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The genus *Chamaecrista* Moench in a fragment of the Ecological Station Raso da Catarina, Bahia, Brazil

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Abstract: *Chamaecrista* has a Panropical distribution, with some occurrences in Australia and temperate areas, and includes about 330 species, of which 266 occur in the Americas. The genus is represented in Brazil by 256 species, of which 97 are cited for the northeast Region. The Ecological Station Raso da Catarina (ESRC) is one of the largest areas of protected Caatinga and occupies about 105,282.00 ha., delimited by the coordinates 09°39'0.30" to 09°50'98.2" S and 38°26'57.5" to 38°29'32.6" W. The floristic survey of *Chamaecrista* in the ESRC included analysis of specimens collected from March 2010 and October 2011. The analyses were supplemented with dried collections from the following herbaria: ALCB, EAC, HRB, HUEFS and MBM. The genus is represented in the study area by ten taxa. The most representative taxa in the area were *Chamaecrista repens* (Vogel) H.S.Irwin & Barneby var. *multijuga* (Benth.) H.S.Irwin & Barneby, *C. brevipalys* (Benth.) H.S.Irwin & Barneby var. *brevipalys*, *C. belemii* (H.S.Irwin & Barneby) H.S.Irwin & Barneby var. *belemii*, which are directly related to sandy soils common in the region. The taxonomic treatment includes a key for the identification, descriptions, illustrations, photos, data geographical distribution, reproductive phenology and comments about the taxa.

Keywords: floristics, taxonomy, semiarid, Caatinga, diversity.

O gênero *Chamaecrista* Moench em um fragmento da Estação Ecológica Raso da Catarina, Bahia, Brasil

Resumo: *Chamaecrista* possui uma distribuição Panropical, com algumas ocorrências na Austrália e em áreas temperadas, inclui cerca de 330 espécies, das quais 266 ocorrem nas Américas. O gênero está representado no Brasil por 256 espécies, das quais 97 são citadas para a região nordeste. A Estação Ecológica Raso da Catarina (ECRC) é uma das maiores áreas protegidas de Caatinga e ocupa cerca de 105.282.00 ha., delimitada pelas coordenadas 09°39'0,30" a 09°50'98,2" S e 38°26'57,5" a 38°29'32,6" W. O levantamento florístico de *Chamaecrista* na ECRC incluiu análises de espécimes coletados de março 2010 a outubro de 2011. As análises foram complementadas com coleções dos seguintes herbários: ALCB, EAC, HRB, HUEFS e MBM. O gênero está representado na área de estudo por dez táxons, onde os mais representativos foram: *Chamaecrista repens* (Vogel) H.S.Irwin & Barneby var. *multijuga* (Benth.) H.S.Irwin & Barneby, *C. brevipalys* (Benth.) H.S.Irwin & Barneby var. *brevipalys*, *C. belemii* (H.S.Irwin & Barneby) H.S.Irwin & Barneby var. *belemii*, estando diretamente relacionados com solos arenosos comuns na região. O tratamento taxonômico inclui uma chave para a identificação, descrições, ilustrações, fotografias, dados de distribuição geográfica, fenologia reprodutiva e comentários sobre os táxons.

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

Introduction

Chamaecrista was established by Moench (1794), segregating it from *Cassia* s.l. (Irwin & Barneby 1982). It is one of the largest genera of the subfamily Caesalpinioideae and the largest of the subtribe Cassiinae (Lewis 2005). It has a Panropical distribution, with some occurrences in Australia and temperate areas. The genus includes approximately 330 species, of which 266 occur in the Americas (Irwin & Barneby 1982, Lewis 2005).

In Brazil, the genus is represented by about 256 species, of which 97 are cited for the Northeast Region. Bahia is considered to be the state with the third greatest number of taxa of *Chamaecrista* with 91 species. The center of their diversity is in campos rupestres (rocky fields) (Lewis 1987, Conceição et al. 2001, Zappi et al. 2003, Souza & Bortoluzzi 2016). In Caatinga twenty-nine species were recorded for *Chamaecrista* (Queiroz 2009).

Chamaecrista is mainly characterized by presence of two alternate bracteoles on the pedicel of the flowers, convex extrafloral nectaries

and spiraled elastically dehiscent fruits. According to Irwin & Barneby (1982), the genus includes six sections. All phylogenetic studies based on morphological and molecular data supported the monophyly of *Chamaecrista* (Conceição et al. 2009, Rando et al. 2016). However, with regard to infrageneric classification, the study of Conceição et al. (2009) showed that only two of the six sections recognized by Irwin & Barneby (1982) are monophyletic. Rando et al. (2016) supports the monophyly of *C. ser. Coriaceae*, suggesting *C. ser. Flexuosae* as the sister group of this clade.

