gerais, Pará and Piauí, related to the Amazon rainforest, Caatinga and Cerrado (Melo et al. 2014).

In the study area it was found in rocky soils and anthropized areas forming small populations. It was collected with flowers from July to November and fruits in November and December.

In the study area the species can be confused mainly with *Cordia trichotoma*, since both represent arboreal habit, costate calyx and marcescent corolla. However, *C. glabrata* can be recognized because it has an oval to orbicular leaf blade, simple trichomes (vs. oval, oboval to elliptic, stellate trichomes in *C. trichotoma*), flowers 2.5–3.5 cm long (vs. 1.4–1.9 cm long), orbicular corolla lobes and obtuse to rounded apex (vs. oblong and subtruncate apex).

**2. *Cordia rufescens* A.DC.**, Prodr. 9: 476. 1845. Figure 2g-j  
*Cordia piauhiensis* Fresen. Fl. Bras. 8(1): 9. 1857.

Subshrub or shrub, 0.6–2 m tall, erect; branches cylindrical, generally with young twigs generally reddish, villous to tomentose. Leaf with blade 4–16.5 × 2.5–8.2 cm, semi-coriaceous, discolorous, oval, elliptic to oboval, apex acute to rounded, margin entire or dentate at apical portion, base cuneate, adaxial



**Figure 2.** a-f) *Cordia glabrata*: a) flowering branch; b) flower; c) longitudinal section of flower, showing androecium and gynoecium; d) simple trichomes on the adaxial surface of the leaf; e) fruit enclosed by calyx; f) fruit. g-k) *Cordia rufescens*: g) flowering branch; h) flower; i) longitudinal section of flower, showing androecium and gynoecium; j) detail of indumentum on the abaxial surface of leaf; k) fruit. a-d) L.R. Silva 12; e-f) D.D. Vieira 393; f-k) A.S. Conceição 1792.

surface strigose, abaxial surface tomentose; petiole 0.3–1.2 cm long, subcylindrical, slightly sulcate, tomentose; venation brochidodromous. Inflorescence 4–8 cm long, panicle with helicoid branches, terminal, lax; peduncle 1.5–5.2 cm long, tomentose. Flowers 3.5–5 cm long, sessile; calyx 1–1.4 cm long, tubular-campanulate, smooth, reddish, externally tomentose, internally glabrous, lobes 3–4 × 3–4.2 mm, oval to depressed-oval, apex obtuse; corolla 3.5–4.6 cm long, infundibuliform, white, with chestnut blotches, deciduous, externally strigose, internally glabrous, tube 2.5–3 cm long, cylindrical, lobes ca. 0.9 × 1.6 cm, orbicular, slightly reflexed, wrinkled, apex rounded, slightly emarginate, rarely with acumen; stamens 4(–5), free, inserted 0.6–0.8 cm from base, filaments 1.2–2 cm long, chestnut, pubescent to the half of length, anthers 3–3.2 × 1.8–2 mm, oblong, apex acute; ovary 2–3 mm long, sub-globose, glabrous, nectariferous disk absent; style 1.5–2.8 cm long, stigmas 1–1.5 mm long, clavate, erect, glabrous. Drupes 1.6–2 × 1–1.5 cm, ovoid, apex apiculate, green when young, cream to yellow when mature, glabrous. Seed 1, 1.2–1.5 × 0.8–1 cm, ovoid, apex aristate, green, reticulate.

**Material examined:** BRAZIL, BAHIA: Euclides da Cunha, Estrada para Sucupira do Galo, 10°21'00" S e 38°41'20" O, 546 m,

11.VI.2013, fl. e fr., D.D. Vieira 447 (HUNEB); Fazenda Santa Rosa, 38°00'53" S e 10°05'00" O, 18.VIII.2003, fr., M.L. Guedes et al. 10563 (ALCB); Jeremoabo, APA Serra Branca, Baixa Grande, Próximo ao povoado de Quelés, 09°58'31" S e 38°27'00" O, 569 m, 19.III.2009, fl. e fr., A.S. Conceição 1556 (HUNEB); 03.IX.2012, fl. e fr., D.D. Vieira 383 (HUNEB); Estrada saindo de Quelés, sentido Estação Ecológica Raso da Catarina, 09°58'01" S e 38°26'12" O, 497 m, 29.VII.2009, fl. e fr., A.S. Conceição 1802 (HUNEB); 09°55'14" S e 38°29'26" O, 509 m, 17.VI.2009, fl., D.D. Vieira 01 (HUNEB); 09°55'17" S e 38°29'24" O, 08.IX.2009, fl. e fr., M.V.V. Romão 540 (HUNEB); 09°57'11" S e 38°26'30" O, 513 m, 08.XII.2009, fl., D.D. Vieira 52 (HUNEB); Fazenda Barreirinhas, 10°16'00" S e 38°47'00" O, 21.X.2006, fl., M. Oliveira 2546 (UFP); Limite entre a APA Serra Branca e a Estação Ecológica Raso da Catarina, 09°53'43" S e 38°29'33" O, 648 m, 17.VI.2009, fl., A.S. Conceição 1654 (HUNEB); Paulo Afonso, Estação Ecológica Raso da Catarina, 09°52'22" S e 38°51'05" O, 31.I.2006, fl., M.M.M. Lopes et al. 463 (HUEFS); Estrada em direção à Mata da Pororoca, 09°48'17" S e 38°29'31" O, 711 m, 18.VIII.2012, fl., D.D. Vieira 351 (HUNEB); Trilha da encruzilhada, 09°48'18" S e 38°29'33" O, 596 m, 01.VII.2010, fl. e fr., A.A.S. Lopes 975 (HUNEB); Ribeira do Pombal, 10°50'00" S e 38°32'00" O, 16.XIII.2003, M.L. Guedes 10436 (ALCB); Sentido Banzaê, 10°46'41" S e 38°34'42" O, 212 m, 10.VI.2013, bot. e fl., L.R. Silva 187 (HUNEB); Santa Brígida, Raso da Catarina, 09°58'05" S e 38°49'38" O, 611 m, 28.VI.2002, fl., L.P. Queiroz et al. 7278 (HUEFS).

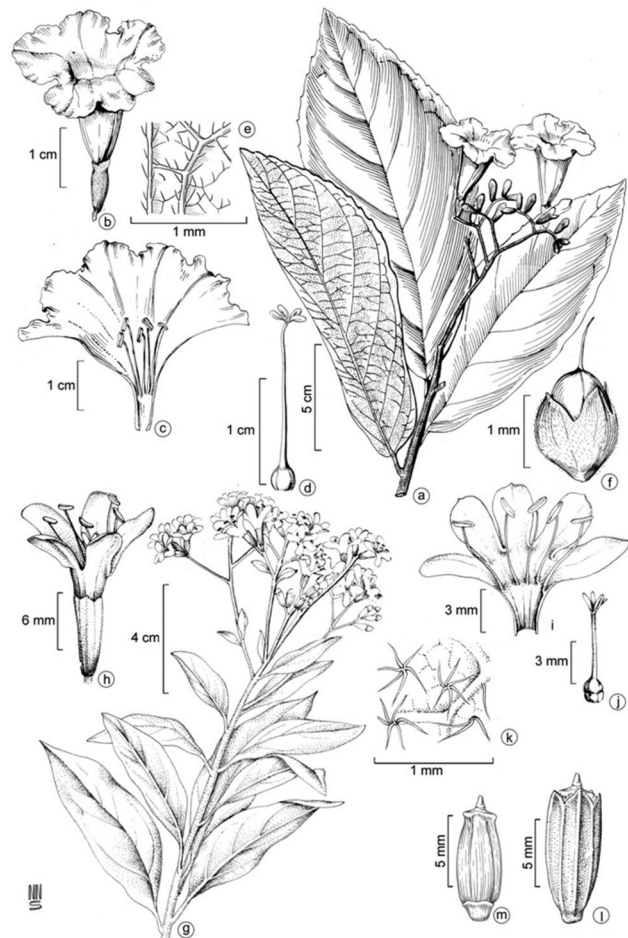
This species is endemic to Brazil and dispersed in north-eastern (Maranhão, Piauí, Ceará, Paraíba, Pernambuco, Bahia, and Alagoas), mid-western (Goiás) and southeastern (Minas Gerais) Brazil, in Caatinga and Cerrado environments (Johnston 1930, Melo et al. 2014).

It was collected in ecotonal areas of Caatinga-Cerrado, at the edge of forests and in environments that are recovering from burned-over land with flowers between June and December and flowers and fruits from July to March.

It is similar to *Cordia superba* mainly because both have leaves with entire or irregular margin in the apical portion, smooth calyx and the corolla with same size or superior to 3.5 cm long, deciduous. However, *Cordia rufescens* presents young twigs generally reddish, villous to tomentose (vs. nut-brown to brown, scabrous to strigose in *C. superba*), leaves with tomentose abaxial surface (vs. puberulous to glabrescent, hispid to strigose on nerves) and reddish calyx, tomentose externally (vs. nut-brown to green-vinaceous, externally scabrous).

### 3. *Cordia superba* Cham., Linnaea 4: 474. 1829. Figure 3a-f

Shrub or small tree, 1.5–4 m tall; branches cylindrical, young twigs nut-brown to brown, scabrous to strigose. Leaf with blade 4–17.5 × 2.2–7.5 cm, semi-coriaceous, discolorous, elliptical to oboval, apex acute to acuminate or rounded, margin entire or dentate at apical portion, base cuneate, obtuse or oblique, adaxial surface scabrous to glabrescent, abaxial surface puberulous to glabrescent, hispid to strigose on nerves; petiole 0.4–1 cm long, subcylindrical, sulcate, scabrous to hispid; venation brochidodromous. Inflorescence 5–9 cm long, panicle with helicoid branches, terminal, lax; peduncle 3.5–6 cm long, hispid to scabrous. Flowers 3.5–5.5 cm long, subsessile; calyx 1.2–1.6 cm long, tubular-campanulate, smooth, nut-brown to green-vinaceous, externally scabrous, internally glabrous, lobes 3.5–3.6 mm, oval, apex obtuse,



**Figure 3.** a-f) *Cordia superba*: a) flowering branch; b) flower; c) longitudinal section of flower, showing androecium; d) gynoecium; e) detail of indumentum on the abaxial surface of leaf; f) fruit. g-m) *Cordia trichotoma*: g) flowering branch; h) flower; i) longitudinal section of flower showing androecium; j) gynoecium; k) stellate trichomes on the adaxial surface of leaf; l) fruit enclosed by calyx; m) fruit. a-f) D.D. Vieira 461; g-k) D.D. Vieira 97; l-m) D.D. Vieira 380.

slightly mucronate; corolla 3.5–5 cm long, infundibuliform, white, deciduous, externally scabrous to glabrescent, internally glabrous, tube 2.8–4 cm long, cylindrical, lobes 0.9–1.2 × 1.5–2 cm, orbicular, slightly reflexed, wrinkled, apex rounded with acumens; stamens 5, free, inserted 0.7–1 cm from base, filaments 1.3–1.6 cm long, nut-brown, pubescent to the half of the length, anthers 2.8–4 × 1.2–2 mm, oblong, apex acute; ovary 2–3 mm long, sub-globose, glabrous, nectariferous disk absent; style 1.2–1.8 cm long, stigmas 1–1.2 mm long, clavate, erect, glabrous. Drupes immature, ca. 1.6 × 1.2 cm, ovoid, apex apiculate, green, glabrous. Seed 1, ca. 1.1 × 0.6 cm, ovoid, apex aristate, green, reticulate.

