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Original Paper

Flora of Ceará state, Brazil: *Evolvulus* (Cresseae, Convolvulaceae)

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Abstract

We present the taxonomic treatment of *Evolvulus* in the state of Ceará, as part of the project "Flora do Ceará: Knowing to conserve". The study was based on the floristic-morphological analysis of specimens deposited in the ASE, CEN, EAC, ESA, HCDAL, HST, HUEFS, HUVA, HVASF, IPA, PEUFR, and UFP herbaria, specialized bibliography, typus collections available on on-line platforms, collections and field observations. In Ceará, we registered 13 species of *Evolvulus*: *E. anagalloides*, *E. cardiophyllus*, *E. eleaegnifolius*, *E. ericifolius*, *E. filipes*, *E. glomeratus*, *E. gypsophiloides*, *E. linoides*, *E. nummularius*, *E. ovatus*, *E. phyllanthoides*, *E. pterocaulon*, and *E. sericeus.* Of these, ten occur in protected areas from Ceara state. The greatest species richness for the genus (10) was registered in the open crystalline caatinga. Additionally, we present an identification key, morphological descriptions, geographic distribution, taxonomic and ecological comments, phenology and illustrations of the diagnostic characters of the species.

Key words: biodiversity, Brazilian flora, Caatinga, Solanales, taxonomy.

Resumo

Apresentamos o tratamento taxonômico de *Evolvulus* no estado do Ceará, como parte do projeto Flora do Ceará: conhecer para conservar. O estudo baseou-se na análise morfolólogica de espécimes depositados nos herbários ASE, CEN, EAC, ESA, HCDAL, HST, HUEFS, HUVA, HVASF, IPA, PEUFR, e UFP, consulta a bibliografia especializada, coleções-tipo disponíveis em plataformas on-line, coletas e observações de campo. No Ceará, registramos 13 espécies de *Evolvulus*: *E. anagalloides*, *E. cardiophyllus*, *E. eleaegnifolius*, *E. ericifolius*, *E. filipes*, *E. glomeratus*, *E. gypsophiloides*, *E. linoides*, *E. nummularius*, *E. ovatus*, *E. phyllanthoides*, *E. pterocaulon* e *E. sericeus.* Dentre essas, dez ocorrem em áreas protegidas no estado do Ceará. A maior riqueza de espécies do gênero (10) foi registrada na Caatinga aberta do cristalino. Apresentamos chave de identificação, descrições morfológicas, distribuição geográfica, comentários taxonômicos e ecológicos, fenologia e ilustrações dos caracteres diagnósticos das espécies.

Palavras-chave: biodiversidade, Flora do Brasil, Caatinga, Solanales, taxonomia vegetal.

Introduction

Evolvulus L. comprises about 100 species distributed throughout tropical America, with two pantropical species: *E. alsinoides* (L.) L. and *E. nummularius* (L.) L. (Ooststroom 1934). In Brazil, 73 species are found, distributed in all regions and phytogeographic domains. The Cerrado and Caatinga embrace the highest species richness for this genus, with 59 (18 endemic) and 42 species (eight endemic), respectively. In the Northeast region, 55 species of the genus are recorded, representing 71% of species registered in Brazil (Simão-Bianchini & Silva 2020).

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Ooststroom (1934) charaterized *Evolvulus* by having two free styles, or partially joined at the base, each with two filiform or clavate stigmas. Stefanovic *et al.* (2002, 2003), when testing the monophyletism of the Convolvulaceae tribes, included two species of the genus (*E. nummularius* and *E. glomeratus* Nees & Mart.) that emerged in a clade in the Cresseae, along with the genera *Bonamia* Thouars, *Cressa* L., *Hildebrandtia* Vatke, *Itzaea* Standl. & Steyerm., *Neuropeltis* Wall., *Neuropeltopsis* Ooststr., *Seddera* Hochst., *Stylisma* Raf., and *Wilsonia* R. Br.

According to Souza & Lorenzi (2012), some species stand out for their ornamental potential, such as *E. glomeratus* and *E. pusillus* Choisy, which are grown in gardens. Ooststroom (1934), in his monograh, reports the use of *E. nummularius* for haemorrhagia in Madagascar and of *E. alsinoides* L. in natural medicine in British India. Patil (2009) highlights the medicinal potential of the latter species, as it has anxiolytic activity.

In Brazil, the genus has been studied in local, state and regional floras surveys, including Ferreira *et al.* (2014) who cited nine species for the Southern region; Silva (2008) listed 15 and 13 species for the state of São Paulo and the Federal District, respectively; Santos & Buril, (2020) cited 17 species for Pernambuco, and Junqueira & Simão-Bianchini (2006) who cited 12 species for the municipality of Morro do Chapéu (Bahia). Additionally, Silva (2013) performed the taxonomic revision of *Evolvulus* section *Phyllostachyi* Meisn., and accepted 17 species. Specifically, in Ceará, studies focusing on *Evolvulus* species are scarce and rarely mentioned in floristic surveys (Ribeiro-Silva *et al.* 2012; Loiola *et al.* 2015, 2020; Silveira *et al.* 2020a, b) or in studies that focused on Convolvulaceae (Santos *et al.* 2020).

Despite the high representativeness of *Evolvulus* in Brazil, the knowledge about its diversity in Brazilian flora is still poorly known, evidenced by its erroneous collections, making it difficult to access its taxonomic richness and geographical distribution. Considering this, we present the floristic-taxonomic treatment of *Evolvulus* in Ceará state, which aims to facilitate the correct recognition of the species and provide information on their phenological period, distribution and morphology.

Material and Methods

Ceará state occupies an area of approximately 148,825.6 km^2, corresponding to 1.74% of the national territory and 9.57% of the Northeast region, being the fourth largest state in the region (IPECE 2013). It is limited to the North by the Atlantic Ocean, to the South by Pernambuco, to the East by Rio Grande do Norte and Paraíba, and to West by Piauí (IPECE 2013). According to Moro *et al.* (2015), Ceará has two large geological domains, one of sedimentary origin divided into five relief units called Planície Costeira, Planície Fluvial, Chapada do Araripe, Chapada do Apodi and Serra da Ibiapaba; and another of crystalline origin, divided into two relief units known as Depressão Sertaneja and Residual Massifs. The state has 11 phytoecological units: Coastal Vegetation Complex, Mangrove, Costal Cerrado and Cerradão, Interior Cerrado and Cerradão, Carnaubal, Crystalline Caatinga, Crystalline Dry Forest, Crystalline Wet Forest, Sedimentary Caatinga, Sedimentary Dry Forest, Sedimentary Wet Forest (Figueiredo 1997) (Fig. 1).

This study was based on the consultation of specialized bibliography (Meisner 1869; Ooststroom 1934; Silva 2013), analysis of type collections and specimens deposited in the ASE, CEN, EAC, ESA, HCDAL, HST (Herbarium Sérgio Tavares), HUEFS, HUVA, HVASF, IPA, PEUFR, and UFP herbaria (acronyms according to Thiers, continuously updated). The samples were processed according to the usual taxonomy techniques (Mori *et al.* 1989) and incorporated into the HUVA, with duplicates sent to the EAC and HUEFS herbaria. Identifications were made based on specialized bibliography (Ooststroom 1934) and analysis of type collections (NY and R) available on online database (<https://plants.jstor.org/>). The binomials are according to the IPNI (2018). The morphological descriptions were standardized according to Harris & Harris (2001). Data regarding the type of habit, flowering and fruiting period were obtained from exsiccate labels and/or from the field observations.

Data about geographic distribution in the world and Brazil were obtained according to specialized literature (Ooststroom 1934) and Flora of Brazil (Simão-Bianchini & Silva 2020), respectively. The geographic distribution maps were prepared using ArcGIS software, version 7.4 (Hijmans *et al.* 2005), based on mainly

records with original geographic coordinates. For records without collections site coordinates associated, those of another species collected at the same location were used through the geoLoc tool (CRIA 2018). For the species distribution, the phytogeographic classification of Figueiredo (1997) modified by Moro *et al.* (2015) was used. Illustrations were made from exsiccates and samples in alcohol, contemplating the main characters that identify the taxa.