The more comprehensive taxonomic treatments for *Chamaecrista* was carried by Vogel (1837), Benthams (1870, 1871), Greene (1897), Pollard (1902), Britton & Rose (1930), Irwin & Rogers (1967), Irwin (1964) and Irwin & Barneby (1977, 1978, 1981, 1982), Fernandes & Nunes (2005). The last three studies comprised the most relevant treatments of the genus, with the recognition of sections and series, and the descriptions of new species and infraspecific taxa, including additional information on ecology and geographic distribution.

The main contributions on taxonomy of the referred genus in Brazil are generally about local floristic surveys, publication of new species or re-establishment, which showed the great diversity of the genus to Brazil, such as the works conducted by Harley & Simmons (1986), Lewis (1987), Barneby (1994), Costa (1996), Conceição et al. (2001, 2003), Camargo & Miotto (2004), Hervencio & Queiroz (2004), Conceição (2006), Bortoluzzi & Miotto (2007), Cardoso & Queiroz (2007), Queiroz (2009), Queiroz & Loiola (2009), Rando (2009), Rando & Pirani (2012), Dantas & Silva (2013), Rando et al. (2013a, b), Souza & Silva (2014, 2015), Silva & Souza (2015), Souza et al. (2015), Barbosa et al. (2016), Cota et al. (2016).

Despite the existence of studies about *Chamaecrista* for the semiarid of northeastern Brazil, regional works for the state of Bahia are scarce,

especially those that include keys of identification and descriptions. Given the importance of *Chamaecrista* in the Caatinga vegetation, this work had as a goal to carry out the survey of the species of the genus in the Ecological Station Raso da Catarina (ESRC) in order to contribute to knowledge about the flora of the semiarid region of Bahia as well as to support the development of the ESRC management plan.

Material and Methods

The Raso da Catarina Ecoregion comprises 30.800 km² and is one of the eight Ecoregions recognized for the Caatinga and includes units of conservation. In the North-south direction it is narrow and elongated. In the North, West and East directions 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 very 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 Ecological Station Raso da Catarina (ESRC, Figure 1) is one of the protected areas of the Raso da Catarina Ecoregion. It is one of the