**Material examined:** BRAZIL, BAHIA: Cícero Dantas, estrada a 2 km da entrada de Cícero Dantas, 10°51'45" S e 38°33'52" O, 436 m, 10.VI.2013, fl., V.O. Amorim 237 (HUNEB); 10°34'30" S e 38°22'50" O, 432 m, 01.VII.2013, fl. e fr., D.D. Vieira 458 (HUNEB); 10°34'30" S e 38°22'50" O, 432 m, 01.VII.2013, fl., D.D. Vieira 459 (HUNEB); 10°34'30" S e 38°22'50" O, 432 m, 01.VII.2013, fl., D.D. Vieira 460 (HUNEB); 10°34'30" S e 38°22'50" O, 432 m, 01.VII.2013, fl., D.D. Vieira 461 (HUNEB).

*Cordia superba* is endemic from Brazil. It is distributed from Maranhão to Paraná in Caatinga, Cerrado and Atlantic forest environments (Melo et al. 2014).

In the study area it was found on sandy-clayey soils at the forest edge, close to the municipality of Cícero Dantas. Specimens were collected with flowers in June and with flowers and fruits in July.

The species is morphologically similar to *Cordia rufescens*. However, it can be easily differentiated by the color and indumentum of the young twigs, calyx and indumentum of the leaf blade (see comments in *C. rufescens*).

**4. *Cordia trichotoma*** (Vell.) Arráb. ex Steud., Nom. ed. 2: 419. 1840. Figure 3g-m

Tree, 4–10 m tall; branches cylindrical, brown-grayish with longitudinal fissure, pubescent, composed of stellate trichomes, lenticels whitish. Leaf with blade 3–12.7 × 1.2–4.5 cm, chartaceous to semicoriaceous, discolorous, oval, oboval to elliptical, apex acute to acuminate, margin entire, base cuneate, rarely rounded or oblique, adaxial surface strigose to glabrescent, ferruginous, abaxial surface pubescent to glabrescent, trichomes stellate, more pronounced on nerves; petiole 0.2–3 cm long, subcylindrical, sulcate, pubescent to sericeous; venation eucamptodromous. Inflorescence 3–15 cm long, panicle, terminal, lax to congested; peduncle 2–6 cm long, pubescent to tomentose. Flowers 1.4–1.9 cm long, subsessile; pedicel ca. 2 mm, cylindrical, tomentose; calyx 0.8–1 cm long, tubular, costate, green, externally tomentose, internally sericeous, lobes 1.4–1.8 × 0.6–1.1 mm, oval-lanceolate, apex slightly mucronate; corolla 1.2–1.7 cm long, hipocrateriform, white, brown when old, marcescent, glabrous, tube 0.7–1 cm long, cylindrical, lobes 0.8–1 × 0.5–0.7 cm, oblong, patent, smooth, apex subtruncate; stamens 5(–6), free, inserted 0.5–0.7 cm from base, filaments 0.6–1.1 cm long, brown, pubescent at base, anthers 2–1.5 × 0.8–1 mm, oblong to lanceolate, apex acute; ovary ca. 2 mm long, sub-globose, glabrous, nectariferous disk 1–1.2 mm long; style ca. 0.9 cm long in brevistyle flowers, ca. 1.4 cm long in longistyle flowers, stigmas 1.5–2.5 mm long, clavate, erect, glabrous. Drupe 0.5–0.7 × 2.5–3.2 mm, subcylindrical, brown at maturity, glabrous. Seed 1, 1.4–5.8 × 2–2.4 mm, ovoid, cream-colored.

**Material examined:** BRAZIL, BAHIA: Euclides da Cunha, Sítio do Jaime, 10°50' S e 39°00' O, 21.IV.2004, fl., M.L. Guedes et al. 11467 (ALCB); Jeremoabo, APA Serra Branca, Baixa Grande, Próximo ao povoado de Quelés, 09°58'31" S e 38°27'01" O, 564 m, 03.IX.2012, fl., D.D. Vieira 385 (HUNEB); Estrada de acesso ao povoado Quelés, sentido Estação Ecológica Raso da Catarina, 09°58'01" S e 38°26'12" O, 493 m, 28.VII.2009, fl., A.S. Conceição 1776 (HUNEB); fl., A.S. Conceição 1792 (HUNEB); 09°53'02" S e 38°32'39" O, 650 m, 22.IX.2010, fl., D.D. Vieira 97 (HUNEB); 09°57'48" S e 38°26'13" O, 493 m, 03.IX.2012, fl., D.D. Vieira 380 (HUNEB); Fazenda Barreirinhas, 10°16'00" S e 38°47'00" O, 21.X.2006, fl., M. Oliveira 2555 (UFP); Fazenda Natureza, 10°03'88" S e 38°43'88" O, 427 m, 12.VIII.2005, fl., E.B. Miranda et al. 887 (HUEFS); Muro, 10°04'16" S e 38°43'05" O, 439 m, 18.X.2009, fl., E. Melo et al. 6738 (HUEFS); Ribeira Pombal, 10°50' S e 38°32' O, 15.X.2003, fl., M. L. Guedes 10507 (ALCB).

*Cordia trichotoma* is registered to Brazil, Northeastern Argentina, Eastern Paraguay and Bolivia (Maia 2004, Miller 2013). In Brazil, the species is found in the Northeast, mid-west, Southeast and Southern regions in the vegetation of the Amazon rainforest, Cerrado, gallery forests and Caatinga (Taroda & Gibbs 1987, Melo et al. 2014).

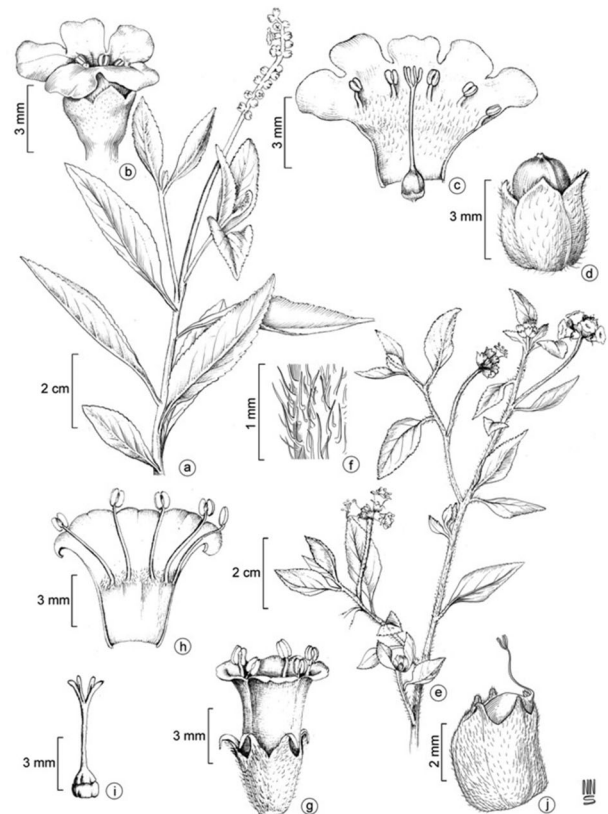
In the study area the species has a restricted distribution in sandy and sandy-clayey soils. Collected with flowers from July to September and fruits between September and November.

The species can be confused with *Cordia glabrata* (see details in *C. glabrata*). However, *C. trichotoma* has an oval, oboval to elliptical leaf blade, stellate trichomes, flowers 1.4–1.9 cm long, oblong corolla lobes and subtruncate apex.

**5. *Varronia curassavica*** Jacq., Enum. Syst. Pl.:14. 1760. Figure 4a-d

*Cordia curassavica* (Jacq.) Roem. & Schult. Syst. Veg. 4: 460. 1819.

Shrub, 1.5–3.5 m tall, erect, sub-scandent to scandent; branches cylindrical, sulcate, brown-grayish, villous to hirsute, lenticels brownish. Leaf with blade 1.5–9 × 0.5–3 cm, chartaceous, discolorous, lanceolate, apex acute, margin serrate, base attenuate, adaxial surface sparsely strigose to glabrescent, abaxial surface pubescent to tomentose; petiole 0.3–1 cm long, cylindrical, sulcate, tomentose; venation semi-craspedodromous. Inflorescence 1.7–10.5 cm long, spicate, terminal and internodal, congested; peduncle 1.5–6 cm long, tomentose and hirsute. Flowers 4–7 mm long, sessile; calyx 2–4 mm long, campanulate, cream to green, externally pubescent, internally glabrous, lobes 1–1.5 × 0.8–1.2 mm, oval-lanceolate, apex trullate; corolla 3–5 mm long, infundibuliforme to salverform, white, glabrous, tube 2–4 mm long, cylindrical, lobes 1.2–2.5 × 0.8–1.8 mm, oval, reflexed, wrinkled,



**Figure 4.** a-d) *Varronia curassavica*: a) flowering branch; b) flower; c) longitudinal section of flower, showing androecium and gynoecium; d) fruit. e-j) *Varronia globosa*: e) flowering branch; f) detail of indumentum of branch; g) flower; h) longitudinal section of flower showing androecium; i) gynoecium; j) fruit. a-d) A.S. Conceição 1756; e-i) R.R. Varjão 07; j) J.V. Santos 07.

apex obtuse to emarginate; stamens 5, free, inserted 2.5–3.5 mm from base, filaments 0.8–1.5 mm long, green, pubescent at base, anthers 0.8–1 × ca. 0.5 mm, orbicular, apex obtuse; ovary 0.8–1.5 mm long, sub-globose, glabrous, nectariferous disk ca. 0.2 mm long; style 0.9–1.5 mm long in brevistyle flowers; ca. 4 mm long in longistyle flowers, stigmas 0.5–0.8 mm long, clavate, erect, villous. Drupes 4–7 × 4–6 mm, ovoid, green when young, red when mature, glabrous. Seed 1, 4.5 × ca. 3 mm, conical, light green, smooth.

**Material examined:** BRAZIL, BAHIA: Jeremoabo, Baixa dos Quelés, 09°58'05" S e 38°44'00" O, 506 m, 17.X.2009, fl., E. Melo et al. 6692 (HUEFS); Limite com a Estação Ecológica Raso da Catarina, 09°53'43" S e 38°29'33" O, 648 m, 17.VI.2009, fl. e fr., A.S. Conceição 1667 (HUNEB); Muro, 10°00'41" S e 38°43'56" O, 439 m, 18.X.2009, fl., E. Melo et al. 6771 (HUEFS); Trilha do Logradouro, 09°56'06" S e 38°28'48" O, 648 m, 19.VI.2009, fl., A.S. Conceição 1729 (HUNEB); Trilha dos Quelés, sentido Estação Ecológica Raso da Catarina, 09°57'17" S e 38°26'25" O, 575 m, 19.VI.2009, fl. e fr., A.S. Conceição 1756 (HUNEB); 09°57'29" S e 38°26'17" O, 502 m, 09.XII.2009, fl. e fr., M.V.V. Romão 558 (HUNEB); 09°53'02" S e 38°32'39" O, 650 m, 22.IX.2010, fl., D.D. Vieira 96 (HUNEB); 09°57'44" S e 38°25'60" O, 502 m, 09.VII.2012, fl. e fr., J.V. Santos et al. 28 (HUNEB); 09°58'18" S e 38°56'08" O, 407 m, 09.VII.2012, fl. e fr., J.V. Santos et al. 32 (HUNEB); 09°57'48" S e 38°26'13" O, 486 m, 05.VI.2012, fl. e fr., A.F.S. Brito 73 (HUNEB); Vaca Morta, 09°54'52" S e 38°41'41" O, 364 m, 16.IV.2008, fr., M.V.V. Romão 68 (HUNEB); 09°54'55" S e 38°41'45" O, 358 m, 12.III.2008, fl., A.S. Conceição 1218 (HUNEB); 09°53'17" S e 38°40'10" O, 384 m, 17.IV.2008, fl. e fr., A.S. Conceição 1294 (HUNEB); Rodelas, 21.I.1987, fl., L.B. Silva & G.O. Matos e Silva 47 (HRB).