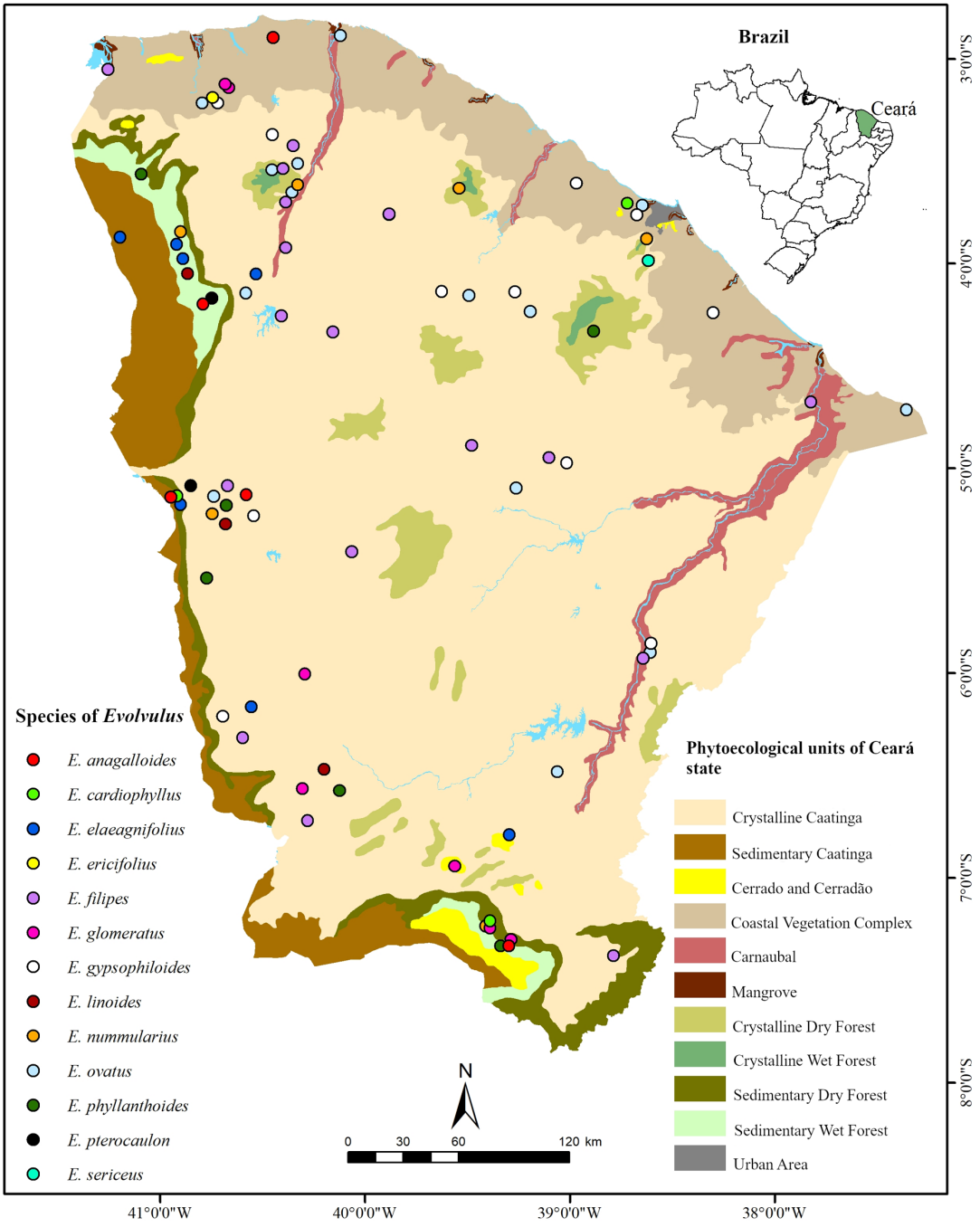

Figure 1 – Phytoecological distribution of *Evolvulus* species recorded in the Ceará state, northeastern Brazil (modified from Figueiredo 1997).

Results and Discussion

In Ceará state, *Evolvulus* is represented by 13 species: *E. anagalloides* Meisn., *E.cardiophyllus* Schltdl., *E. eleaegnifolius* Dammer, *E. ericifolius* Mart. *ex* Schrank, *E. filipes* Mart., *E. glomeratus* Nees & Mart., *E. gypsophiloides* Moric., *E. linoides* Moric., *E. nummularius* (L.) L., *E. ovatus* Fernald, *E. phyllanthoides* Moric., *E. pterocaulon* Moric., *E. sericeus* Sw. Six of them are endemic to Brazil (*E. anagalloides*, *E.cardiophyllus*, *E. eleaegnifolius*, *E. ericifolius*, *E. gypsophiloides* and *E. phyllanthoides*), and two are restricted to the Caatinga domain (*E. anagalloides* and *E. eleaegnifolius*). The other species *E. filipes*, *E. glomeratus*, *E. nummularius* and *E. sericeus* Sw. occur in all regions, including the Amazon, Caatinga, Cerrado, Atlantic Forest and Pampa. Among the phytoecological units in Ceará, Crystalline Caatinga presents the highest species diversity for the genus (10), representing 77% of the total species diversity in Ceará. The Costal Vegetation Complex and the Sedimentary Wet Forest present six species each, equating to 46% of the total species in the state (Tab. 1). In the Wet Forest of Crystalline, and in Mangrove no species of *Evolvulus* was found.

Among the geological domains, the lands with crystalline origin have the highest species richness (10). *Evolvulus anagalloides*, *E. eleaegnifolius*, *E. glomeratus*, *E. linoides*, *E. nummularius*, *E. phyllanthoides* and *E. pterocaulon* occur in lands with sedimentary and crystalline origin. *Evolvulus cardiophyllus* occurs in Caatinga vegetation with sedimentary origin only, while *E. ovatus* only occurs in Caatinga of crystalline origin. *Evolvulus ericifolius* is restricted to the Coastal Vegetation Complex (Tab. 1). Among the species recorded, ten occur in protected areas: APA - Environmental protection area Serra da Ibiapaba (*E. anagalloides*, *E. eleaegnifolius*, *E. phylanthoides*); ESEC - Aiuaba Ecological Station (*E. glomeratus*, *E. phyllanthoides*); FLONA - National Forest of Araripe-Apodi (*E. anagalloides*, *E. cardiophyllus*, *E. nummularius*); Ubajara National Park (*E. nummularius*); Serra das Almas Private Natural Heritage Reserve (RPPN in Portuguese), municipality of Crateus (*E. anagalloides*, *E. cardiophyllus*, *E. eleaegnifolius*, *E. filipes*, *E. gypsophiloides*, *E. linoides*, *E. nummularius*, *E. phyllanthoides*, *E. pterocaulon*). This last protection area has great potential for the conservation of *Evolvulus* species in Ceará, as most of them are protected by this conservation unit.

The main morphological characters used to distinguish the species are: type of habit, presence or absence of stoloniferous roots, presence or absence of wings on the stem, morphology and type of leaf induction, pattern of distribution of isolated flowers and inflorescence along the branches, and corolla shape. According to our results, we found that the diversity of this genus is overestimated in Ceará (Simão-Bianchini & Silva 2020), as we found that the records of *E. alopecuroides* Mart., *E. argyreus* Choisy, *E. echioides* Moric., *E. linarioides* Meisn., *E. macroblepharis* Mart., *E. martii* Collar for the state are mistaken identifications, and their geographic distributions are updated herein.

Taxonomic treatment

Evolvulus L. Sp. Pl. (ed. 2) 1: 391. 1762.

Herb or subshrub erect, prostrate or decumbent, stem stoloniferous or sarmentose, smooth or with wings in *E. pterocaulon*, branches sericeous, villose, lanose, pilose to glabrescent with malpighiaceous trichomes. Leaves simple, entire, sessile or petiolate; leaf blade ovate, elliptic, elliptical to oblanceolate, orbicular, linear, lanceolate, oblong or obovate, villose, pilose, sericeous, concolorous or discolorous, membranaceous, papyraceous, margin entire, flat or revolute, base acute, emarginate, rounded, apex acute, rounded, emarginate, acuminate; bract oblanceolate, oblong, elliptical, lanceolate or absent; bracteoles linear, lanceolate. Flowers axillary, isolated, congested at the apex of the branches, or in dichasium with long or short peduncle along the branches terminals or concentrated at the apex of the branches. Calyx with sepals elliptical, ovate, lanceolate rhombic. Corolla rotate, funnel-shaped or hypocrateriform, deeply lobed, slightly lobed or entire, mesopetalic area sericeous, blue, whitish blue, white, interstaminal appendix only in *E. nummularius*; filament filiform, anthers elliptical, linear or oblong, base sagittate to cordate, sometimes with epidermal vesicles; ovary ovoid, globoid, ellipsoid, glabrous; 2 styles, free or partially joined, each with two filiform or clavate stigmas. Capsule ovoid to globoid, compressed, glabrous; 3–4 seeds blackish, glabrous.

Table 1 – Distribution of *Evolvulus* species by phytoecological unit and geological domain in Ceará state, Northeast Brazil. CC = Crystalline Caatinga; SC = Sedimentary Caatinga; CE = Cerrado and Cerradão; CVC = Coastal Vegetation Complex; CA = Carnaubal; CDF = Crystalline Dry Forest; CWF = Crystalline Wet Forest; SDF = Sedimentary Dry Forest; SWF = Sedimentary Wet Forest; Geological domains (LSO = Land of Sedimentary Origin; LCO = Land of Crystalline Origin).

Species	Phytoecological units of Ceará state								Geological domain	
	CC	SC	CE	CVC	CA	CDF	SDF	SWF	LSO	LCO
Evolvulus anagalloides	X	X					X	X	X	X
Evolvulus cardiophyllus		X	X	X					X	
Evolvulus eleaegnifolius	X	X	X				X	X	X	X
Evolvulus ericifolius				X						
Evolvulus filipes	X				X	X	X			X
Evolvulus glomeratus	X			X	X		X		X	X
Evolvulus gypsophiloides	X			X	X					X
Evolvulus linoides	X							X	X	X
Evolvulus nummularius	X			X		X	X	X	X	X
Evolvulus ovatus	X			X		X				X
Evolvulus phyllanthoides	X							X	X	X
Evolvulus pterocaulon	X							X	X	X

Identification key for *Evolvulus* species in Ceará state

1. Plant prostrate.
   2. Stem stoloniferous; leaf blade orbicular, apex obtuse or emarginate ... 9. *Evolvulus nummularius*
   2'. Stem sarmentose; leaf blade ovate, apex acute ..... 1. *Evolvulus anagalloides*

1'. Plant erect to decumbent.
   3. Dichasium at the apex of the branches; flowers not congested at the apex of the branches.
      4. Sepals with apex obtuse ..... 4. *Evolvulus ericifolius*
      4'. Sepals with apex acuminate ..... 7. *Evolvulus gypsophiloides*
   3'. Dichasium axillary distributed from the middle to the apex of the branches or along the branches or concentrated in the terminal portions of the branches; flowers isolated axillary distributed along the branches, or congested at the apex of the branches.
      5. Flowers congested at the apex of the branches.
         6. Stem winged; leaves with base decurrent ..... 12. *Evolvulus pterocaulon*
         6'. Stem smooth; leaves with base cuneate ..... 6. *Evolvulus glomeratus*
      5'. Flowers in dichasium axillary distributed from the middle to the apex of the branches or along the branches; or concentrated in portions terminals of the branches; flowers isolated, axillary, distributed along the branches.
         7. Dichasium with long peduncle (1.3–3 cm long).
            8. Leaf blade concolorous; corolla < 0.5 cm diam ..... 5. *Evolvulus filipes*
            8'. Leaf blade discolorous; corolla 1–1.8 cm diam.
               9. Leaf blade with margins revolute; corolla deeply lobed ..... 8. *Evolvulus linoides*
               9'. Leaf blade with margins flat; corolla entire..... 3. *Evolvulus eleaegnifolius*
         7'. Dichasium or flowers isolated axillary with short peduncle (1–3 mm long).