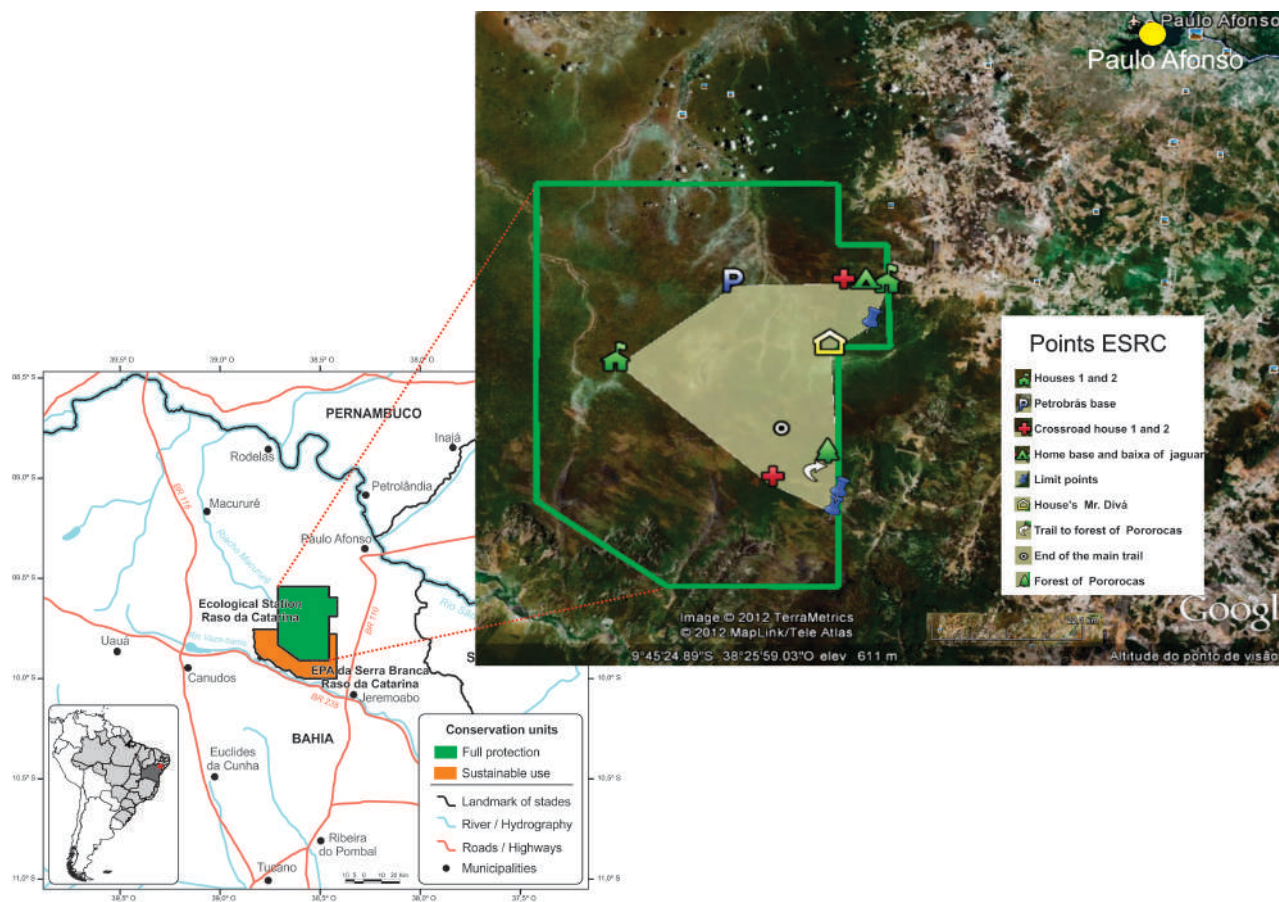


Figure 1. Location of the fragment studied in the Raso da Catarina Ecological Station (Varjão et al. 2013, modified).

largest areas of protected Caatinga and occupies about 105,282.00 ha., delimited by the coordinates 09°39'0.30" to 09°50'98.2" S and 38°26'57.5" to 38°29'32.6" W, limited to the North with the Pankararé aldeia, to the east with the municipalities of Rodelas and Canudos, to the South with the municipality of Jeremoabo and West with the municipalities of Paulo Afonso and Jeremoabo. The climate of the ESRC is semiarid with average rainfalls of 500 mm/year and annual temperature is approximately 23°C (Szabo et al. 2007). The soils are generally sandy deep and very fertile relief plan with sandstone formations (Velloso et al. 2002).

The study was based on fieldwork carried out in the period between March 2010 and October 2011, besides information complemented by the analysis of species deposited in the herbaria: ALCB, EAC, HRB, HUEFS and MBM, acronyms according to Thiers 2016 (continuously updated). The 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), where fertile material was collected with flowers and/or fruit. Observations were made about the distribution of the species and the type of soil (Tricart 1972, Sampaio 1995). The specimens were deposited in the herbarium of the State University of Bahia (HUNEB – Collection Paulo Afonso) and the duplicates were sent to the main herbaria in the state of Bahia.

The identifications were made based mainly on specialized bibliographies (e.g., Irwin & Barneby 1978, 1982 and Queiroz 2009), protologues, photos of type collections and consulting of the collections in the herbaria that were visited. For the taxonomic descriptions, the terminologies proposed by Radford et al. (1974), Irwin & Barneby (1978, 1982), Ribeiro et al. (1999), Harris & Harris (2001) and Gonçalves & Lorenzi (2011) were adopted. The 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

Chamaecrista Moench, Meth. pl. hort. Bot. Marburg.: 272, 1794. Lectotype (designated by Irwin, 1964): sect. *Chamaecrista*, *C. nictitans* (L.) Moench.

Herbs, shrubs or subshrubs, erect, prostrate, sarmentose, decumbent or procumbent, little or profusely branched; branches cylindrical, rare quadrangular, straight, sometimes tortuous, rare fractiflex. Leaves green, alternating, paripinnate, 2–multifoliate; extrafloral nectaries present or absent, when present with concave secretory surface, sessile and discoid or stipitate and caliciform, located on the petiole, rarely on the rachis and pairs of leaflets. Inflorescence racemose, elongated, or reduced in fascicles axillary or supra-axillary, with few flowers or reduced to a single flower; bracteoles 2, alternating or subopposite, than in different positions on the pedicel; flowers pentamerous, asymmetric; sepals free, the internal larger the ones; petals free, yellow to orange, heteromorphic, with a differentiated internal abaxial petal (cuculus), falcate, spatulate to suborbicular, bent on the stamens, protecting the androecium, stamens 10, homomorphic, arranged at equal length levels or at different levels, anthers dehiscent by apical pore. Legumes elastically dehiscent, oblong, plan-compressed, with valves chartaceous or coriaceous, spiraled after seed release. Seeds compressed, glossy, rhomboid to pyriform, testa dark brown, pitted, pits aligned in vertical rows.