*Varronia curassavica* occurs in the Southeast of Mexico reaching Panama, the West Indies up to the Northeast of South America (Gibson 1970). In Brazil it is widely distributed, occurring in the northeastern (Alagoas, Bahia and Piauí), southeastern (Espírito Santo, Minas Gerais, Rio de Janeiro and São Paulo) and southern (Paraná and Rio Grande do Sul) regions, in Amazon rainforest, Caatinga and Atlantic forest (Melo et al. 2014).

In the study area this species is found only in the localities of Jeremoabo and Rodelas in environments of the hiperxerophytic Caatinga vegetation and in areas of contact with seasonal Caatinga-forest, on rocky, sandy or sandy-clayey soils. It was collected with flowers and fruits in January, March, April, June, July, September and December.

It can be securely recognized in the area as it is shrubby, erect, sub-scandent to scandent, leaf blade with attenuated base, spicate inflorescences, calyx lobes oval-lanceolate with trullate apex and infundibuliform to salverform corolla.

**6. *Varronia globosa* Jacq., Enum. Syst. Pl.: 14. 1760. Figure 4e-j**

*Cordia globosa* (Jacq.) Kunth, Nov. Gen. Sp. 3: 76. 1819.

Shrub, 1.5–4 m tall, erect; branches cylindrical, brown-grayish, scabrous to strigose, lenticels whitish. Leaf with blade 1.5–6.2 × 0.6–2.7 cm, chartaceous, discolorous, oval to lanceolate, apex acute, margin serrate, base cuneate to truncate, adaxial surface scabrous to strigose, sometimes having trichomes with tuberculate base, abaxial surface strigose to tomentose; petiole 0.2–0.8 cm long, cylindrical, not sulcate, strigose to hirsute; venation semi-craspedodromous. Inflorescence 1–2.4 cm long, glomerulate-globose, terminal and

internodal, congested; peduncle 0.2–5 cm long, strigose. Flowers 4–9 mm long, sessile; calyx 3–5 mm long, campanulate, green, externally strigose, internally glabrous, lobes 1–3 × 0.5–1 mm, oval, apex filiform; corolla 2.5–7 mm long, infundibuliform, white, glabrous, tube 3–6 mm long, cylindrical, lobes 1.5–2 × 2.2–3 mm, orbicular, patent, smooth, apex truncate to emarginate; stamens 5, free, inserted 2.5–4 mm from base, filaments 1.5–2.5 mm long, white, pubescent at base, anthers 0.6–1.2 × 0.5–0.8 mm, oblong to oval, apex acute; ovary 1–1.5 mm long, pyriform, glabrous, nectariferous disk 0.8–1 mm long; style ca. 1.2 mm long in brevistyle flowers, 2.9–3.5 mm long in longistyle flowers, stigmas 0.5–1.2 mm long, clavate, erect, glabrous. Drupes 3.5–6 × 2–4.5 mm, globose, green when young, red when mature, glabrous. Seed 1, 3–4.5 × 1.5–2.5 mm conical to ovoid, green-brownish, smooth.

**Material examined:** BRAZIL, BAHIA: Canudos, Estação Biológica de Canudos, 09°42'57" S e 38°58'60" O, 400 m, 27.VI.2002, fl., L.P. Queiroz et al. 7215 (HUEFS); 10°16'60" S e 39°15'00" O, 16.II.2003, fl., F.H.M. Silva 336 (HUEFS); 09°45'55" S e 38°58'33" O, 381 m, 17.II.2004, fl. e fr., R.M. Harley 54861 (HUEFS); Base 1, próximo a cerca, 09°56'59" S e 38°59'32" O, 397 m, 29.III.2012, fl., D.D. Vieira 239 (HUNEB); Caminho para a Gruta do Minadouro, 09°46'09" S e 3°58'44" O, 383 m, fl., R.M. Harley 54872 (HUEFS); Toca Velha, próximo a casa de Sr. Zequinha, 09°56'47" S e 38°59'10" O, 383 m, 17.V.2012, fl., D.D. Vieira 297 (HUNEB); Trilha em direção à base 2, 09°56'67" S e 38°59'68" O, 400 m, 28.II.2012, fl., D.D. Vieira 233 (HUNEB); Parque Estadual de Canudos, Trilha do Vale da Morte, 09°55'06" S e 39°06'58" O, 378 m, 07.V.2013, fl., D.C. Silva 163 (HUNEB); Glória, BA 210, sentido Glória-Rodelas, ca. 3,5 km do Centro Administrativo José Messias, 09°31'38" S e 38°40'05" O, 310 m, 05.V.2007, fl., A.S. Conceição et al. 959 (HUEFS); Brejo do Burgo, 09°18'53" S e 38°21'30" O, 378 m, 14.VI.2013, fl. e fr., V.O. Amorim 285 (HUNEB); Serra de Itaparica, 09°10'22" S e 38°32'16" O, 323 m, 16.VII.2007, fl. e fr., A.S. Conceição 1081 (HUEFS); Jeremoabo, APA Serra Branca, 10°04' S e 38°21' O, 20.I.2006, fl., G.C. Sessego et al. 235 (ALCB); Estrada sentido Serra do Navio, 09°52'33" S e 38°39'09" O, 432 m, 10.VII.2012, fl. e fr., J.V. Santos et al. 38 (HUNEB); 09°51'56" S e 38°38'34" O, 484 m, 4.XI.2010, fl., R.R. Varjão 07 (HUNEB); 09°52'43" S e 38°39'12" O, 473 m, 10.VII.2012, fl. e fr., A.F.S. Brito 95 (HUNEB); Fazenda Serra Branca, ca. 4,5 km da Vaca Morta, 09°52'52" S e 38°39'45" O, 464 m, 18.IV.2008, fl. e fr., A.S. Conceição 1322 (HUNEB); Povoado Quelés, sentido Estação Ecológica Raso da Catarina, 09°57'17" S e 38°26'25" O, 575 m, 19.VI.2009, fl., A.S. Conceição 1747 (HUNEB); Tanque de Dentro, 09°51'56" S e 38°38'45" O, 156 m, 30.X.2008, fl. e fr., M.V.V. Romão 391 (HUNEB); Vaca Morta, 09°54'52" S e 38°41'41" O, 364 m, 16.IV.2008, fl., M.V.V. Romão 71 (HUNEB); Estrada entre Jeremoabo e Canudos, 10°06'60" S e 38°47'50" O, 297 m, 27.VI.2007, fl., R.M. Santos 1653 (HUEFS); Paulo Afonso, Aldeia Serrota, 09°48'33" S e 38°08'33" O, 26.IV.2006, fl., M. Colaço 114 (HUEFS); 09°48'33" S e 38°08'33" O, 06.VI.2006, fl., M. Colaço 135 (HUEFS); Estação Ecológica Raso da Catarina, estrada da base da Petrobrás em direção à Mata da Pororoca, 09°46'50" S e 38°40'52" O, 658 m, 18.VIII.2012, fl., D.D. Vieira 341 (HUNEB); Ribeira do Pombal sentido Banzaê, 10°46'41" S e 38°34'42" O, 212 m, 10.VI.2013, fl. e fr., L.R. Silva 183 (HUNEB).

*Varronia globosa* is registered to the south of the United States, Mexico, Central America including the West Indies,



Venezuela and the Northeast of South America (Nowicke 1969, Miller 1988). However, in Brazil it is found exclusively in the Caatinga vegetation from Ceará to Bahia (Taroda & Gibbs 1986b, Melo et al. 2014).

The species is widely distributed in the studied area, associated with bushy to shrubby-arboreal Caatinga on sandy, clayey or rocky soils. It blooms from February to November, virtually all year round.

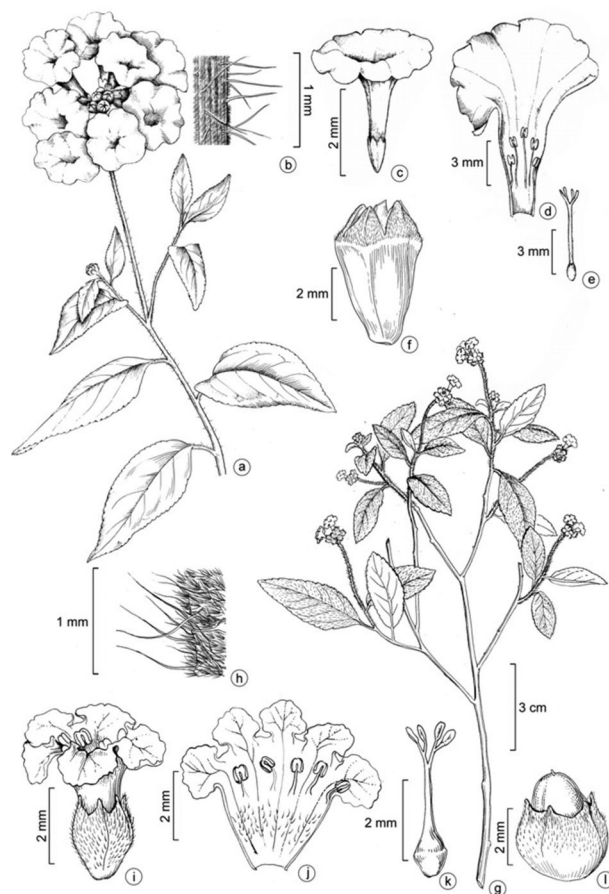
*Varronia globosa* has characteristics similar to *V. leucocephala* and *V. leucomalloides*, being shrubby, glomerulate-globose inflorescence, campanulate calyx and infundibuliform corolla, the morphological features being more similar to these species. However, *V. globosa* can be differentiated from the two species by its scabrous to strigose branches (vs. velvety intermingled by larger hirsute trichomes in *V. leucocephala* and hirsute intermingled by smaller floccose or densely floccose trichomes in *V. leucomalloides*); terminal and internodal inflorescence (vs. terminal in *V. leucocephala* and terminal and axillary in *V. leucomalloides*), and mainly by the calyx with lobes of filiform apex (vs. acute in *V. leucocephala* and mucronate in *V. leucomalloides*).

7. *Varronia leucocephala* (Moric.) J.S.Mill., Novon 17(3): 374. 2007. Figure 5a-f

*Cordia leucocephala* Moric. Pl. Nouv. Amer. 9: 148. 1847.

Shrub, 1–2.5 m tall, erect; branches cylindrical, brown-grayish, velutinous intermingled by larger hirsute trichomes, lenticels whitish. Leaf with blade 2.2–9 × 0.6–4.5 cm, chartaceous, discolorous, oval, elliptical to oval-lanceolate, apex acute, margin serrate, base cuneate to obtuse, adaxial surface strigose, abaxial surface pubescent to tomentose; petiole 0.2–1.8 cm long, subcylindrical, slightly sulcate, velutinous, interspersed with larger trichomes, hirsute; venation craspedodromous. Inflorescence 2.8–4 cm long, glomerulate-globose, terminal, congested; peduncle 1–3.2 cm long, velutinous. Flowers 2.4–3.5 cm long, sessile; calyx 4–6 mm long, campanulate, light green, puberulent to strigose externally, internally glabrous, lobes 1–1.8 × 0.8–1.2 mm, oval, apex acute; corolla 20–35 mm long, infundibuliform, white, glabrous, tube 1.8–3 cm long, cylindrical, lobes 2.5–4 × 5–8 mm, suborbicular, patent, smooth, apex emarginate; stamens 5, free, inserted 0.5–0.7 cm from base at the different levels, filaments 1.5–3 cm long, white, pubescent at base, anthers 8–2 × 1–1.2 mm, oblong to oval, apex acute; ovary ca. 2 mm long, sub-globose, glabrous, nectariferous disk 0.2–0.4 mm long; style 0.7–0.9 cm long in brevistyle flowers, ca. 2.5 cm long in longistyle flowers, stigmas 0.8–1 mm long, filiform, erect, glabrous. Drupes 2–2.8 × 3–5 mm, ovoid, green when young, red when mature, glabrous. Seed 1, 2.5–3 × 1.8–2 mm, conical, light green, rugose.