10. Flowers in dichasium concentrated in terminal region of the branches....11. *Evolvulus phyllanthoides*
10'. Flowers isolated (rarely 2) distributed along the branches.
    11. Leaf blade with abaxial surface sericeous and adaxial glabrous ..... 13. *Evolvulus sericeus*
    11'. Leaf blade with both surfaces pilose to glabrescent.
        12. Corolla hypocrateriform..... 2. *Evolvulus cardiophyllus*
        12'. Corolla funnel-shaped.....10. *Evolvulus ovatus*

1. *Evolvulus anagalloides* Meisn., *Fl. bras.* 7: 348. 1869. Fig. 2a-d

Subshrub prostrate, stem sarmentose and smooth, branches pilose. Leaves sessile; leaf blade 0.8–2 × 0.5–1.2 cm, ovate, base rounded, truncate, apex acute, margins flat, both surfaces densely sericeous in the younger leaves, glabrescent when mature, concolorous, papyraceous. Dichasium 1–3 flowers, axillary distributed along the branches; peduncle short, 0.1–0.5 cm long, sericeous; bracteoles 0.2–0.3 cm long, lanceolate, sericeous; pedicel 0.2–0.6 cm long, sericeous. Sepals ca. 3 mm long, lanceolate, base cuneate, apex acuminate, sericeous, margin not hyaline. Corolla ca. 1 cm diam., funnel-shaped, entire, whitish blue. Filament ca. 2.5 mm long, anthers ca. 0.1 cm long, oblong, base cordate, epidermal vesicles absent. Styles ca. 0.4 cm long, free, stigmas filiform ca. 2.3 mm long. Capsule ca. 0.3 cm long, ovoid. Seeds 3–4, ca. 0.1 cm long.

Examined material: Aracati, 04º33'42"S, 37º46'11"W, 15.VI.2012, fl., *A.M. Carvalho* (EAC 52578). Barbalha, chapada do Araripe, 07°18'40"S, 39°18'15"W, 29.III.2000, fl. and fr., *E.B. Souza et al.* (EAC 29968). Camocim, Lago Seco, 02º54'08"S, 40º50'28"W, 16.III.2018, fl., *E.B. Souza et al. 5104* (HUVA). Crateús, RPPN Serra das Almas, 05º10'42"S, 40º40'39"W, 26.III.2003, fl., *F.S. Araújo 1395* (EAC, HUEFS). Guaraciaba do Norte, 04º10'01"S, 40º44'51"W, 27.II.1981, fl. and fr., *A. Fernandes* (EAC 9798). Jijoca de Jericoacoara, 02º53'42"S, 40º26'57"W, 5.V.2000, fl., *L.Q. Matias* (EAC 29527). Tianguá, 03º43'56"S, 40º49'30"W, 17.IV.2014, fl., *Lima 33* (HUVA, PEUFR); III.1859, fl., *Freire Allemão 1103* (R).

Evolvulus anagalloides is easily recognized by its sarmentose stem, sessile and ovate leaves. It is similar to *E. nummularius* by sharing the prostrate habit, but differs from it by its sarmentose stem (*vs*. stoloniferous stem). In the R herbarium, there are two specimens collected by Freire Allemão (number 1103), who considered them as *E. anagalloides*. However, one of them is attributed to *E. anagalloides* (R 45710) and the other to *E. sericeus* (R 40671), and are distinguished by their registration numbers. Freire Allemão, in 1859, identified these specimens as the same species probably because they share sarmentose stems and ovate leaf blades.

This species is endemic to Brazil, with continuous distribution from Maranhão, Piauí, Ceará, Pernambuco, Bahia and Minas Gerais, in the Caatinga. In Ceará state, this species occurs in Caatinga vegetation with sedimentary and crystalline origin; sedimentary Wet Forest, and in Coastal Vegetation Complex (Fig. 1). This species was found in Environmental Protection area (APA in portuguese) Serra da Ibiapaba and in the FLONA (National Forest) from Araripe.

The species was collected with flowers from February to June; and with fruits from February to March.

2. *Evolvulus cardiophyllus* Schltdl., Linnaea 26: 653. 1855. Fig. 2e-h

Subshrub erect, stem smooth, branches densely pilose. Leaves sessile or petiolate; petiole 0–0.3 cm long, pilose; leaf blade 1.5–4 × 1–2.5 cm, ovate to lanceolate, base cordate, apex obtuse to acute, margins flat, both surfaces pilose, concolorous, membranaceous. Flowers isolated, axillary distributed along the branches; peduncle short, ca. 1.5 mm long, pilose; bracteoles linear; pedicel absent. Sepals 0.5–0.6 cm long, lanceolate, base obtuse, apex acuminate, setose, margin entire. Corolla 0.8–1 cm long, hypocrateriform, entire, blue. Filament ca. 2.5 mm long, anthers ca. 0.1 cm long, oblong, base cordate, epidermal vesicles absent. Styles ca. 0.4 cm long, free, stigmas filiform ca. 2.5 mm long. Capsule ca. 0.3 cm long, ovoid. Seeds 3–4, ca. 0.1 cm long.

Examined material: Caucaia, Soledade, 03º44'10"S, 38º44'39"W, 11.VI.1974, fl., *A. Fernandes* (EAC 2426). Crateús, RPPN, Sertão de Cratéus, 05º10'42"S, 40º40'39"W, 21.V.1997, fl., *L.W. Lima-Verde 786* (EAC). Lajedo, 8.V.2002, fl., *F.S. Araújo 1509* (HUEFS). Crato, Geopark, Geossítio Batateira, 07º14'03"S, 39º24'34"W, 25.III.2016, fl. and fr., *J.A.A.M. Lourenço 07* (PEUFR). *Freire Allemão & M. Cysneiro 1106* (R).

Evolvulus cardiophyllus is a morphologically well-defined species, being characterized by having flowers isolated, axillary distributed along the

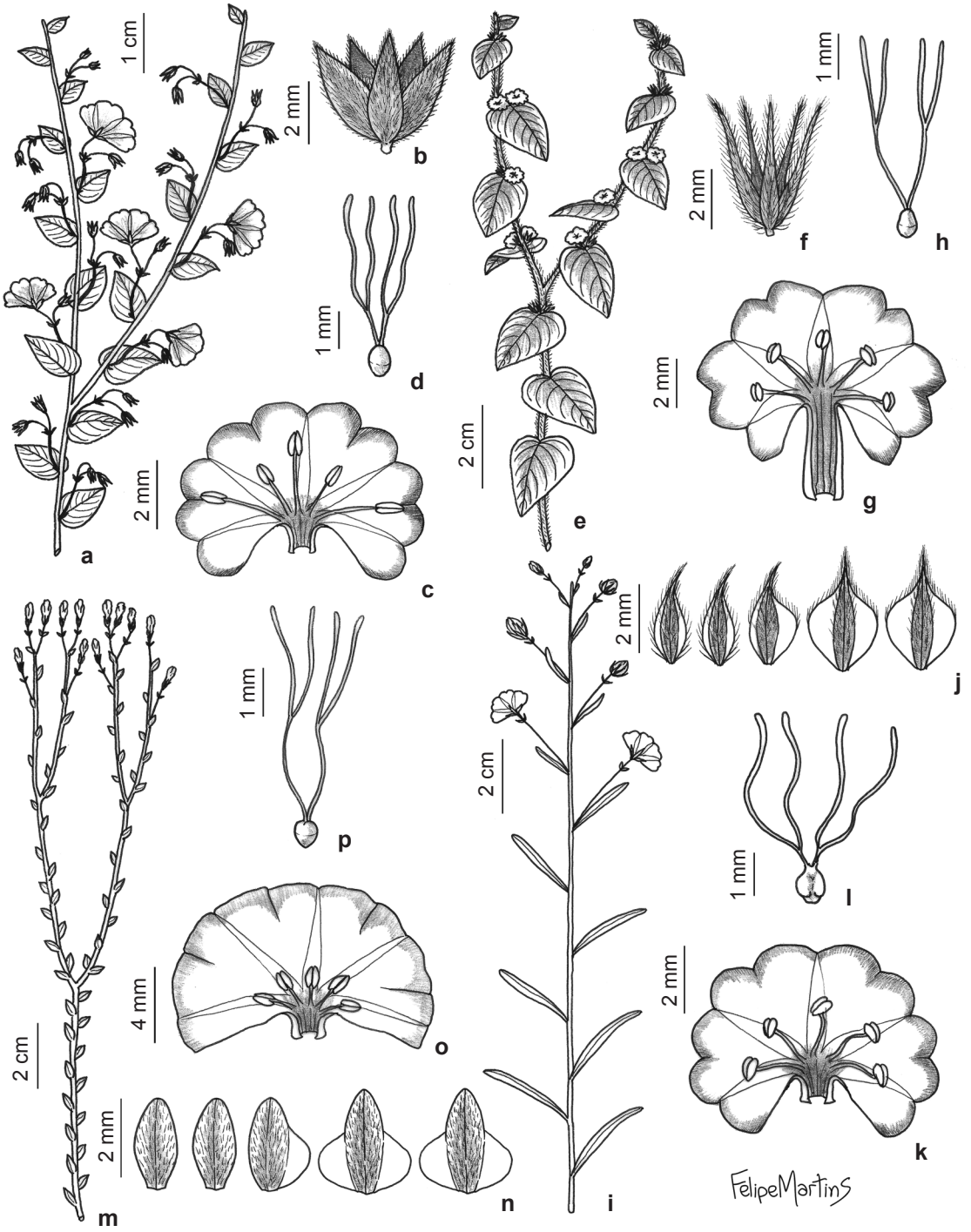

Figure 2 – a-d. *Evolvulus anagalloides* – a. fertile branch; b. sepals lanceolate; c. corolla funnel-shaped and entire; d. gynoecium. e-h. *E. cardiophyllus* – e. fertile branch; f. sepals lanceolate with apex acuminate; g. corolla hypocrateriform; h. gynoecium. i-l. *E. eleaegnifolius* – i. fertile branch; j. sepals acuminate; k. corolla rotate; l. gynoecium. m-p. *E. ericifolius* – m. fertile branch; n. sepals obtuse; o. corolla entire; p. gynoecium. (a-d. *Lima 33*; e-h. *J.A.A.M. Lourenço 07*; i-l. *E.B. Souza 4602*; m-p. *E.B. Souza et al. 5051*). Drawn by Felipe Martins.

branches, leaf blade with both surfaces pilose and hypocrateriform corolla. It can be confused with *E. latifolius* which occurs in surrounding states, due to its ovate to lanceolate leaf blade, but it differs from this by the sepals with acuminate apex (*vs.* falcate to acute in *E. latifolius*), epidermal vesicles absent on the anthers (*vs.* present) and hypocrateriform corolla (*vs.* funnel-shaped).

This species is widely distributed, occurring in Mexico, Venezuela, Colombia and Brazil, where it presents a disjunct distribution, occurring in the north in Acre, Amazonas and Roraima, and continuously into Piauí, Ceará, Bahia, Minas Gerais and Rio de Janeiro, and further south into Paraná. In Ceará, this species has a disjunct distribution between Caatinga vegetation and the Coastal Vegetation Complex (Fig. 1). This species occurs in FLONA from Araripe and in RPPN Serra das Almas.