In the Ecological Station Raso da Catarina ten taxa were recorded for genus. *Chamaecrista repens* (Vogel) H.S.Irwin & Barneby var. *multijuga* (Benth.) H.S.Irwin & Barneby, *C. brevicalyx* (Benth.) H.S.Irwin & Barneby var. *brevicalyx*, *C. belemii* (H.S.Irwin & Barneby) H.S.Irwin & Barneby var. *belemii*, were taxa predominant in the studied area, being directly related to sandy soils common in the region.

Identification key for the representatives of the genus *Chamaecrista*

1. Presence of tector trichomes only; extrafloral nectaries present; leaves with 2–21 pairs of leaflets; inflorescences axillary, supra-axillary or reduced to only flower.
2. Leaves with 2–8 pairs of leaflets; inflorescences axillary, reduced to a single flower.
3. Leaves with two pairs of leaflets, venation paralelinervous; sepals multistriated.....7. *Chamaecrista ramosa* var. *ramosa*
- 3'. Leaves with 4–8 pairs of leaflets, venation palminervous; sepals striated.
4. Branches quadrangular, fractiflex; stipules acuminate to aristated; leaflets with cuspidate to spinescent apex9. *C. swainsonii*
- 4'. Branches cylindrical, erect; stipules lanceolate to deltoid; leaflets with acuminate to cuspidate apex10. *C. tenuisepala*
- 2'. Leaves with 8–21 pairs of leaflets; inflorescences supra-axillary.
5. Extrafloral nectary sessile to shortly stipitate, discoid to caliciform, head less dilated the stipe, located little above the middle of the petiole; midrib excentric, dividing the leaflet in a ratio of 1:2–2.5 at the base.....8. *C. repens* var. *multijuga*
- 5'. Extrafloral nectary shortly stipitate, caliciform, head more dilated than the stipe, located next to the middle of the petiole; midrib little excentric dividing the leaflet in a ratio of 1:1–1.5 at the base6. *C. nictitans* subsp. *disadena* var. *disadena*
- 1'. Presence of tector and glandular trichomes; extrafloral nectaries absent; leaves with two pairs of leaflets; inflorescence terminal.
6. Herbs procumbent to sarmentose; petiole c. 1.5 times longer than the rachis; flower buds acute5. *C. carobinha*
- 6'. Shrubs to subshrubs erect or herbs to subshrubs procumbent; petiole c. 1.5–7 times longer than the rachis; flower buds rounded.
7. Petiole c. 7 times longer than the rachis; leaflets glabrous.
8. Epidermis on the young branches pale to whitish; leaflets ovate to suborbicular, 9–35 mm long.; flowers c. 3 cm. diam.....4. *C. brevicalyx* var. *brevicalyx*
- 8'. Epidermis on the young branches green; leaflets ovate to obovate, 4–11 mm long.; flowers c. 1 cm diam.2. *C. amiciella*
- 7'. Petiole 1.5–5 longer than the rachis; leaflets glabrous to pilose.
9. Leaflets ovate to obovate, apex emarginate to rounded; petiole c. 1.5 times longer than the rachis3. *C. belemii* var. *belemii*
- 9'. Leaflets elliptic to obelliptic, apex acute to emarginate; petiole c. 3–5 times longer than the rachis.....1. *C. acosmifolia*
1. *Chamaecrista acosmifolia* (Benth.) H.S.Irwin & Barneby var. *acosmifolia*, Mem. New York Bot. Gard. 35(2): 660. 1982. Figures 2a; 3a-k