**Material examined:** BRAZIL, BAHIA: Canudos, 10°01'16" S e 39°02'50" O, 504 m, 19.II.2004, fl., R.M. Harley 54906 (HUEFS); ca. 35,7 km de Canudos, 09°56'60" S e 38°06'44" O, 344 m, 28.VI.2002, fl., L.P. Queiroz 7268 (HUEFS); Euclides da Cunha, estrada Euclides da Cunha-Monte Santo, 10°48'33" S e 39°06'60" O, 439 m, 23.V.2003, fl., C. Correia 245 (HUEFS); Glória, Aldeia Serrota, 09°33'00" S e 38°48'33" O, 06.I.2006, fl., M. Colaço 86 (HUEFS); Brejo do Burgo, 09°20' S e 38°15' O, 02.VII.1995, fl., F.P. Bandeira 204 (HUEFS); 09°19'09" S e 38°26'30" O, 320 m, 14.VI.2013, fl. e fr., D.C. Silva 186 (HUNEB); Raso da Catarina, 09°33'00" S e 38°48'33" O, 05.VI.2004, fl., M.V.M. Oliveira 693 (HUEFS); Serra do Cágado, 09°20' S e 38°15' O, 11.I.1993, fl., F.P. Bandeira 112 (ALCB); Jeremoabo, APA Serra Branca, 10°04' S e 38°21' O,



**Figure 5.** a-f) *Varronia leucocephala*: a) flowering branch; b) detail of indumentum of branch; c) flower; d) longitudinal section of flower, showing androecium; e) gynoecium; f) fruit. g-l) *Varronia leucomalloides*: g) flowering branch; h) detail of indumentum of branch; i) flower; j) longitudinal section of flower showing androecium; k) gynoecium; l) fruit. a-e) A.S. Conceição 1295; f) L.R. Silva 64; g-k) D.D. Vieira 434; l) D.D. Vieira 445.

20.I.2006, fl., G.C. Sessegolo et al. 222 (ALCB); Fazenda Serra Branca, estrada principal depois da base, 09°54'32" S e 38°41'27" O, 468 m, 27.III.2012, fl. e fr., L.R. Silva 64 (HUNEB); Vaca Morta, 09°54'42" S e 38°41'56" O, 123 m, 23.VIII.2008, fl., M.V.V. Romão 298 (HUNEB); 09°53'17" S e 38°40'10" O, 384 m, 17.IV.2008, fl., A.S. Conceição 1295 (HUNEB); Paulo Afonso, acesso próximo a casa nº 1 do Raso da Catarina, 09°33' S e 38°29' O, 20.VI.1981, fl., M.L. Guedes et al. 298 (ALCB); Aldeia Serrota, 09°29' S e 38°12' O, 31.VIII.2006, fl., R.S. Gonçalves 28 (HST); Reserva Ecológica Raso da Catarina, 09°33' S e 38°29' O, 25.VI.1982, fl., L.P. Queiroz & M.L. Guedes 369/487 (ALCB); Estrada para Estação Ecológica Raso da Catarina, 09°39'08" S e 38°20'48" O, 360 m, 18.VIII.2012, fl., D.D. Vieira 361 (HUNEB); Rodelas, Salgado do Melão, 08°50' S e 38°46' O, 03.VIII.1994, fl., M.C. Ferreira 603 (HRB); Santa Brigida, 09°44' S e 38°07' O, 24.V.1984, fl., L.C. Oliveira-Filho 177 (ALCB); Uauá, Serra da Canabrava, 09°60' S e 39°60' O, 562 m, 21.V.2003, fl., J. Costa 397 (HUEFS).

The species is endemic to the Caatinga and registered for the states of Bahia, Ceará, Paraíba, Pernambuco and Piauí (Taroda & Gibbs 1986b, Melo et al. 2014).

In the study area the species is associated with the shrubby and shrubby-arborescent Caatinga in sandy and stony soils, common at the roadsides and in anthropized areas. It was collected with flowers between April and August.

*Varronia leucocephala* resembles to *V. globosa* and *V. leucomalloides* (see comments in *V. globosa*). It can be differentiated from the two species by the velutinous branches interspersed with large hirsute trichomes, terminal inflorescence, flowers having a calyx lobes with acute apex and corolla 20–35 mm long.

**8. *Varronia leucomalloides*** (Taroda) J.S.Mill., Novon 17(3): 374. 2007. Figure 5g-1

*Cordia leucomalloides* Taroda, Notes Roy. Bot. Gard. Edinburgh 44(1): 125. 1986.

Shrub, 1–2 m tall, erect; branches cylindrical, green-grayish, hirsute intermingled by smaller floccose or densely floccose trichomes. Leaf with blade 1.5–5 × 0.6–2 cm, chartaceous, discolorous, elliptical, oval to lanceolate, apex acute to cuneate, margin serrate, base cuneate to obtuse, slightly asymmetrical, adaxial surface tomentose to hirsute, abaxial surface densely floccose, hirsute on venation; petiole 0.2–0.4 cm long, cylindrical, tomentose to hirsute; venation craspedodromous. Inflorescence 0.8–1 cm long, glomerulate-globose, terminal and axillary, congested; peduncle 0.4–2 cm long, tomentose. Flowers 4–6 mm long, sessile; calyx 2.5–3 mm long, campanulate, cream to green, floccose externally, internally glabrous, lobes 0.6–0.8 × 0.4–0.5 mm, oval to lanceolate, apex mucronate; corolla 4–5 mm long, infundibuliform, white, glabrous, tube ca. 3 mm long, cylindrical, lobes 1.5–2 × 2–3 mm, broad-oval, reflexed, wrinkled, apex obtuse; stamens 5, free, inserted ca. 2 mm from base, filaments 0.6–1 mm long, green, glabrous, anthers 0.4–0.5 × 0.3–0.4 mm, oval, apex acute to rounded; ovary 0.8–1 mm long, globose, glabrous, nectariferous disk ca. 0.2 mm long; style 2–3 mm long, stigmas 0.3–0.5 mm long, clavate, erect or recurved, glabrous. Drupes 3.5–4 × 2.8–3.2 mm, sub-globose, green when young, red when mature, glabrous. Seed 1, 2.5–3.5 × 2–2.5 mm, ovoid, light green, smooth.

**Material examined:** BRAZIL, BAHIA: Canudos, Estação Biológica de Canudos, estrada que leva ao Saco 1 das araras, 09°58'26" S e 39°00'21" O, 550 m, 08.V.2013, fl., D.C. Silva 172 (HUNEB); 09°58'75" S e 39°00'01" O, 566 m, 29.II.2012, fl., D. D. Vieira 236 (HUNEB); 09°57'43" S e 39°00'58" O, 499 m, 08.V.2013, fl., D.D. Vieira 428 (HUNEB); 09°58'35" S e 38°59'46" O, 560 m, 08.V.2013, fl., D.D. Vieira 434 (HUNEB); Euclides da Cunha, Estrada para Sucupira do Galo, 10°21'00" S e 38°41'20" O, 546 m, 11.VI.2013, fl. e fr., D.D. Vieira 445 (HUNEB); Jeremoabo, APA Serra Branca, Baixa da Forca, 10°00'05" S e 38°28'46" O, 562 m, 23.I.2013, bot., L.R. Silva 118 (HUNEB); Paulo Afonso, Estação Ecológica Raso da Catarina, estrada base da Petrobrás em direção à Mata da Pororoca, 09°46'79" S e 38°39'92" O, 684 m, 18.VIII.2012, fl., D.D. Vieira 344 (HUNEB); Estrada em direção a base do ICMBio, 09°39'04" S e 38°27'02" O, 562 m, 19.VIII.2012, fl., D. D. Vieira 360 (HUNEB); Paus-Preto, 09°06'50" S e 38°58'55" O, 01.II.2006, fl., M.M.M. Lopes et al. 483 (HUEFS); Santa Brígida, 09°44' S e 38°07' O, 24.VI.1982, fl., L.P. Queiroz 304 (HUEFS).

*Varronia leucomalloides* was registered in the Northeastern region of Brazil. It was collected up to now in Caatinga and Cerrado vegetation in the states of Alagoas, Bahia, Ceará and Paraíba (Stapf 2010, Melo et al. 2014).

In the studied area it was found in the hiperxerophytic shrubby Caatinga, associated with rocky and sandy soils and in areas of contact between the Caatinga and the Cerrado. It blooms in February, June and August and fruits in June. Although the heterostyly is a hallmark of the genus, it was not possible to observe different sizes in the length of styles in that species.

*Varronia leucomalloides* is morphologically similar to *V. globosa* and *V. leucocephala* (see similarities in *V. globosa*). It is different from these two having terminal and axillary inflorescence, calyx with lobes of mucronate apex and especially the floccose indumentum present in the branches and calyx.

**Heliotropiaceae** Schrad., Comment. Soc. Regiae Sci. Gott. Recent. 4: 192. 1819.

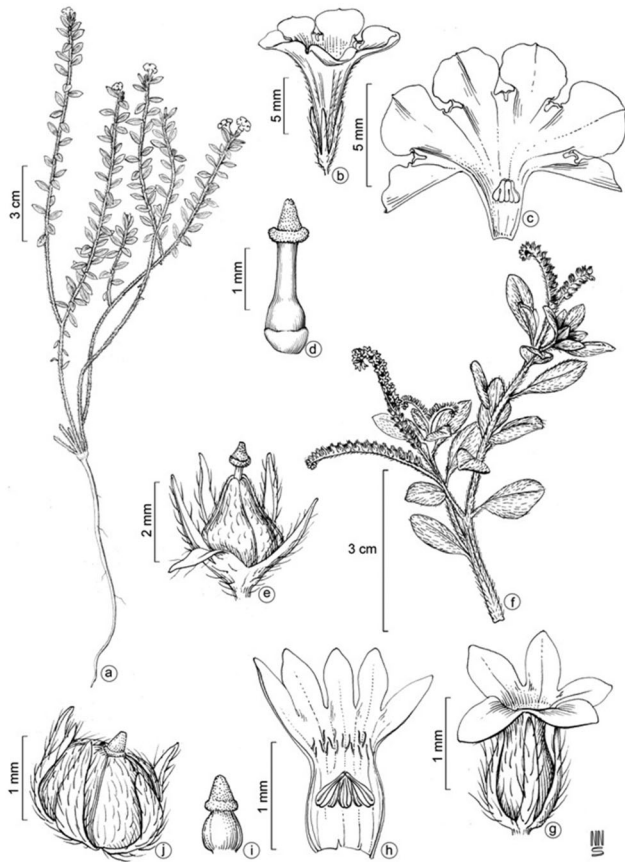
Annual or perennial herbs, subshrubs, shrubs, lianas or small trees. Leaves simple, alternate, subopposite or opposite, petiolate or sessile, margin usually entire, persistent. Inflorescences scorpioid, terminal, falsely terminal, axillary and internodal, lax or congested, rare solitary and axillary flowers, usually without bracts, rarely bracteose. Flowers dichlamydeous, actinomorphic, androgynous; calyx 5-lobed, gamosepalous with short tube, campanulate, deeply lobed, persistent; corolla 5-lobed, gamopetalous, tubular (e.g., hipocrateriform, obcampanulate or tubular-salverform), greenish, white, yellow, orange or purple, lobes patent, alternating with sepals. Stamens 5, subsessile or sessile, epipetalous often puberulous at insertion point; anthers free, connate or coherent at apex, usually introrse, dorsifixed. Gynoecium bicarpelar, ovary falsely tetralocular by the intrusion of a false septum, 2 ovules 2 per locule, anatropous; style terminal entire; 1 stigma, conical, with apex uni or slightly bilobed, sterile. Fruit indehiscent, drupaceous or dehiscent, schizocarpic, bony endocarp separating into pyrenes (*Myriopus* and *Tournefortia*) or nutlets (*Euploca*, *Heliotropium* and *Ixhorea*) at maturity. Seeds 4, rarely 1 or 2, testa with transfer cells, endosperm sparse, embryo straight or curved; cotyledons linear to ovoid, never plicated.