The species was collected with flowers in March, May and June; and with fruits in March.

3. *Evolvulus elaeagnifolius* Dammer, Bot. Jahrb. Syst. 33(57): 38. 1897. Fig. 2i-l

Subshrub erect, stem smooth, branches sericeous to glabrescent. Leaves sessile or petiolate; petiole 0–0.1 cm long, sericeous; leaf blade 1–4.5 × 0.2–0.6 cm, linear, base attenuate, apex acute to acuminate, margin flat, adaxial surface sericeous, abaxial surface densely sericeous, discolorous, membranaceous. Dichasium axillary distributed from the middle to the apex of the branches; peduncle long, 1.3–2.2 cm long, sericeous to lanose; bracteoles 0.3–0.5 cm long, lanceolate, sericeous; pedicel 0.1–0.3 mm long, sericeous. Sepals equal, ca. 0.3 cm long, 2 outer lanceolate, base cuneate, apex acuminate, sericeous, margins entire; 3 inner lanceolate, base cuneate, apex acuminate, sericeous, margins with lobe hyaline. Corolla 1–1.8 cm diam., rotate, entire, blue. Filament ca. 2.5 mm long, anthers ca. 0.1 cm long, oblong, base cordate, epidermal vesicles absent. Styles ca. 0.5 cm long, free, stigmas filiform ca. 0.3 cm long. Capsule ca. 0.3 cm long, ovoid. Seeds 3–4, ca. 0.1 cm long.

Examined material: Crateús, RPPN Serra das Almas, 05º10’42”S, 40º40’39”W, 25.III.2002, fl., *F.S. Araújo 1381* (HUEFS); trilha cruzinho, 8.V.2002, fl., *F.S. Araújo 1486* (HUEFS). Parambú, faz. Pau Preto, 22.V.1982, fl. and fr., *E. Nunes* (EAC 11450). Reriutaba, 04º08’30”S, 40º34’56”W, 25.V.1981, fl. and fr., *A. Fernandes & P. Martins* (EAC 10313). São Benedito, 04º13’56”S, 39º11’33”W, 7.V.1981, fl., *A. Fernandes* (EAC 10386). Tianguá, Queimadas, 03º43’56”S, 40º49’30”W, 19.V.2017, fl. and fr., *E.B. Souza 4602* (HUEFS); APA do Planalto da Ibiapaba, 03º52’13”S, 41º11’44”W, 19.V.2017, fl. and fr., *E.B. Souza et al. 4580* (EAC, HUVA). Ubajara, planalto da Ibiapaba, 03º51’16”S, 40º55’16”W, 5.II.2004, fl., *E.B. Souza et al. 865* (HUVA); *F. Freire Alemão & M. Cysneiro 1104* (PO, R); VIII.1859, fr., *Freire Allemão & M. Cysneiros 1111* (PO, R).

Evolvulus eleaegnifolius is characterized by axillary dichasium with long peduncles distributed from the middle to the apex of the branches, discolorous leaf blade and entire corolla. It is similar to *E. linoides* by its linear and discolorous leaf blade, but differs by its leaf margin flat (*vs.* revolute in *E. linoides*) and entire corolla (*vs.* deeply lobed).

It is endemic to Brazil with continuous distribution from Ceará, Pernambuco, Bahia to Minas Gerais, in the Caatinga. In Ceará, this species occurs in Caatinga vegetation with sedimentary and crystalline origin; in Cerrado and Cerradão, and Dry and Wet Forests with sedimentary origin (Fig. 1). This species occurs in the APA Serra da Ibiapaba and in the RPPN Serra das Almas.

The species was collected with flowers in February, March and May; and with fruits in May.

4. *Evolvulus ericifolius* Mart. *ex* Schrank, Pl. Rar. Hort. Monac., t. 94. 1822. Fig. 2m-p

Subshrub erect, stem smooth, branches sericeous to glabrescent. Leaves sessile; leaf blade 0.3–0.8 × 0.2 cm, linear, base truncate, apex acute to acuminate, margin flat, adaxial surface sericeous, abaxial surface densely sericeous, discolorous, papyraceous. Dichasium at the apex of the branches; peduncle short, 0.1–0.2 cm long, sericeous; bracteoles ca. 0.2 cm long, lanceolate, sericeous; pedicel 0.1–0.2 cm long, sericeous. Sepals equal, ca. 0.3 cm long, elliptic, base cuneate, apex obtuse, sericeous, margin hyaline, lobed. Corolla 1–1.8 cm diam, rotate, entire, blue. Filament ca. 2.5 mm long, anthers ca. 0.1 cm long, oblong, base cordate, epidermal vesicles absent. Styles 0.5 cm long, free, stigmas filiform ca. 0.3 cm long. Capsule ca. 0.3 cm long, ovoid. Seeds 3–4, ca. 0.1 cm long.

Examined material: Granja, 03º07’13”S, 40º49’34”W, 15.III.2017, fl. and fr., *E.B. Souza 4480* (EAC, HUEFS); 10 km em direção a Martinópoles, 21.V.2015, fl., *E.B. Souza et al. 3439* (EAC); 3.VI.2016, fl., *E.B. Souza et al. 4183* (HUVA); 03º11’12”S, 40º44’34”W, 3.V.2016, fl., *E.B. Souza et al. 5051* (HUVA); 8.1859, fr., *Freire Allemão & M. Cysneiros 1111* (R).

This species is characterized by its discolorous leaf blade, dichasium at the apex of the branches and sepals with obtuse apex. It is similar to *E. gypsophiloides* Moric. by sharing discolorous leaf blade, dichasium at the apex of the branches, but differs by its sepals with obtuse apex (*vs.* acuminate).

This species is endemic to Brazil, it has continuous geographical distribution from Maranhão, Piauí, Ceará, Pernambuco, Bahia, Minas Gerais, Espírito Santo, Rio de Janeiro, as well as in Tocantins, Goiás and Mato Grosso, in the Caatinga and Cerrado. In the study area, this species is restricted to the Coastal Vegetation Complex, in Cerrado *stricto sensu* in the municipality of Granja (Fig. 1) from an unprotected area.

The species was collected with flowers in March, May and June; and with fruits in March.

5. *Evolvulus filipes* Mart., Flora 24(2): 100. 1841. Fig. 3a-d

Herb erect to decumbent, stem smooth, branches sericeous to glabrescent. Leaves sessile or petiolate; petiole 0–0.1 cm long, sericeous; leaf blade 0.6–2.5 × 0.2–0.9 cm, elliptical to oblanceolate, base attenuate, apex acute, margin flat, both surfaces sericeous, concolorous, membranaceous. Dichasium axillary distributed along the branches; peduncle long 1.5–3 cm long, sericeous; bracteoles 1–2.5 mm long, lanceolate, sericeous; pedicel 0.2–0.5 cm long, sericeous. Sepals 2.5–3 mm long, lanceolate, rhombic, base cuneate, apex acuminate, sparsely sericeous, margin flat, not hyaline. Corolla less than 0.5 cm diam., rotate, entire, blue or white. Filament ca. 1.5 mm long, anthers ca. 0.1 cm long, oblong, base cordate, epidermal vesicles absent. Styles ca. 0.5 cm long, free, stigmas clavate 3.5–4 mm long. Capsule ca. 2.5 mm long, ovoid. Seeds 3–4, ca. 0.1 cm long.

Examined material: Aiuaba, Estação Ecológica de Aiauaba, 06º34’25”S, 40º07’25”W, 11.IV.1991, fl., *M.A. Figueredo et al.* (EAC 17510). Chaval, 03º02’01”S, 41º14’38”W, 10.VI.2016, fl., *E.B. Souza 4269* (EAC, HUEFS). Crateús, RPPN Serra das Almas, 05º10’42”S, 40º40’39”W, 9.VI.2002, fl., *F.S. Araújo 1515* (EAC, HUEFS). Groaíras, 03º54’48”S, 40º23’00”W, 9.IV.2016, fl. and fr., *F.D.S. Sousa 409* (HUVA). Quixadá, 6.VI.1982, fl., *E. Nunes* (EAC 11605). Ipu, 04º19’20”S, 40º42’39”W, 19.III.2002, fl. and fr., *V.C. Souza et al. 28736* (ESA). Irauçuba, 03º44’46”S, 39º47’39”W, 19.V.2002, fl., *E. Trigueiro* (EAC 31634). Itaiçaba, 04º40’28”S, 37º49’21”W, 10.IV.1982, fl., *E. Nunes* (EAC 11178). Jaguaribe, 05º53’26”S, 38º37’19”W, 10.IV.2011, fl. and fr., *A.M. Miranda 6276* (HUEFS, HST). Massapê, 03º31’22”S, 40º20’34”W, 11.VIII.2014, fl. and fr., *M.C.P. Teixeira 18* (HUVA). Mauriti, 07º23’21”S, 38º46’28”W, 11.V.2009, fl., *M. Oliveira 4020* (HVASF). Meruoca, 03º32’30”S, 40º27’18”W, 19.V.2018, fl. and fr., *A.F.B. Silva 229* (HUVA). Quixadá, 04º58’17”S, 39º00’55”W, Fazenda Iracema, 6.VI.1982, fl. and fr., *E. Nunes* (EAC 11605). Quixeramobim, 05º11’57”S, 39º17’34”W, assentamento Vista Alegre-Agrossilvipastoril, 22.III.2014, fl., *L.B.Oliveira & Leydiane 151* (CEN). Santa Quitéria, 04º19’55”S, 40º09’24”W, 24.IV.2012, fl., *J. Paula-Souza et al. 10861* (ESA). Sobral, 03º41’10”S, 40º20’59”W, 20.V.2016, fl., *E.B. Souza 4081* (HUEFS, EAC). Tauá, 20.IV.2014, fl., *R.C. Gomes 59b* (EAC); *Freire Allemão & M. Cysneiro 1105* (R).

Evolvulus filipes is easily identified because it is an herb with erect or decumbent stem, concolorous leaf blade, dichasium with long peduncle distributed along the branches, and corolla < 5 mm diam. In several analyzed specimens, *E. filipes* has been misidentified as *E. linarioides*, probably because they share a decumbent stem, leaf blade elliptical, sericeous and concolorous. However, *E. filipes* differs by the pedicel shorter than the floral peduncle (longer than the peduncle in *E. linarioides*) and corolla < 0.5 cm diam. (*vs.* 1–1.2 cm diam.).