Heliotropiaceae comprises the genera *Euploca* Nutt. (ca. 100 spp.), *Heliotropium* L. (ca. 200 spp.), *Ixhorea* Fenzl (monospecific, restricted to Argentina), *Myriopus* Small (ca. 20 spp.) and *Tournefortia* L. (ca. 100 spp.). Their representatives are distributed in Tropical and Subtropical zones of all the continents, being more diversified in seasonally dry habitats. Monophyly of the family is sustained by molecular data as well as by a complex conical stigma, an unique morphological synapomorphy within Boraginales (Diane et al. 2004, Hilger & Diane 2003). In Brazil, the family is represented by the genera *Euploca* (17 spp.), *Heliotropium* (nine spp.), *Myriopus* (six spp.) and *Tournefortia* (13 spp.). In Caatinga vegetation occurs 19 species, among these eight belonging to *Euploca*, five to *Heliotropium*, three to *Myriopus* and *Tournefortia* (Melo et al. 2014).

**9. *Euploca paradoxa*** (Mart.) J.I.M.Melo & Semir, Kew Bull. 64(2): 289. 2009. Figure 6a-e

*Preslaea paradoxa* Mart., Nov. Gen. Sp. Pl. 2: 76. 1827.

Herb or subshrub, 10–15 cm tall, prostrate, stoloniferous; branches cylindrical with the bark falling off longitudinally, brownish-green, strigose. Leaf with blade 0.3–1.2 × 0.1–0.4 cm, chartaceous to semi-crass, concolor, lanceolate, apex acute, margin entire, base attenuate, strigose on both surfaces, showing trichomes with discoid base; petiole 0.2–1.2 cm long, subcylindrical, sulcate, strigose; venation hyphodromous.



**Figure 6.** a-e) *Euploca paradoxa*: a) flowering branch; b) flower; c) longitudinal section of flower showing androecium; d) gynoecium; e) fruit. f-j) *Euploca procumbens*: f) fertile branch; g) flower; h) longitudinal section of flower showing androecium; i) gynoecium; j) fruit. a-e) D.D. Vieira 456; f-j) L.R. Silva 148.

Flowers 0.8–1.2 mm long, solitary, axillary, pedicellate; peduncle 0.2–0.4 mm long, cylindrical, strigose; bracts 3–4 × 1–1.8 mm, foliaceous, elliptic to lanceolate, strigose; calyx 3–4 mm long, deeply lobed, green, externally strigose, internally glabrous, lobes 3–3.8 × 0.6–0.8 mm, narrow-lanceolate, apex acute; corolla 0.8–1 mm long, campanulate, entirely yellow, externally strigose, internally glabrous, tube 3–7 mm long, cylindrical, lobes 2–3.2 × 2.4–3.6 mm, orbicular, patent, wavy, apex rounded to slightly cuspidate, alternate by appendages 0.8–1 mm long, involute, falcate, oval to broadly lanceolate; stamens 5, coherent at apex, inserted 2–3 mm from base, subsessile, anthers 0.8–1 × 0.4–0.6 mm, oval, apex rounded; ovary 0.5–0.8 mm long, depressed-globose, glabrous, nectariferous disk ca. 0.2 mm long; style 0.8–1 mm long, stigma 0.5–0.8 mm long, conical, glabrous, stigmatic disk ca. 0.2 mm long. Schizocarp 3–4 × 2–3 mm, depressed-pyriform, apex aristated, green at maturity, pubescent to strigose, 4 nutlets with 1 seed each. Seeds 4, 1–1.8 × 0.5–0.8 mm, elliptic, green to brown, smooth.

**Material examined:** BRAZIL, BAHIA: Glória, Lagoa de Itaparica, Ilha a 10 km à Oeste do Hotel, 09°02'21" S e 38°18'00" O, 304 m, 19.I.2012, fl. e fr., V.M. Cotarelli 1211 (HVASF); Rodelas, próximo à bomba d'água, 08°50'17" S e 38°45'47" O, 330 m, 13.VI.2013, fl. e fr., D.D. Vieira 456 (HUNEB).

*Euploca paradoxa* is distributed in northeastern (Bahia, Paraíba, Pernambuco and Piauí) and mid-western (Goiás and Mato Grosso) regions (Melo et al. 2014). The species is commonly found in the Caatinga and more rarely at the edge of swamps, Cerrado and Campo Rupestre. In the state of Bahia it is frequent in fluvial areas bathed by the São Francisco River (Melo & Semir 2010).

In the study area it was collected in anthropogenic environments on sandy soils at the banks of the São Francisco River, growing alongside *Euploca procumbens*. It was collected with flowers and fruit in January and June.

The species can be recognized in the studied area mainly due its lanceolate leaf blade, solitary, pedicellate, bracteate flowers, completely yellow corolla, lobes alternated by appendages and a depressed-pyriform pubescent and strigose fruit.

**10. *Euploca procumbens*** (Mill.) Diane & Hilger, Bot. Jahrb. Syst. 125(1): 48. 2003. Figure 6f-j

*Heliotropium procumbens* Mill., Gard. Dict. 8: 10. 1768.

Herb or subshrub, 10–30 cm tall, erect or prostrate; branches cylindrical, fistulous, green-ashen, sericeous. Leaf with blade 0.8–3.2 × 0.5–1.5 cm, semi-crass, concolor to slightly discolorous, elliptical to oboval, apex acute to obtuse or mucronate, margin entire, base attenuate, sericeous on both surfaces, sometimes presenting trichomes with discoid base, more pronounced on the abaxial surface; petiole 0.3–1.4 cm long, subcylindrical, ventrally sulcate, sericeous; venation eucamptodromous. Inflorescence 0.8–6 cm long, scorpioid, terminal and axillary, congested, entire or forked; peduncle 0.6–3 cm long, strigose to sericeous. Flowers 2–3 mm long, subsessile, ebracteate; pedicel ca. 0.5 mm, cylindrical, sericeous; calyx 0.8–2.5 mm long, deeply lobed, green, externally sericeous, internally strigose, lobes 0.6–2.2 × 0.2–0.5 mm, oval to lanceolate, apex acute; corolla 1.5–2.5 mm long, tubular, white, mouth yellow, externally sericeous, internally glabrous, tube 1.2–2 mm long, cylindrical, lobes 0.4–0.6 × 0.2–0.4 mm, oboval, patent smooth, apex acute to obtuse, not alternated by appendages; stamens 5, coherent at apex, inserted 0.6–1 mm from base, subsessile, anthers 0.3–0.5 × 0.2–0.4 mm, oval to lanceolate, apex caudate; ovary 0.3–0.5 mm long, sub-globose, glabrous, nectariferous disk ca. 0.2 mm long; style obsolete, stigma 0.3–0.4 mm long, conical, pubescent, stigmatic disk 0.2–0.4 mm long. Schizocarp 1.2–2 × 1–1.8 mm, sub-globose, green at maturity, sericeous, 4 nutlets with 1 seed each. Seeds 4, 0.8–1 × 0.5–0.7 mm, oval, light green, smooth.

**Material examined:** BRAZIL, BAHIA: Canudos, estrada em direção à Estação Biológica de Canudos, passando pelo museu, 09°53'52" S e 39°01'51" O, 320 m, 05.IX.2012, fl. e fr., D.D. Vieira 391 (HUNEB); Parque Estadual de Canudos, Fazenda Velha, margem do açude, 09°54'33" S e 39°07'25" O, 360 m, 07.V.2013, fl. e fr., D.C. Silva 171 (HUNEB); Glória, Brejo do Burgo, 09°20' S e 38°15' O, 01.VII.1995, fl., F.P. Bandeira 250 (HUEFS); Jeremoabo, estrada entre Jeremoabo e Canudos, 10°01'32" S e 38°31'38" O, 298 m, 13.VII.2012, fl., D.D. Vieira 332 (HUNEB); 10°09' S e 38°28' O, Margem do rio Vaza Barris, 04.IV.2008, fl. e fr., K. Mendes 185 (UFP); Paulo Afonso, Estação Ecológica Raso da Catarina, 09°51'38" S e 38°40'00" O, 454 m, 11.XII.2005, fl., A.O. Moraes et al. 86 (HST); Base do ICMBio, 09°39'85" S e 38°28'02" O, 598 m, 29.XI.2011, fl. e fr., D.D. Vieira 207 (HUNEB); 09°39'87" S e 38°28'02" O, 595 m, 19.VIII.2012, fl., D.D. Vieira 359 (HUNEB); Sede do Ibama, 09°46'44" S e 38°46'04" O, 600 m, 30.XI.2005, fl. e fr.,

F. França et al. 5331 (HUEFS); Rodelas, bomba d'água, 08° 50'17" S e 38°45'47" O, 330 m, 13.VI.2013, fl. e fr., D.D. Vieira 457 (HUNEB); Santa Brígida, 09°42'07" S e 38°08'27" O, 274 m, 27.XI.2009, fl., E. Melo et al. 7248 (HUEFS).

*Euploca procumbens* spreads from the South of the United States to Argentina as well as in the West Indies and in Brazil in northern (Acre, Pará, Rondônia, Roraima), northeastern (Alagoas, Bahia, Ceará, Maranhão, Paraíba, Pernambuco, Piauí, Rio Grande do Norte and Sergipe), mid-western (Goiás, Mato Grosso and Mato Grosso do Sul), southeastern (Minas Gerais and São Paulo) and southern (Rio Grande do Sul and Santa Catarina) regions. In the Brazilian territory it is found in all the vegetation types, mainly in the Caatinga where it is frequently observed sympatrically with *H. angiospermum* and *H. elongatum* (Melo & Semir 2010).

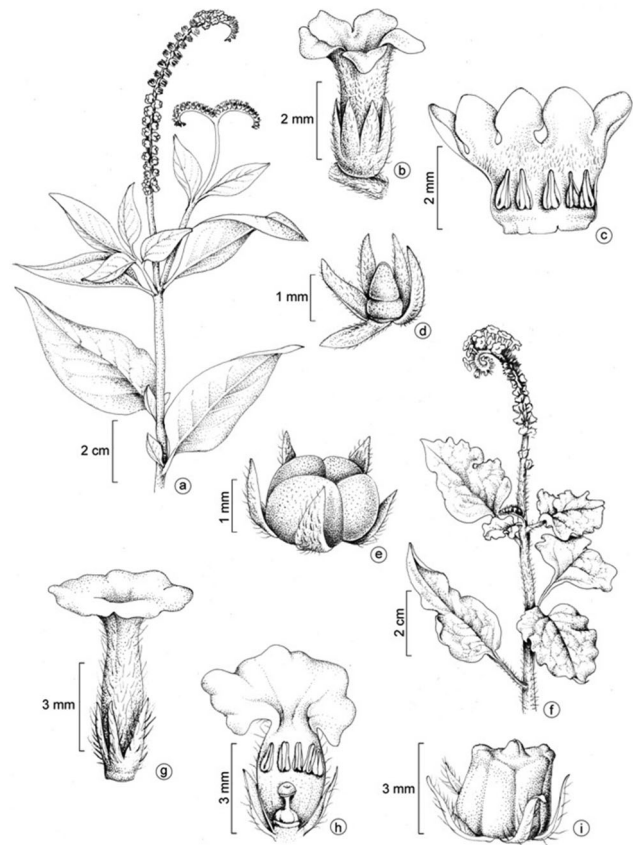
In the Ecoregion Raso da Catarina it is quite common in anthropized areas close to small farms, houses and vacant land lots. Thus, it can be considered an invasive species. Specimens were collected with flowers and fruits in July and November.