Evolvulus filipes is widely distributed, from Mexico to Paraguay. In Brazil, it has a continuous distribution from the Amazonas to Paraná. In Ceará, this species occurs in Caatinga and Dry Forest; in Sedimentary Dry Forest, Carnaubal, and in the Coastal Vegetation Complex (Fig. 1). This species occurs in the Estação Ecológica de Aiuaba and in the RPPN Serra das Almas.

The species was collected with flowers and fruits from March to August.

6. *Evolvulus glomeratus* Nees & Mart., Nov. Actorum Acad. Caes. Leop.-Carol. Nat. Cur. 11(1): 81. 1823. Fig. 3e-i

Subshrub erect or decumbent, stem smooth, branches sericeous to glabrescent. Leaves sessile or petiolate; petiole 0–1 mm long, sericeous; leaf blade 0.8–3.5 × 0.3–1.2 cm, elliptical to oblanceolate, rarely oblong, base cuneate, apex obtuse to acute, margin flat, adaxial surface sericeous, abaxial surface densely sericeous, discolorous, papyraceous. Flowers congested at the apex of the branches; peduncle long 1–2.5 cm long.; bracteoles absent; lower bract oblanceolate,

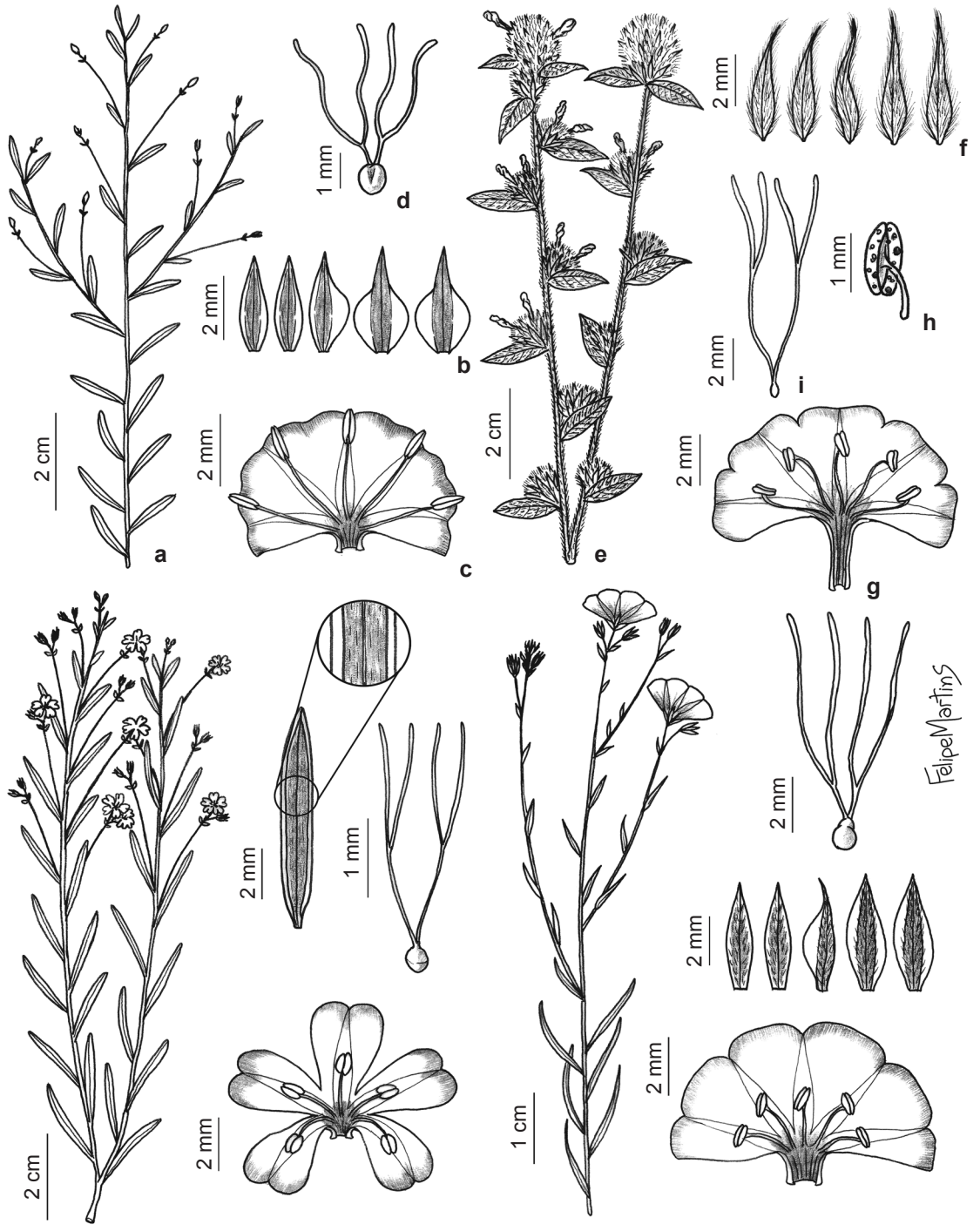

Figure 3 – a-d. *Evolvulus filipes* – a. fertile branch; b. sepals lanceolate; c. corolla rotate and entire; d. gynoecium. e-i. *E. glomeratus* – e. fertile branch; f. sepals lanceolate with apex acute; g. corolla hypocrateriform; h. anther with epidermal vesicles; i. gynoecium. j-m. *E. gypsophiloides* – j. fertile branch; k. sepals acuminate; l. corolla funnel-shaped, and entire; m. gynoecium. n-q. *E. linoides* – n. fertile branch; o. leaf blade with margins revolute; p. corolla deeply lobed; q. gynoecium. (a-d. *F.D.S. Sousa 409*; e-i. *E.B. Souza et al. 4933*; j-m. *F.S. Araújo 1537*; n-q. *Araújo et al. 1486*). Drawn by Felipe Martins.

oblong, elliptical, lanceolate, sericeous in both surfaces, leaf-like; the upper ones lanceolate, rarely oblanceolate, adaxial surface glabrous, abaxial surface sericeous, sepal-like; pedicel absent. Sepals 4–6.5 mm long, lanceolate, base cuneate, apex acute, sericeous, margin not hyaline. Corolla 0.8–1 cm diam., hypocrateriform, slightly lobed, blue. Filament ca. 0.3 cm long, anthers ca. 1.5 mm long, oblong base cordate, with epidermal vesicles. Styles 2.5–3.5 mm long, free, stigmas filiform 0.6–0.8 mm long. Capsule ca. 0.3 cm long, globoid. Seeds 3–4, ca. 0.1 mm long.

Examined material: Aiuaba, Estação Ecológica de Aiuaba, 06º34'25"S, 40º07'25"W, 6.IV.1983, fl., *F.A. Viana* (EAC 11970); 30.V.1996, fl., *M.I.B. Loiola et al. 170* (EAC); estrada Gameleira-Cedro, 29.IV.1981, fl., *P. Martins* (EAC10197). Barbalha, 27.IV.2009, fl., *M. Oliveira 3982* (HVASF). Crato, estrada da Velha Minguiriba, 07º14'03"S, 39º24'34"W, 22.V.2011, fl., *E. Melo 9718* (HUEFS). Granja, 03º07'13"S, 40º49'34"W, 22.II.2018, fl., *E.B. Souza et al. 4933* (HUVA). Irauçuba, 03º44'46"S, 39º47'39"W, 22.IV.1995, fl., *M.F. Mata* (HUVA655). Tauá, Cachoeirinha, 06º00'11"S, 40º17'34"W, 27.IV.1981, fl. and fr., *E. Nunes* (EAC10069). *Freire Allemão & M. Cysneiros 1108* (R).

Evolvulus glomeratus is characterized by its flowers congested at the apex of the branches, and hypocrateriform corolla. It is similar to *E. pterocaulon* by these characteristics, but differs by its smooth stem (*vs*. winged stem in *E. pterocaulon*) and epidermal vesicles present on the anthers (*vs.* absent).

Evolvulus glomeratus is widely distributed, occurring throughout South America, except for Chile and Peru. In Brazil, it is registered in all regions and phytogeographic domains. In Ceará, this species occurs in Caatinga vegetation on crystalline lands; Cerrado and Cerradão, Sedimentary Dry Forest and Coastal Vegetation Complex (Fig. 1). There are populations of this species in Aiuaba Ecological Station.

Flowers were observed in February, April and May; and fruits in April.

7. *Evolvulus gypsophiloides* Moric., Pl. Nouv. Amer. 52, t. 35. 1838. Fig. 3j-m

Herb erect, stem smooth, branches sericeous to glabrescent. Leaves sessile; leaf blade 0.5–1.5 × 0.1–0.2 cm, linear, base cuneate, apex acute, margin flat, adaxial surface sparsely sericeous, abaxial surface densely sericeous, discolorous, membranaceous. Dichasium at the apex of the branches; peduncle short 0.8–1.2 cm long, sericeous; bracteoles 0.2–0.3 cm long, lanceolate, sericeous; pedicel 0.2–0.3 cm long, sericeous. Sepals 0.5–0.6 cm long, elliptical, ovate, base cuneate, apex acuminate, sericeous, margin flat, the inner have margins hyaline. Corolla ca. 1–1.2 cm diam., funnel-shaped, entire, blue. Filament ca. 2.5 mm long, anthers ca. 0.2 cm long, base sagittate, epidermal vesicles absent. Styles ca. 1.5 mm long, partially joined at the base, stigmas filiform 0.5–0.8 cm long. Capsule ca. 3 mm long, ovoid. Seeds 3–4, ca. 0.1 cm long.

Examined material: Caridade, Fazenda Feijão, 04º13'56"S, 39º11'33"W, 25.III.1990, fl., *B. Freitas 151* (EAC). Caucaia, 03º44'10"S, 38º39'11"W, 11.V.2005, fl., *M. Oliveira 1731* (UFP, IPA). Crateús, RPPN Serra das Almas, 05º10'42"S, 40º40'39"W, 27.III.2002, fl. and fr., *F.S. Araújo 1351* (EAC, HUEFS). Granja, ca. 8 km de Martinópoles, 03º10'44"S, 40º45'17"W, 21.VI.2018, fl. and fr., *E.B. Souza et al. 5337* (HUVA). Irauçuba, 03º44'46"S, 39º47'39"W, 4.V.2001, fl. and fr., *A.M.M. Carvalho* (EAC31757). Jaguaribe, Maciço do Pereiro, 05º53'26"S, 38º37'19"W, 11.IV.2011, fl. and fr., *A.M. Miranda 6288* (EAC, HST). Quixadá, Faz. Iracema, 04º58'17"S, 39º00'55"W, 5.VI.1982, fl., *E. Nunes* (EAC11534); 9.V.2002, fl. and fr., *F.S. Araújo 1537* (EAC). São Gonçalo do Amarante, 26.VIII.2004, fl., *L.W. Lima-Verde et al. 3076* (EAC). Santa Quitéria, 04º19'55"S, 40º09'24"W, 18.III.2002, fl., *V.C. Souza et al. 28708* (ESA).