The species is easily recognized in the studied area by the elliptical to oboval leaf blade, flowers clustered in inflorescence, subsessile, ebracteate, white corolla with yellow mouth, lobes that are not alternated by appendages and by the subglobose, sericeous fruit.

**11. *Heliotropium angiospermum* Murray, Prodr. stirp. götting.: 217. 1770. Figure 7a-e**

Herb or sub-shrub, 15–30 cm tall, erect; branches cylindrical, fistulous, sulcate, green, scabrous to strigose. Leaf with blade 2.2–9 × 1.2–4.4 cm, membranous, discolorous, oval to elliptical, apex acute to acuminate, margin entire, ciliate, base attenuate, strigose to pubescent on both surfaces; petiole 0.2–1.8 cm long, subcylindrical, sulcate, wingless, strigose to hirsute; venation eucamptodromous. Inflorescence 2.6–16 cm long, scorpioid, falsely terminal and axillary, lax to congested, entire or forked; peduncle 1–6 cm long, strigose to hirsute. Flowers 3–4 mm long, sessile; calyx 2–3 mm long, deeply lobed, green, strigose, lobes 1.8–2.8 × 0.3–0.6 mm, oblong to lanceolate, apex acute; corolla 3–4 mm long, obcampanulate, white to purple-colored, mouth yellow, externally strigose, internally tomentose, tube 2–2.5 mm long, subcylindrical, lobes 1.2–2 × 0.8–1.5 mm, orbicular, patent, smooth, apex rounded to obtuse; stamens 5, free, inserted 0.8–1.2 mm from base, subsessile, anthers 0.8–1.4 × 0.3–0.5 mm, oval to oblong, apex acute; ovary ca. 0.5 mm long, sub-globose, glabrous, nectariferous disk ca. 0.2 mm long; style obsolete, stigma 0.5–0.8 mm long, widely conical, sparsely strigose, stigmatic disk ca. 0.2 mm long. Schizocarp 2–3.2 × 2–3 mm, depressed-globose, green at maturity, verrucose. Seeds 4, 1.5–2 × 0.8–1.2 mm, ovoid, light green, smooth to rugose.

**Material examined:** BRAZIL, BAHIA: Canudos, estrada em direção à Estação Biológica de Canudos, passando pelo museu, 09°53'52" S e 39°01'51" O, 320 m, 05.IX.2012, fl. e fr., D.D. Vieira 392 (HUNEB); Jeremoabo, APA Serra Branca, Fazenda Barreirinhas, 10°16' S e 38°47' O, 21.X.2006, fl., M. Oliveira 2536 (UFP); Fazenda Serra Branca, 09°51'56" S e 38° 28'45" O, 479 m, 31.VII.2009, fl. e fr., A.S. Conceição 1862 (HUNEB); Povoado Quelés, sentido Estação Ecológica Raso da Catarina, 09°57'17" S e 38°26'25" O, 575 m, 19.VI.2009, fl. e fr., A.S. Conceição 1743 (HUNEB); Estrada entre Jeremoabo e Canudos, 10°01'32" S e 38°31'38" O, 298 m, 13.VII.2012, fl., D.D. Vieira 331 (HUNEB); Paulo Afonso, Estação Ecológica



**Figure 7.** a-e) *Heliotropium angiospermum*: a) fertile branch; b) flower; c) longitudinal section of flower, showing androecium; d) gynoecium; e) fruit. f-i) *Heliotropium elongatum*: f) fertile branch; g) flower; h) longitudinal section of flower showing androecium and gynoecium; i) fruit. a-e) M.V.V. Romão 550; e-i) D.D. Vieira 05.

Raso da Catarina, Baixio do Cachimbo, 09°53'33" S e 38° 53'11" O, 550m, 10.VIII.2005, fl. e fr., E.B. Miranda et al. 858 (HUEFS); Base do ICMBio, 09°39'87" S e 38°28'02" O, 595 m, 19.VIII.2012, fl., D.D. Vieira 358 (HUNEB); Ribeira do Pombal, Estrada sentido Banzaê, 10°46'41" S e 38°34'42" O, 212 m, 11.VI.2013, fl. e fr., L.R. Silva 186 (HUNEB); RPPN Fazenda Flor de Lis, 10°50'08" S e 38°32'37" O, 203 m, 11.VI.2013, fl. e fr., V.O. Amorim 255 (HUNEB).

*Heliotropium angiospermum* is found from the South of the United States of America to Brazil, including the West Indies. In Brazil it occurs in northeastern and southeastern regions (Melo & Semir 2008, Melo et al. 2014).

In the studied area the species is widely found in anthropized areas, such as roadsides, small farms and houses. It also occurs in areas with herbaceous vegetation and bushy Caatinga, associated with sandy and clayey soils. Collected with flowers and fruit between March and September.

It resembles in the study area with its congeners by presence herbaceous or sub-shrubby habit, flowers clustered in scorpioid inflorescences, with white or purple corolla and yellow mouth. However, *H. angiospermum* can be easily recognized by having branches scabrous to strigose, wingless petiole, obcampanulate corolla, stigmas that are widely conical and depressed-globose fruit with a verrucose surface.

**12. *Heliotropium elongatum* (Lehm.) I.M.Johnst., Contr. Gray Herb. Harv. Univ. 81: 18. 1928. Figure 7f-I**

Herb or subshrub, 20–70 cm tall, erect to decumbent; branches angular, fistulous, green, strigose to hirsute. Leaf with blade 2.5–6 × 1.5–4 cm, membranaceous, discolorous, oval to deltoid, apex acute, margin irregular, base asymmetrical, attenuate or truncate, adaxial surface bullate, strigose, abaxial surface strigose to tomentose, stronger on nerves, both sides interspersed by larger aciculate trichomes; petiole 0.5–5 cm long, cylindrical, sulcate, winged, strigose to tomentose, interspersed with hirsute indumentum; venation eucamptodromous. Inflorescence 2–14 cm long, scorpioid, falsely terminal and axillary, congested; peduncle 5–5 cm long, strigose to tomentose, interspersed with hirsute indumentum. Flowers 4–7 mm long, sessile; calyx 2–2.8 mm long, deeply lobed, green, externally hairy, composed of trichomes aciculate, internally glabrous, marcescent, persistent on the axis of the inflorescence after the fall of the fruit, lobes 1.5–2.5 × 0.2–0.5 mm, lanceolate, apex acute to acuminate; corolla 3.8–6.5 mm long, hipocrateriform, white to purple-colored, mouth yellow, externally puberulous, interspersed by larger aciculiform trichomes, internally glabrescent, tube 3–5 mm long, subcylindrical, lobes 1–1.2 × ca. 1.5 mm, orbicular, patent, smooth, apex rounded; stamens 5, free, inserted 0.8–1.5 mm from the base, sessile, anthers ca. 1 × 0.3–0.5 mm, oblong, apex retuse; ovary ca. 0.5 mm long, globose, glabrous, nectariferous disk 0.2–0.4 mm long; style 0.3–0.5 mm long, cylindrical, stigma 0.4–0.5 mm long, clavate, glabrous, stigmatic disk ca. 0.1 mm long. Schizocarp 3.5–4.5 × 3–4 mm, mitriform, green at maturity, costate, glabrous or hispid, nutlets juxtaposed, apex slightly toothed. Seeds 4, 2.5–3 × 1.5–2 mm, trigonous, green or gray, smooth.

**Material examined:** BRAZIL, BAHIA: Canudos, Estação Biológica de Canudos, 09°42'07" S e 38°08'56" O, 05.I.2002, fl. e fr., M.S. Castro 66335 (ALCB); 10°16'60" S e 39°15'00" O, 20.VI.2003, fl. e fr., F.H.M. Silva 413 (HUEFS); Lagoa do Manezão, 09°57'02" S e 39°00'93" O, 424 m, 27.II.2012, fl. e fr., D.D. Vieira 220 (HUNEB); Roça de Das Neves, 09°56'16" S e 38°58'95" O, 368 m, 27.IV.2012, fl. e fr., D.D. Vieira 269 (HUNEB); 18.V.2012, fl. e fr., D.D. Vieira 298 (HUNEB); Toca da onça, roça de Zé Boquinha, 09°58'60" S e 38°56'13" O, 414 m, 07.VI.2012, fl. e fr., D.D. Vieira 328 (HUNEB); Jeremoabo, APA Serra Branca, Estrada dos Quelés, 09°56'52" S e 38°27'12" O, 598 m, 08.XII.2009, fl. e fr., T.M.S. Melo 118 (HUNEB); 09°56'23" S e 38°28'07" O, 631 m, 22.IX.2010, fl. e fr., D.D. Vieira 100 (HUNEB); 09°57'41" S e 38°25'32" O, 509 m, 03.IX.2012, fl. e fr., D.D. Vieira 376 (HUNEB); Paulo Afonso, Estação Ecológica Raso da Catarina, 09°46'44" S e 38°46'04" O, 600 m, 30.XI.2005, fl. e fr., F. França et al. 5324 (HUEFS); Base do ICMBio, 09°39'85" S e 38°28'02" O, 598 m, 29.XI.2011, fl. e fr., D.D. Vieira 206 (HUNEB); Ribeira do Pombal sentido Banzaê, 10°46'41" S e 38°34'42" O, 212 m, 10.VI.2013, fl. e fr., L.R. Silva 185 (HUNEB); Rodelas, 08°50' S e 38°46' O, 22.I.1987, fl. e fr., G.O. Mattos 35 (ALCB); Praia de Zorobabel, 08°53'06" S e 38°42'23" O, 398 m, 13.VI.2013, fl. e fr., D.D. Vieira 455 (HUNEB).

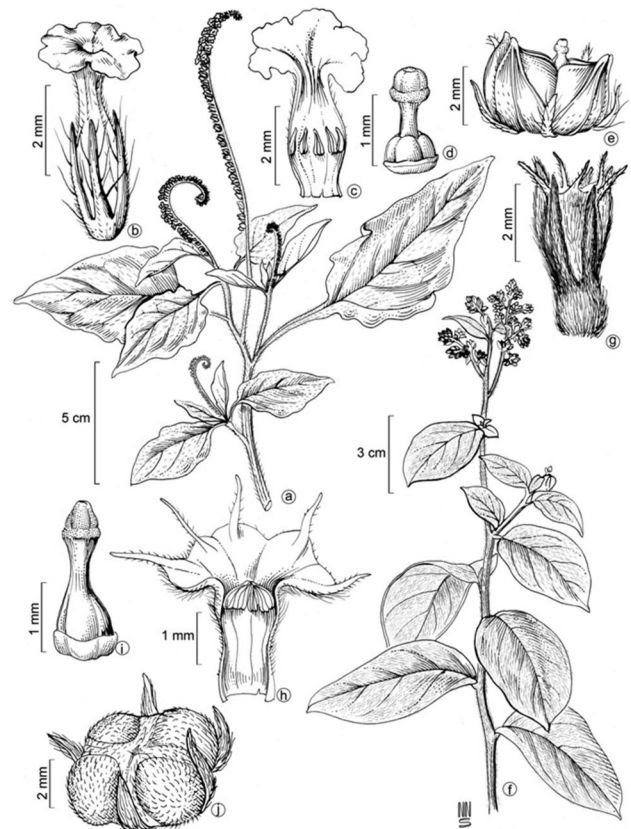
*Heliotropium elongatum* occurs in South America, distributed in Argentina, Bolivia, Paraguay, Uruguay and in Brazil (Johnston 1928), where it is spread in all regions (Melo et al. 2014).