Evolvulus gypsophiloides is characterized by having discolorous leaf blade, dichasium at the apex of the branches, and sepals with acuminate apex. Its similarity with *E. ericifolius* is discussed under the comments of this species.

This species is endemic to Brazil, occurring continuously in Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Bahia, Minas Gerais, Rio de Janeiro, as well as in Goiás and Mato Grosso, in Caatinga and Cerrado. In Ceará state, this taxon occurs in Caatinga vegetation on crystalline lands, Carnaubal, and the Coastal Vegetation Complex (Fig. 1). This species was collected in the RPPN Serra das Almas.

The species was collected with flowers from March to August; and with fruits in March to June.

8. *Evolvulus linoides* Moric., Pl. Nouv. Amér., 139, t 83. 1844. Fig. 3n-q

Subshrub erect, stem smooth, branches sericeous to glabrescent. Leaves sessile; leaf blade 1.5–3.5 × 0.2–0.3 cm, linear, base attenuate, apex acuminate, margin revolute, adaxial surface sericeous, abaxial surface densely sericeous, discolorous, papyraceous. Dichasium distributed

from middle to the apex of the branches; peduncle long 1.5–2.3 cm long, sericeous; bracteoles 0.3–0.6 cm long, lanceolate to linear, sericeous; pedicel 1–2 mm long, sericeous. Sepals equal, ca. 0.3 cm long, 2 outer ovate, base cuneate, apex acuminate, sericeous, margin entire; 3 inner ovate, base cuneate, apex acuminate, sericeous, margin with lobe hyaline. Corolla 1–1.3 cm diam., rotate, deeply lobed, blue. Filament ca. 2.5 mm long, anthers ca. 0.1 cm long, oblong, base cordate, epidermal vesicles absent. Styles ca. 0.5 cm long, free, stigmas filiform ca. 0.3 cm long. Capsule ca. 0.3 cm long, ovoid. Seeds 3–4, ca. 0.1 cm long.
Examined material: Aiuaba, Serra Nova, 06º34'25"S, 40º07'25"W, 13.I.1998, fl., *F.M. Figueiredo et al. 939* (EAC). Crateús, RPPN Serra das Almas, 05º10'42"S, 40º40'39"W, 8.V.2002, fl., *F.S. Araújo et al. 1486* (EAC). São Benedito, Faveira, 04º02'55"S, 40º51'54"W, 7.V.1981, fl. and fr., *A. Fernandes & P. Martins* (EAC10386).

This species is characterized by its leaf blade linear, revolute margins, dichasium with long peduncle distributed from the middle to the apex of the branches, and corolla deeply lobed. It is similar to *E. eleaegnifolius*, but differs as shown in this species' comment.

This species has disjunct geographical distribution between Bolivia and Brazil. In Brazil, it has a continuous distribution from Ceará, Rio Grande do Norte, Pernambuco, Bahia, Minas Gerais and Mato Grosso. In Ceará, this species has disjunct distribution between the Crystalline Caatinga and Sedimentary Wet Forest (Fig. 1). This species occurs in the RPPN Serra das Almas.

The species was collected with flowers in January and May; and with fruits in May.

9. *Evolvulus nummularius* (L.) L., Sp. Pl. (2)1: 391. 1762. Fig. 4a-d

Herb prostrate, stem stoloniferous and smooth, branches pilose to glabrescent. Leaves petiolate; petiole 0.1–0.5 cm long, pilose; leaf blade 0.6–1.5 × 0.5–2.5 cm, orbicular, base truncate to cordate, rounded, apex obtuse or emarginate, margin flat, adaxial surface glabrous, abaxial surface with trichomes restricted to the main vein, concolorous, membranaceous. Inflorescence uniflora, axillary; peduncle short ca. 1.5 mm long; bracteoles 0.1–0.2 cm long, lanceolate, glabrous; pedicel 1.5–3 mm long, sericeous. Sepals ca. 0.3 cm long, ovate, lanceolate, elliptical, oblong, base cuneate, obtuse, apex acute, cuspidate, obtuse, ciliate, margin entire, hyaline in inner. Corolla 5–7 mm diam., funnel-shaped, slightly lobed, white. Filament ca. 1.5–2.5 mm long, anthers ca. 0.1 cm long, oblong, base sagittate, epidermal vesicles absent. Styles 0.5–1 mm long, free, stigmas filiform 2.5–4.5 mm long. Capsule ca. 3–3.5 mm long, ovoid. Seeds 4, ca. 0.1 cm long.
Examined material: Crateús, Serra das Almas, 05º10'42"S, 40º40'39"W, *F.S. Araújo 1395* (PEUFR). Crato, Chapada do Araripe, 07º14'03"S, 39º24'34"W, 29.VII.1997, fl., *J.E. Gomes et al. 237* (HST). Maracanaú, próximo ao anel viário, 19.V.1996, fl., *Castro, A.S.F. 170* (EAC). Sobral, faz. experimental da UVA, 03º41'10"S, 40º20'59"W, 21.V.2010, fl., *M.O.O. Mesquita 33* (UFP). Ubajara, Parque Nacional de Ubajara, 03º51'16"S, 40º55'16"W, 9.VI.2016, fl. and fr., *J.A.A.M. Lourenço et al. 91* (PEUFR). *Freire Allemão & M. Cysneiro 1109* (R).

In the study area, this species is easily recognized by its stoloniferous stem and orbicular leaf blade. The resemblance to *E. anagalloides* is discussed before, under the comments of this species.

Evolvulus nummularius has a pantropical distribution. In Brazil, it is found from Amazonas to Paraná. In the study area, it occurs in Caatinga and Dry Forest vegetation of crystalline origin, and Wet Forest of sedimentary origin (Fig. 1). This species occurs in the Ubajara National Park and RPPN Serra das Almas.

The species was collected with flowers from May to July; and with fruits in June.

10. *Evolvulus ovatus* Fernald., Proc. Amer. Acad. Arts 33(5): 89. 1897. Fig. 4e-h

Herb to subshrub decumbent or erect, stem smooth, branches pilose to glabrescent. Leaves petiolate; petiole 0.1–0.2 cm long, pilose; leaf blade 0.6–2.5 × 0.4–1.5 cm, ovate, elliptical, rarely obovate and oblong, base truncate, rounded, cuneate, apex acute, margin flat, both surfaces pilose to glabrescent, concolorous, membranaceous. Flowers isolated (rarely 2) axillary along the branches; peduncle 0.1–0.3 cm long, pilose; bracteoles 1.5–3 mm long, lanceolate, pilose. Sepals 0.5–0.6 cm long, lanceolate, base cuneate, apex acute, pilose, margin entire. Corolla 5–6 mm diam., funnel-shaped, entire, sericeous, blue. Filament ca. 1.5 mm long, anthers ca. 0.1 cm long, elliptical, base cordate, epidermal vesicles absent. Styles ca. 0.1 cm long, free, stigmas filiform 3.5–4 mm long. Capsule ca. 2.5 mm long, globoid. Seeds 4, ca. 0.1 cm long.