In the Ecoregion Raso da Catarina the species is associated with sandy soils. It is found in shrubby-arboreal vegetation, in open areas near fences and house yards and in the proximity of artificial water bodies. It was collected with flowers and fruits during almost all year.

*Heliotropium elongatum* may be confused with *H. indicum* because both present habit herbaceous to sub-shrubby, erect to decumbent, branches angular, fistulous, strigose to hirsute, winged petiole, aciculate trichomes on the leaves and flowers, fruit costate mitriform. The first species can be different because it presents a leaf blade that is bullate on the adaxial surface (vs. flat in *H. indicum*), clavate stigma (vs. sub-capitate in *H. indicum*), and by juxtaposed nutlets in fruits (vs. divergent in *H. indicum*).

**13. *Heliotropium indicum* L., Sp. pl. 1: 130. 1753.** Figure 8a-e

Herb or subshrub, 30–60 cm tall, erect to decumbent; branches angular, fistulous, green, strigose to hirsute. Leaf with blade 2.6–1.6 × 1.5–6.5 cm, membranous, discolorous, oval, deltoid to rhombic, apex acute to acuminate, margin entire or irregular, base asymmetric, narrowing to petiole or truncate, adaxial surface flat, puberulous, abaxial surface scabrous, both surfaces interspersed with larger aciculate trichomes; petiole 0.4–5.5 cm long, subcylindrical, sulcate, winged, scabrous to strigose, interspersed by hirsute indumentum; venation eucamptodromous. Inflorescence 2.5–20 cm long, scorpioid, terminal and axillary, congested only at apex; peduncle 1–4 cm long, strigose, interspersed by hirsute indumentum. Flowers 4–6 mm long, sessile; calyx 2.5–3.5 mm long, deeply lobed, green, externally strigose to hirsute, composed of trichomes aciculate, internally glabrous, marcescent, persistent on the axis of the inflorescence after the fall of the fruit, lobes



**Figure 8.** a-e) *Heliotropium indicum*: a) fertile branch; b) flower; c) longitudinal section of flower, showing androecium; d) gynoecium; e) fruit. f-j) *Myriopus candidulus*: f) fertile branch; g) flower; h) longitudinal section of flower showing androecium; i) gynoecium; j) fruit. a-e) D.D. Vieira 441; f-j) D.D. Vieira 451.

1.8–2.8 × 0.2–0.4 mm, narrow-oval to lanceolate, apex acute to acuminate; corolla 4–5 mm long, hipocrateriform, white to purple-colored, mouth yellow, externally pubescent, interspersed with larger aciculiform trichomes, internally glabrous, tube 3.5–4.2 mm long, subcylindrical, lobes 0.6–0.8 × 1–1.2 mm, orbicular, patent, smooth, apex rounded; stamens 5, free, inserted 1.2–1.8 mm from base, sessile, anthers 0.8–1 × 0.2–0.3 mm, oblong-oval to lanceolate, apex acute; ovary 0.5–0.8 mm long, longitudinally 4-sulcated, glabrous, nectariferous disk ca. 0.2 mm long; style 0.4–0.8 mm long, cylindrical, stigma ca. 0.5 mm long, sub-capitate, glabrous, stigmatic disk ca. 0.2 mm long. Schizocarp 3–4 × 3.5–4.2 mm, mitriform, green at maturity, costate, glabrous, nutlets divergent, apex strongly dentate. Seeds 4, 1.5–2.5 × 1–1.5 mm, ellipsoid, green, smooth.

**Material examined:** Ribeira do Pombal, RPPN Fazenda Flor de Lis, 10°50'28" S e 38°31'57" O, 191 m, 11.VI.2013, fl. e fr., D.D. Vieira 441 (HUNEB).

*Heliotropium indicum* has a cosmopolitan distribution, associated predominantly with tropical regions (Melo et al. 2009b). In South America it occurs in Bolivia, Paraguay, Argentina, Uruguay and Brazil (Johnston 1928). In the Brazilian territory it is distributed in all the regions and phytogeographical domains (Melo et al. 2014).

In the studied area it was collected on sandy, flooded soils, in an anthropized area close to an artificial aquatic body, with flowers and fruit in June.

*Heliotropium indicum* is morphologically similar to *H. elongatum*, mainly because both present winged petioles. However, *H. indicum* can be differentiated by presenting a flat leaf blade on adaxial surface, subcapitate stigma and principally the fruits with divergent nutlets.

**14. *Myriopus candidulus*** (Miers) Feuillet, J. Bot. Res. Inst. Texas, 2(1): 264. 2008. Figure 8f-j

*Tournefortia candidula* (Miers) I.M.Johnst., Contr. Gray Herb. 92: 84. 1930.

Shrub, 1.2–1.7 m tall, scandent; branches cylindrical, grayish to whitish, pubescent, devoid of lenticels. Leaf with blade 1.9–7.5 × 1–5 cm, chartaceous, discoloured, oval, apex acute to cuspidate, margin entire, base rounded, adaxial surface densely pubescent, abaxial surface tomentose, trichomes with discoid base on adaxial surface; petiole 0.2–0.4 cm long, cylindrical, sulcate, tomentose; venation eucamptodromous. Inflorescence 2–7.5 cm long, scorpioid with secondary branches, clustered in panicle, terminal, congested, pyramidal; peduncle 1.4–2 cm long, pubescent to tomentose. Flowers 5–6 mm long, sessile; calyx 3–4.5 mm long, deeply lobed, green-cinereous, densely villous externally, internally sparsely pubescent, lobes 3–4 × 0.8–1.1 mm, lanceolate, apex acute, with unequal sizes between them, two major and three minor; corolla 4–5 cm long, tubular, white, green-cinereous, externally densely villous, internally glabrous, tube 2.5–3.2 mm long, cylindrical, lobes 1.5–1.8 × 0.6–1 cm, narrow-oval, erect, involute, apex apiculate; stamens 5, coherent, inserted 1.8–2.5 mm from base, sessile, anthers 0.6–0.8 × 0.2–0.3 mm, lanceolate, apex apiculate; ovary 0.8–1 mm long, conical to sub-globose, glabrous, nectariferous disk 0.2–0.3 mm long; style 0.8–1 mm long, stigma ca. 0.5 mm long, conical-triangular, elongated, glabrous, stigmatic disk ca. 0.3 mm long. Drupes 3–4.5 × 5–7 mm, 4 pyrenes, sub-globose, green when young, white with 4 spherical black spots, corresponding to the seeds, when mature, villous to tomentose. Seeds 4, 2–3 × 1.8–2.6 mm, suborbicular, brownish, smooth.

**Material examined:** Euclides da Cunha, Estrada para Sucupira do Galo, 10°21'00" S e 38°41'20" O, 546 m, 11.VI.2013, fl. e fr., D.D. Vieira 451 (HUNEB); D.D. Vieira 453 (HUNEB); D.D. Vieira 454 (HUNEB); Ribeira do Pombal, 10°50' S e 38°32' O, 16.VIII.2003, fl. e fr., M.L. Guedes 10508 (ALCB); Tabuleiro entre Pombal e Tucano, 10°50' S e 38°32' O, 03.II.1973, bot. e fl., A.L. Costa s.n. (ALCB).

*Myriopus candidulus* occurs in Venezuela, Guiana and Brazil (Johnston 1930). In the Brazilian territory it is distributed in the northern (Pará), northeastern (Bahia, Ceará, Maranhão and Pernambuco) and southeastern (São Paulo and Rio de Janeiro) regions, in environments of the Amazon rainforest, Caatinga, Cerrado and Atlantic forest, being more abundant in the northeastern region (Cavalheiro et al. 2011, Melo et al. 2014).

In the studied area it was collected in areas of plains, on sandy soils and vegetation of Caatinga-seasonal forest contact. Specimens were collected with flowers in January and with fruits and flowers in June and August.

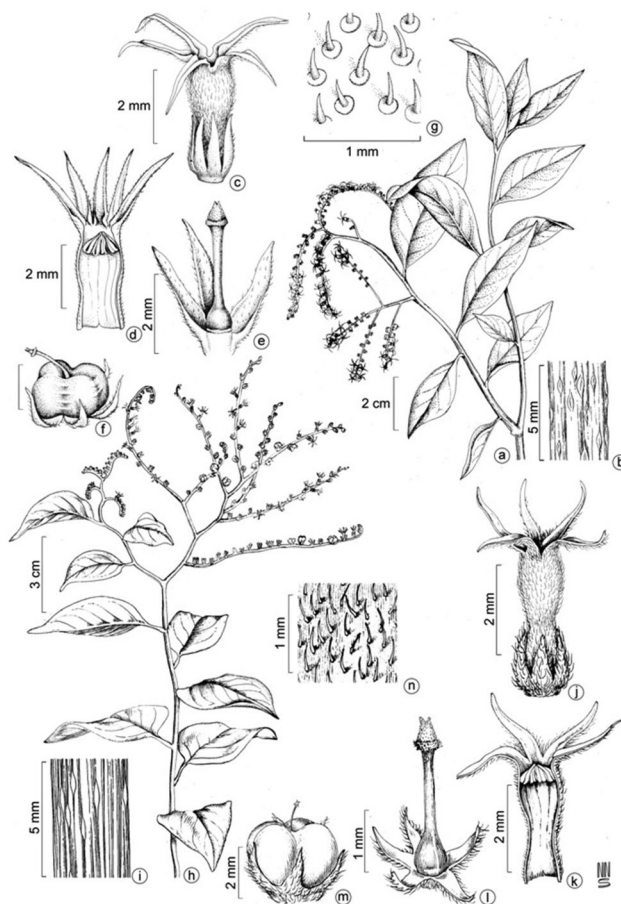
It can be easily recognized in the study area by show up branches grayish and whitish without lenticels, congested inflorescences, pyramidal, flowers with a green-cinereous calyx and white corolla to green-cinereous, both densely villous as well as by the villous to tomentose drupe.

**15. *Myriopus rubicundus*** (Salzm. ex DC.) Luebert, Taxon, 60(3): 677. 2011. Figure 9a-g

*Tournefortia rubicunda* Salzm. ex DC., Prodr. 9: 526. 1845.

Shrub, 1.5–2 m tall, erect to decumbent, forming clumps; branches cylindrical, brown-grayish, glabrous or sparsely strigose, lenticels whitish. Leaf with blade 2.5–10.5 × 0.8–4 cm, membranous, discoloured, oval to lanceolate, apex acute to acuminate, margin entire, base acute to obtuse, sometimes oblique, adaxial surface densely strigose, abaxial surface sparsely strigose, trichomes with sharply discoid base on both surfaces; petiole 0.2–1.1 cm long, cylindrical, sulcate, strigose; venation eucamptodromous. Inflorescence 2–6 cm long, scorpioid with secondary branches clustered in panicles, terminal and internodal, lax, secundiflorous; peduncle 0.4–1.5 cm long, strigose to sericeous. Flowers ca. 5 mm long, sessile; calyx 2–3.2 mm long, deeply lobed, green, externally strigose, internally glabrescent, lobes 1.8–3 × 0.2–0.6 mm, lanceolate, apex acute to acuminate, with unequal sizes among each other, three major and two minor; corolla 3–4.5 cm long, tubular, green to orange, externally sericeous, internally glabrous, tube 2.5–4 mm long, cylindrical, lobes 1.5–3 × 0.2–0.5 cm, linear, patent, apex filiform; stamens 5, coherent, inserted 2.5–3.8 mm from base, sessile, anthers 0.6–1 × ca. 0.2 mm, oval to lanceolate, apex apiculate; ovary 0.6–1 mm long, obclavate, glabrous, nectariferous disk ca. 0.2 mm long; style 1.5–2 mm long, stigma ca. 0.5 mm long, conical-triangular, short, puberulous, stigmatic disk ca. 0.2 mm long. Drupes 3–5 × 2–4 mm, 4 pyrenes, sub-globose, green when young, yellow, orange-colored or red when mature, glabrous to hirsute. Seeds 4, 1.5–2.5 × 1.2–2 mm, suborbicular, brown, smooth.

**Material examined:** BRAZIL, BAHIA: Glória, Aldeia Serrota, 09°48'33" S e 38°08'33" O, 26.IV.2006, fl., M. Colaço et al. 117 (HUEFS); Brejo do Burgo, 09°20' S e 38°15' O, 03.VII.1995, fl. e fr., F.P. Bandeira 231 (HRB); Euclides da Cunha, Sítio do Jaime, 39°00' S e 10°50' O, 21.IV.2004, fl., M.L. Guedes et al. 10844 (ALCB); Jeremoabo, APA Serra Branca, estrada do Tamburi, próximo a baixa dos Quelês, 09°57'44" S e 38°25'60" O, 502 m, 09.VII.2012, fl., J.V. Santos 29 et al. (HUNEB); Fazenda



**Figure 9.** a-g) *Myriopus rubicundus*: a) fertile branch; b) lenticels; c) flower; d) longitudinal section of flower showing androecium; e) gynoecium; f) fruit; g) trichomes with discoid base on the adaxial surface of leaf. h-n) *Myriopus salzmannii*: h) fertile branch; i) lenticels; j) flower; k) longitudinal section of flower showing androecium; l) gynoecium; m) fruit; n) trichomes without discoid base on the adaxial surface of leaf. a-g) A.S. Conceição 1352; h-n) D.D. Vieira.

Serra Branca, ca. 8 km da base da Vaca Morta, 09°52'10" S e 38°38'53" O, 479 m, 18.IV.2008, fl. e fr., A.S. Conceição 1352 (HUNEB); Raso da Catarina, 10°09' S e 38°28' O, 15.V.1981, fr., G. Pinto 105 (HRB); Trilha do Araçá, 09°52'19" S e 38°38'32" O, 476 m, 08.V.2008, fl. e fr., M.V.V. Romão 115 (HUNEB); Vaca Morta, 09°54'52" S e 38°41'41" O, 364 m, 16.IV.2008, fr., M.V.V. Romão 47 (HUNEB); 09°54'24" S e 38°41'23" O, 367 m, 17.IV.2008, fr., A.S. Conceição 1280 (HUNEB); Paulo Afonso, Estação Ecológica Raso da Catarina, estrada base da Petrobrás em direção à Mata da Pororoca, 09°46'50" S e 38°40'52" O, 658 m, 18.VIII.2012, fl. e fr. D.D. Vieira 340 (HUNEB); 09°46'79" S e 38°39'92" O, 684 m, 18.VIII.2012, fl., D.D. Vieira 346 (HUNEB); Ribeira do Pombal sentido Banzaê, 10°46'41" S e 38°34'42" O, 212 m, 10.VI.2013, fr., L.R. Silva 182 (HUNEB); Santa Brígida, 09°44' S e 38°07' O, 26.VI.1982, fl., L.P. Queiroz 381 (HUEFS); Raso da Catarina, 09°06'55" S e 38°48'27" O, 622 m, 28.VI.2002, fl., L.P. Queiroz 7288 (HUEFS).

*Myriopus rubicundus* occurs from México to Central America, including the West Indies, and from north to west of South America (Johnston 1930). In Brazil it occurs from the Amazonas and Pernambuco to Rio Grande do Sul in areas of Caatinga, Cerrado and Atlantic forest (Cavalheiro et al. 2011, Melo et al. 2014).

In the studied area the species is associated with the shrubby-arboreal Caatinga, being common in shadowy areas where it rests on some trees. It was collected with flowers and fruits from April to August.

It is morphologically similar to *M. salzmannii*, mainly because of its lenticelled branches and lax inflorescences. It can be easily differentiated of the latter by its shrubby habit forming clumps, cylindrical branches with whitish lenticels, foliar trichomes with sharply discoid base, obclavate ovary and short, conical-triangular stigma.

**16. *Myriopus salzmannii* (DC.) Diane & Hilger, Bot. Jahrb. Syst., 125(1): 47. 2003. Figure 9h-n**

*Tournefortia salzmannii* DC., Prodr. 9: 524. 1845.

Shrub, 2–3.5 m tall, decumbent or scandent; branches subcylindrical, brown, villous when young and glabrous; lenticels brownish on branches older. Leaf with blade 2.5–7.5 × 1–4.5 cm, membranous, discolorous, oval to elliptical, apex acute to acuminate, margin entire, base rounded, adaxial surface strigose, abaxial surface strigose to slightly sericeous, trichomes without discoid base; petiole 0.2–1 cm long, cylindrical, sulcate, villous; venation brochidodromous. Inflorescence 1.5–14 cm long, scorpioid with secondary branches clustered in panicles, terminal and internodal, lax, secundiflorous; peduncle 0.5–2.5 cm long, villous to tomentose. Flowers 3.5–5 mm long, sessile; calyx 2–2.5 mm long, deeply lobed green, externally strigose, internally glabrous, lobes 0.3–0.5 × 1.6–2.2 mm, lanceolate, apex acute; corolla 3.5–4.5 mm long, tubular, orange, externally villous to tomentose, internally glabrescent, tube 3–3.5 mm long, cylindrical, lobes 2–2.5 × 0.2–0.3 mm, linear, patent, involute, apex filiform; stamens 5, coherent, inserted 2.5–3 mm from the base, sessile, anthers 0.5–0.8 × 0.2 mm, oval to lanceolate, apex apiculate; ovary ca. 1 mm long, conical-pyramidal, glabrous, nectariferous disk obsolete; style ca. 1.5 mm long, cylindrical, stigma ca. 0.5 mm long, conical-triangular, elongated, pubescent, stigmatic disk 0.5–0.8 mm long. Drupes 3–4.5 × 3–5 mm, 4 pyrenes, globose, green when immature, orange-colored to reddish when mature or rarely white, presenting 4 spherical black spots, corresponding to the seeds, glabrous. Seeds 4, 2–3 × 1.5–2.3 mm, depressed-globose, black, rugose.

**Material examined:** BRAZIL, BAHIA: Canudos, Estação Biológica de Canudos, Capoeira da Finada Doninha, 09°56'68" S e 38°59'73" O, 394 m, 08.V.2013, fl., D.D. Vieira 436 (HUNEB); Roça de Caboclo, próximo à base 2, 09°56'71" S e 39°00'95" O, 430 m, 28.II.2012, fl., D.D. Vieira 227 (HUNEB); Roça da Biodiversitas, 09°57'11" S e 39°00'41" O, 419 m, 28.II.2012, fl. e fr., D.D. Vieira 229 (HUNEB); Trilha em direção à base 2, 09°56'67" S e 38°59'68" O, 400 m, 28.II.2012, fl., D.D. Vieira 232 (HUNEB); Roça de Dominginhos de Ermoges, 09°57'10" S e 39°00'41" O, 417 m, 26.IV.2012, fr., D.D. Vieira 251 (HUNEB); 09°56'85" S e 39°00'52" O, 412 m, 07.VI.2012, fl., D.D. Vieira 327 (HUNEB); Toca da onça, roça de Zé Boquinha, 09°58'60" S e 38°56'13" O, 414 m, 07.VI.2012, fl., D.D. Vieira 329 (HUNEB); Euclides da Cunha, Estrada para Sucupira do Galo, 10°21'00" S e 38°41'20" O, 546 m, 11.VI.2013, fr., D.D. Vieira 446 (HUNEB); Jeremoabo, 10°24'16" S e 38°40'16" O, 410 m, 21.II.2006, fl. e fr., E. Melo et al. 4274 (HUEFS); APA Serra Branca, Baixa dos Quelés, próximo ao tanque, 09°57'48" S e 38°26'13" O, 486 m, 05.VI.2012, fl. e fr., A.F. S. Brito 71 (HUNEB); Estrada saindo de Quelés, sentido Estação Ecológica Raso da Catarina, estrada secundária a direita, 09°52'88" S e 38°32'70" O, 653 m, 05.V.2011, fl. e fr., D.D. Vieira 151 (HUNEB); 09°56'57" S e 38°27'39" O, 555 m, 17.VI.2011, fr., R.R. Varjão 130 (HUNEB); Paulo Afonso, Estação Ecológica Raso da Catarina, Trilha da encruzilhada, 09°48'18" S e 38°29'33" O,

596 m, 01.VII.2010, fr., A.A.S. Lopes 984 (HUNEB); Ribeira do Pombal, 10°50' S e 38°32' O, 15.VIII.2003, fr., M.L. Guedes 10509 (ALCB); Sentido Banzaê, 10°46'41" S e 38°34'42" O, 212 m, 10.VI.2013, fr., L.R. Silva 184 (HUNEB).

The species occurs in Paraguay, Bolivia, Argentina and Brazil (Johnston 1930), where it spreads in the regions Northeast and Southeast in the Caatinga, Cerrado and Atlantic rainforest vegetation (Cavalheiro et al. 2011, Melo et al. 2014).

In the Ecoregion Raso da Catarina it occurs from the shrubby Caatinga to environments of transition between Caatinga and forest. Scandent individuals resting on shrubs or trees are commonly found. It was collected with flowers and fruits from February to July.

*Myriopus salzmannii* can be recognized in the studied area by presents shrubby habit, decumbent or scandent, subcylindrical branches with brownish lenticels, foliar trichomes without discoid base, conical-pyramidal ovary and elongated, conical-triangular stigma.

## List of Additional Material Examined

**Andrade-Lima, D.:** 747695 (1). **Barreto, V.:** 229 (16), 243 (15). **Batista, M.A.:** 04 (2). **Bautista, H.P.:** 750 (6). **Cardoso, D.:** 104 (1), 621 (4), 899 (15), 1195 (15), 1210 (2). **Carvalho-Sobrinho, J.G.:** 2541 (8). **Conceição, S.F.:** 121 (5), 126 (11), 127 (15), 131 (16), 196 (11), 286 (12). **Costa, A.L.:** s/n (6), s/n (14). **Dias Martins, C.T.V.:** 02 (4). **Fonseca, W.N.:** 380 (11), 419 (7). **Fotius, G.:** 3496 (12), 3859 (10). **França, F.:** 1873 (1). **Gomes, F.S.:** 161 (11). **Guedes, L.M.:** 2849 (5), 12073 (4), 12074 (7), 16094 (12), 16211 (6). **Harley, R.M.:** 3406 (11), 16311 (7). **Jesus, N.G.:** 889 (16). **Lima, L.:** 220 (10). **Lordêlo, R.P.:** 57357 (1). **Mangabeira, M.O.:** 2522 (10). **Mariano, K.R.S.:** 33 (6). **Melo, E.:** 1949 (15), 6495 (1), 7525 (5). **Moraes, M.V.:** 190 (2). **Paula-Souza, J.:** 9756 (5), 9767 (12), 9897 (7), 10164 (1). **Pesqueira, U.S.:** 32 (9). **Queiros, L.P.:** 1732 (4), 9013 (6), 9022 (11). **Sant'Ana, S.C.:** 506 (16). **Santos, A.K.A.:** 47 (3). **Santos, V.J.:** 553 (8). **Souza, R.D.:** 26 (8). **Souza, R.P.:** 42 (5). **Stapf, M.N.S.:** 249 (2), 266 (7), 296 (3), 268 (4).

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