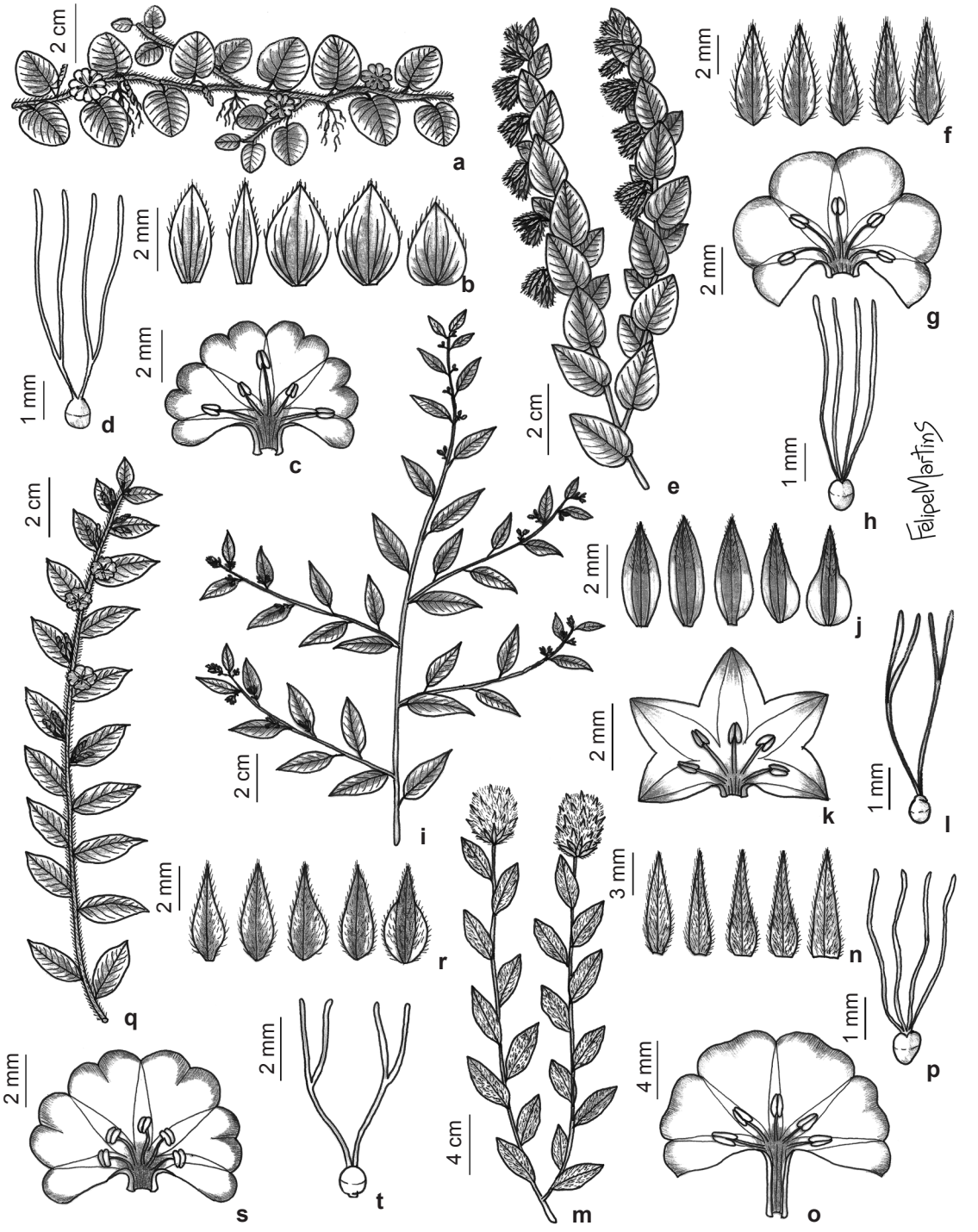

Figure 4 – a-d. *Evolvulus nummularius* – a. fertile branch; b. sepals acute; c. corolla funnel- shaped and slightly lobed; d. gynoecium. e-h. *E. ovatus* – e. fertile branch; f. sepals lanceolate with apex acute; g. corolla funnel-shaped and entire; h. gynoecium. i-l. *E. phyllanthoides* – i. fertile branch; j. sepals lanceolate; k. corolla rotate and slightly lobed; l. gynoecium. m-p. *E. pterocaulon* – m. fertile branch; n. sepals lanceolate with apex acute; o. corolla hypocrateriform; p. gynoecium. q-t. *E. sericeus* – q. fertile branch; r. sepals with apex acute and sericeous; s. corolla rotate; t. gynoecium. (a-d. *F.S. Araújo 1395*; e-h. *A.M. Miranda & D. Lima 3368*; i-l. *F.S. Araújo 866*; m-p. *Sobrinho et al.* (EAC 33480); q-t. *M. Oliveira 530*). Drawn by Felipe Martins.

Examined material: Acaraú, 02º52'30"S, 40º06'24"W, 26.V.2015, fr., *J.B. Verçosa et al. 02* (HUVA). Caridade, 04º13'56"S, 39º11'33"W, 30.VII.1991, fl., *L.C. Coelho* (EAC 18707). Caucaia, Salgadinho, 03º44'10"S, 38º39'11"W, 5.VI.2015, fl. and fr., *A.S.F. Castro 2325* (EAC). Cedro, 15.V.2015, fl., *W. Batista 395* (EAC). Crateús, 05º10'42"S, 40º40'39"W, 10.V.1996, fl. and fr., *F.S. Cavalcanti 290* (EAC). Crato, Floresta Nacional do Araripe, Reserva Guaribas, 23.V.1999, fl. and fr., *A.M. Miranda & D. Lima 3368* (HST). Granja, distrito de Santa Teresinha, 03º10'44"S, 40º45'17"W, 3.VI.2016, fl. and fr., *E.B. Souza 4112* (HUVA). Icapuí, 29.IV.2000, fl., *Montenegro et al. 08* (EAC). Irauçuba, 03º44'46"S, 39º47'39"W, 19.V.2002, fl., *E. Trigueiro* (EAC). Jaguaribe, Maciço do Pereiro, 05º53'26"S, 38º37'19"W, 10.IV.2011, fr., *A.M. Miranda & K. Manso 6262* (EAC, HST). Massapê, Cacimbinha, 03º31'22"S, 40º20'34"W, 28.I.2014, fl. and fr., *M.C.P. Texeira 20* (HUVA). Meruoca, distrito de Palestina, 03º32'30"S, 40º27'18"W, 12.VIII.2017, fr., *A.F.B. Silva 49* (HUVA). Quixadá, Fazenda Iracema, 04º58'17"S, 39º00'55"W, 22.IV.1982, fl. and fr., *Adeito* (IPA 43510). Quixadá, Fazenda Não Me Deixeis, 04º58'17"S, 39º00'55"W, 22.IV.1982, fl., *M.P.M. Gonçalves* & *L.B. Silva* (HST 21669, RB 735859). Quixeramobim, 05º11'57"S, 39º17'34"W, 14.IV.1964, fl., *O.J. Viana 214* (HUVA). Reriutaba, 25.V.1981, fl. and fr., *A. Fernandes* (EAC 10305). Santa Quitéria, 04º19'55"S, 40º09'24"W, 25.IV.2012, fl. and fr., *J. Paula-Souza et al. 10955* (ESA); 12.IV.2012, fl. and fr., *J. Paula-Souza et al. 10860* (ESA). São Gonçalo do Amarante, 1.V.2011, fl., *A.S.F. Castro 2472* (EAC). Sobral, 03º41'10"S, 40º20'59"W, 10.VI.1999, fl., *E.B. Souza 354* (EAC), *Freire Allemão & M. Cysneiro 1110* (R).

This species is characterized by its decumbent or erect stem, pilose to glabrescent leaf blade, flower isolated axillary along the branches and corolla 5–6 mm diam. It is similar to *E. cordatus* by its pilose leaf blade, but differs by the length of the floral peduncle, 0.1– 0.3 cm long (*vs*. > 0.5 cm long in *E. cordatus*) and diameter of the corolla, 5–6 mm diam (*vs*. > 8 mm diam.).

This species has a wide geographical distribution, occurring from southern Mexico, Guatemala, Venezuela, Colombia, and Brazil. In Brazil, it reported to northern Amazonas from Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Bahia, Alagoas, Minas Gerais and Goiás states, in the Amazon, Caatinga and Cerrado. In Ceará, this species is recorded in Crystalline Caatinga, Crystalline Dry Forest, and in the Coastal Vegetation Complex (Fig. 1). One population of this species was registered in the FLONA from Araripe.

The species was collected with flowers in January, April to July; and with fruits in January, April to June, and August.

11. ***Evolvulus phyllanthoides*** Moric., Pl. Nouv. Amér: 82, t 54. 1840. Fig. 4i-l

Subshrub erect, stem smooth, branches pilose to glabrescent. Leaves sessile or petiolate; petiole ca. 0.1 cm long, sericeous; leaf blade 1.5–2.5 × 0.4–1 cm, ovate to lanceolate, base acute, cuneate, apex acute, margin flat, both surface sericeous, slightly discolorous, membranaceous. Dichasium axillary concentrated in terminal portions of the branches; peduncle short ca. 0.1 cm long, sericeous; bracteoles ca. 0.1 cm long, lanceolate, sericeous; pedicel 1–2.5 mm long, sericeous. Sepals 4–4.5 mm long, narrowly elliptical, lanceolate, base cuneate, truncate, apex subacute, sericeous, margin hyaline in inner. Corolla 0.6–0.7 cm diam., rotate, slightly lobed, sericeous, white. Filament ca. 0.2 cm long, anthers ca. 1.5 mm long, oblong, base cordate, epidermal vesicles absent. Styles ca. 2.5 mm long, free, stigmas clavate 1.5–2 mm long. Capsule ca. 0.3 cm long, ovoid. Seeds 3–4, ca. 0.1 cm long.

Examined material: Aiuaba, Estação Ecológica de Aiuaba, 06°34'25"S, 40°07' 25"W, 23.III.1984, fl. and fr., *E. Nunes* (EAC12415). Barbalha, próximo ao riacho do meio, Chapada do Araripe, 07°18'02"S, 39°18' 02"W, 28.IV.2009, fl., *J.R. Maciel, 1020* (HVASF, UFP); 12.V.2009, fr., *M. Oliveira 4054* (HVASF). Baturite, 04°19'43"S, 38°53' 05"W, fl. and fr., *Freire Allemão & M. Cysneiro 1102* (R). Crateus, RPPN Serra das Almas, 05º10'42"S, 40º40'39"W, 7.V.2002, fl., *F.S. Araújo 1562* (HUEFS). Novo Oriente, APA Planalto da Ibiapaba, 15.II.1991, fl., *F.S. Araújo 16* (IPA). Ubajara, Planalto da Ibiapaba, 03°51'16"S, 40°55'16"W, 830 m, 21.VII.1994, fl., *F.S. Araújo 866* (EAC). Viçosa do Ceará, 03°33'44"S, 41°05'32"W, 21.VII.1994, fl., *A. Fernandes* (EAC 3921); *Freire Allemão & M. Cysneiro 1107* (R).

This species is morphologically well defined and can be characterized by its leaf blade ovate to lanceolate, dichasium axillary with short peduncle concentrated in the terminal portions of branches.

This species is endemic to Brazil, with continuous distribution from Pará, Maranhão, Piauí, Ceará, Rio Grande do Norte, Pernambuco, Bahia, Sergipe, Minas Gerais and Rio de Janeiro, in the Caatinga, Cerrado and Atlantic Forest. In Ceará, this species occurs in Caatinga vegetation and Dry Forest of Crystalline origin, and Wet Forest of sedimentary origin (Fig. 1). This species was collected in the APA Serra da Ibiapaba, Ecological Station de Aiuaba and in the RPPN Serra das Almas.

The species was collected with flowers from February to July; and with fruits in March and May.

12. *Evolvulus pterocaulon* Moric., Pl. Nouv. Amer.: 140, t. 84. 1844. Fig. 4m-p

Subshrub erect, stem winged, branches vilose to glabrescent. Leaves sessile; leaf blade 1–4.5 × 0.2–0.8 cm, lanceolate, base decurrent, apex acute to subacute, margin flat, both surfaces vilose, concolorous, membranaceous. Flowers congested in the apex of the branches; peduncle long 2–3 cm long; bracts ca. 0.8 cm long, pilose, lanceolate, sepal-like along the inflorescence; pedicel absent. Sepals 0.8–0.9 cm long, lanceolate, base truncate, apex acute, pilose, margin not hyaline. Corolla 0.8–1 cm diam., hypocrateriform, slightly lobed, blue. Filament ca. 0.2 cm long, anthers 1–1.5 mm long, oblong, base sagittate, epidermal vesicles present. Styles ca. 4.5 mm long, partially joined at the base, stigmas filiform ca. 5.5 mm long. Capsule ca. 1.5 mm long, globoid. Seeds 3–4, ca. 1 mm long.
Examined material: Crateús, RPPN Serra das Almas, 650 m, 18.VII.2001, fl. and fr., *M.S. Sobrinho et al.* (EAC 33480). Guaraciaba do Norte, 04°10'01"S, 40°44'51"W, 26.V.1981, fl., *A. Fernandes* (EAC 10333).

Evolvulus pterocaulon is easily recognized by the following set of characters: winged stems, decurrent leaf base, flowers congested at the apex of the branches and hypocrateriform corolla. Its resemblance to *E. glomeratus* is discussed under the comments of this species.

This species occurs in Bolívia, Venezuela and Brazil. In Brazil, it is widely distributed, occurring in Tocantins, Maranhão, Piauí, Ceará, Alagoas, Sergipe, Bahia, Goiás, Mato Grosso do Sul, Mato Grosso, Minas Gerais, Espírito Santo and São Paulo. In Ceará, this species is found on the Caatinga vegetation of crystalline origin and Wet Forest of sedimentary origin (Fig. 1). Populations of this species were collected in RPPN Serra das Almas.

The species was collected with flowers in May and July; and with fruit in July.

13. *Evolvulus sericeus* Sw., Prod. Veg. Ind. Occ.: 55. 1788. Fig. 4q-t

Herb decumbent, stem smooth, branches sericeous to glabrescent. Leaves sessile or petiolate; petiole 0–0.1 cm long, sericeous, leaf blade 0.7–2.5 × 0.2–0.7 cm, ovate, elliptical, base cuneate, apex acute, margin entire, adaxial surface glabrous, abaxial surface sericeous, discolorous, chartaceous. Flowers isolated axillary along the branches; peduncle ca. 0.1 cm long; bracteoles ca. 0.2 cm long, lanceolate, sericeous. Sepals ca. 0.4 cm long, lanceolate, base cuneate, apex acute, sericeous, margin hyaline in inner. Corolla ca. 0.1 cm diam., rotate, entire, blue. Filament ca. 0.2 cm long, anther ca. 0.1 cm long, oblong, base cordate, epidermal vesicle absent. Styles ca. 0.2 cm long, free, stigmas filiform ca. 0.3 cm long. Capsule 3–3.5 mm long, ovoid. Seeds 4, ca. 1 mm long.
Examined material: Ceará, estrada de Pacatuba, 26.IV.1859, fl., *Freire Alemão & M. Cysneiros 1103* (R).
Additional examined material: BRASIL. PERNAMBUCO: Jaboatão dos Guararapes, 7.IX.1924, fl., *B. Pickel 793* (IPA). São Lourenço da Mata, 23.IV.1934, fl., *B. Pickel 3547* (IPA, NY); Mata do Conde, Fazenda Estivas, 10.I.2000, fl. and fr., *M. Oliveira 530* (UFP).

In the study area *E. sericeus* is characterized by having decumbent stem, ovate to elliptical leaf blade, abaxial surface sericeous, adaxial surface glabrous, and isolated axillary flowers along the branches. It resembles *E. cardiophyllus* and *E. ovatus*, but differs from these by its leaf blade with glabrous adaxial surface (*vs.* pilose in both surfaces).

This species has wide geographical distribution, occurring in the Southern United States, throughout Central America, Bolivia, Northern Argentina and Brazil. In Brazil, it is recorded in all regions and phytogeographic domains. In Ceará, only the material collected by *Freire Alemão & M. Cysneiros 1103* deposited in R, from 1859, was traced. No other records of this species have been found so far in the state.

The species was collected with flowers in April.

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References

CRIA (2018) Geoloc. Available at <http://splink.cria.org.br/>. Access on 23 August 2021.

Dammer CLU (1897) Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie 33: 38.

Fernald ML (1897) A systematic study of the United States and Mexican species of *Pectis*. Proceedings of the American Academy of Arts and Sciences 33: 89.

Ferreira PPA, Simão-Bianchini R & Miotto STS (2014) O gênero *Evolvulus* L. (Convolvulaceae) na Região Sul do Brasil. Iheringia, Série Botânica 69: 201-214.

Figueiredo MA (1997) A cobertura vegetal do Ceará (Unidades Fitoecológicas): Atlas do Ceará. Governo do Estado do Ceará, IPLANCE, Fortaleza. 65p.

Harris JG & Harris MW (2001) Plant identification terminology: an illustrated glossary. 2nd ed. Spring Lake Publishing, Utah. 197p.

IPECE (2013) Instituto de Pesquisa e Estratégia Econômica do Ceará. Ceará em números. Available at <https://www.ipece.ce.gov.br/>. Access on 25 August 2021.

IPNI (2018) The International Plant Names Index. The Royal Botanic Gardens, Kew. Available at <http://www.ipni.org>. Access on 17 July 2019.

Junqueira MER & Simão-Bianchini R (2006) O gênero *Evolvulus* L. (Convolvulaceae) no município de Morro do Chapéu, BA, Brasil. Acta Botanica Brasilica 20: 152-172.

Linnaeus CV (1762) Species Plantarum. Editio Secunda 1: 391.

Loiola MIB, Araújo FS, Lima-Verde LW, Souza SSG, Matias LQ, Menezes MOT, Soares Neto RL, Silva MAP, Souza MMA, Mendonça AM, Macêdo MS, Oliveira SF, Sousa RS, Balcázar AL, Crepaldi CG, Campos LZO, Nascimento LGS, Cavalcanti MCBT, Oliveira RD, Silva TC & Albuquerque UP (2015) Flora da Chapada do Araripe. *In*: Albuquerque UP & Meiado MV (eds.) Sociobiodiversidade na Chapada do Araripe. Vol. 1. NUPEEA, Recife. Pp. 103-148.

Loiola MIB, Ribeiro RTM, Sampaio VS & Souza EB (2020) Diversidade de angiospermas do Ceará. Edições HUVA, Sobral. Available at <https://centrodeciencias.ufc.br/wp-content/uploads/2021/10/livro-17.pdf>. Access on 22 December 2020.

Martius CFPV (1822) *In*: Plantae Rariores Horti Academici Monacensis, t. 94.

Martius CFPV (1841) Flora 24: 100.

Meisner CDF (1869) Convolvulaceae. *In*: Martius CFP & Urban I (eds.) *Flora brasiliensis*. Fleischer, Leipzig. Vol. 7, pars 1, pp. 199-370, t.72-124.

Meisner CDF (1869) Convolvulaceae. *In*: Martius CFP & Urban I (eds.) *Flora brasiliensis*. Fleischer, Leipzig. Vol. 7, 1, pp. 348.

Meisner CDF (1869) Convolvulaceae. *In*: Martius CFP & Urban I (eds.) *Flora brasiliensis*. Fleischer, Leipzig. Vol. 7, 1, pp. 348.

Moricand MES (1838) Plantes Nouvelles d'Amérique 52, t. 35.

Moricand MES (1844) Plantes Nouvelles d'Amérique 140, t.84.

Mori AS, Silva LAM, Lisboa G & Coradin L (1989) Manual de Manejo do Herbário Fanerogâmico. 2ª ed. Centro de Pesquisas do Cacau, Itabuna. 97p.

Moro MF, Macedo MB, Moura-Fé MM, Castro ASF & Costa RC (2015) Vegetação, unidades fitoecológicas e diversidade e paisagística do estado do Ceará. Rodriguésia 66: 717-743.

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

Moricand MES (1844) Plantes Nouvelles d'Amérique 139, t. 83.

Moricand MES (1840) Plantes Nouvelles d'Amérique 82, t. 54.

Ooststroom SJ (1934) A monograph of the genus *Evolvulus*. Mededeelingen van het Botanisch Museum en Herbarium van de Rijks Universiteitte Utrecht 14: 1-267.

Ribeiro-Silva S, Medeiros MB, Gomes BM, Seixas ENC & Silva MAP (2012) Angiosperms from the Araripe National Forest, Ceará, Brazil. Check List 8: 744-751.

Santos, D. & Buril, M.T. 2020. O gênero *Evolvulus* (Convolvulaceae) no estado de Pernambuco, Brasil. Rodriguesia 71: e02432018. DOI: 10.1590/2175-7860202071119

Silva CV (2008) O gênero *Evolvulus* L. (Convolvulaceae) no estado de São Paulo e no Distrito Federal, Brasil. Dissertação de Mestrado. Instituto de Botânica, São Paulo. 72p.

Silva CV (2013) Revisão taxonômica de *Evolvulus* seção *Phyllostachyi* Meisn. (Convolvulaceae). Tese de Doutorado. Instituto de Botânica, São Paulo. 133p.

Silveira AP, Loiola MIB, Gomes VS, Lima-Verde LW, Oliveira TS, Silva EF, Otutumi AT, Ribeiro K, Xavier FAS, Bruno MMA, Souza SSG & Araújo FS (2020a) Flora de Baturité - Ceará: a wet island in the Brazilian semiarid. Floresta e Ambiente 27: e20180320.

Silveira AP, Menezes BS, Loiola MIB, Lima-Verde LW, Zanina DN, Carvalho ECD, Souza BC, Costa RC, Mantovani W, Menezes MOT, Flores LMA, Nogueira FCB, Matias LQ, Barbosa LS, Gomes FM, Cordeiro LS, Sampaio VS, Batista MEP, Soares Neto RL, Silva MAP, Campos NB, Oliveira AA & Araújo FS (2020b) Flora and annual distribution of flowers and fruits in the Ubajara National Park, Ceará, Brazil. Floresta e Ambiente 27: e20190058.

Simão-Bianchini R & Silva CV (2020). *Evolvulus in* Flora do Brasil 2020 (continuously updated). Jardim Botânico do Rio de Janeiro. Available at <http://floradobrasil.jbrj.gov.br/reflora/floradobrasil/FB6990>. Access on 13 February 2021.

Souza VC & Lorenzi H (2012) Botânica sistemática. Guia ilustrado para identificação das famílias de fanerógamas nativas e exóticas no Brasil baseada

em APGIII. 3ª ed. Instituto Plantarum de Estudos da Flora, Nova Odessa. 768p.

Schlechtendal DFLV (1853) Linnaea : Ein Journal für die Botanik in ihrem ganzen Umfange. Linnaea 26: 653.

Stefanovic S, Austin DF & Olmstead RG (2003) Classification of Convolvulaceae: a phylogenetic approach. Systematic Botany 28: 797-806.

Stefanovic S, Krueger L & Olmstead RG (2002) Monophyly of the Convolvulaceae and circumscription of their major lineages based on DNA sequences of multiple chloroplast loci. American Journal of Botany 89: 1510-1522.

Swartz OP (1788) Nova Genera et Species Plantarum seu Prodromus 55.

Thiers B (continuously updated) Index Herbariorum: a global directory of public herbaria and associated staff. New York Botanical Garden's Virtual Herbarium. Available at <http://sweetgum.nybg.org/science/ih/>. Access on 2 January 2019.

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