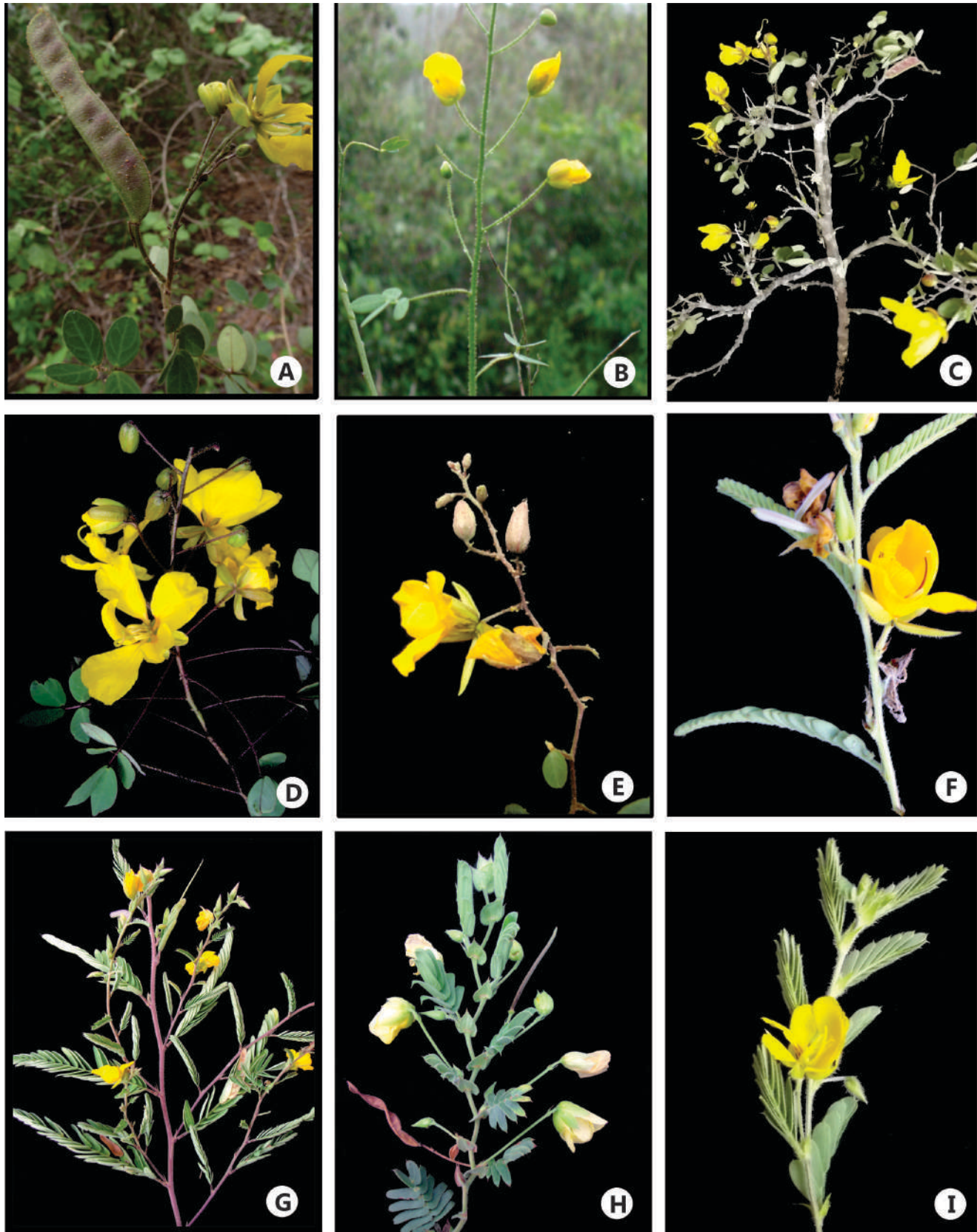


Figure 2. Representative of *Chamaecrista* in the ESRC: a) *Chamaecrista acosmifolia* (Benth.) H.S.Irwin & Barneby var. *acosmifolia*; b) *C. amiciella* (H.S.Irwin & Barneby) H.S.Irwin & Barneby; c) *C. belemii* (H.S.Irwin & Barneby) H.S.Irwin & Barneby var. *belemii*; d) *C. brevicalyx* (Benth.) H.S.Irwin & Barneby var. *brevicalyx*; e) *C. carobinha* (H.S.Irwin & Barneby) H.S.Irwin & Barneby; f) *C. nictitans* Moench subsp. *disadena* (Steud.) H.S.Irwin & Barneby var. *disadena*; g) *C. repens* (Vogel) H.S.Irwin & Barneby var. *multijuga* (Benth.) H.S.Irwin & Barneby; h) *Chamaecrista swainsonii* (Benth.) H.S.Irwin & Barneby; i) *C. tenuisepala* (Benth.) H.S.Irwin & Barneby. Photos by C.L.S.B. Correia.

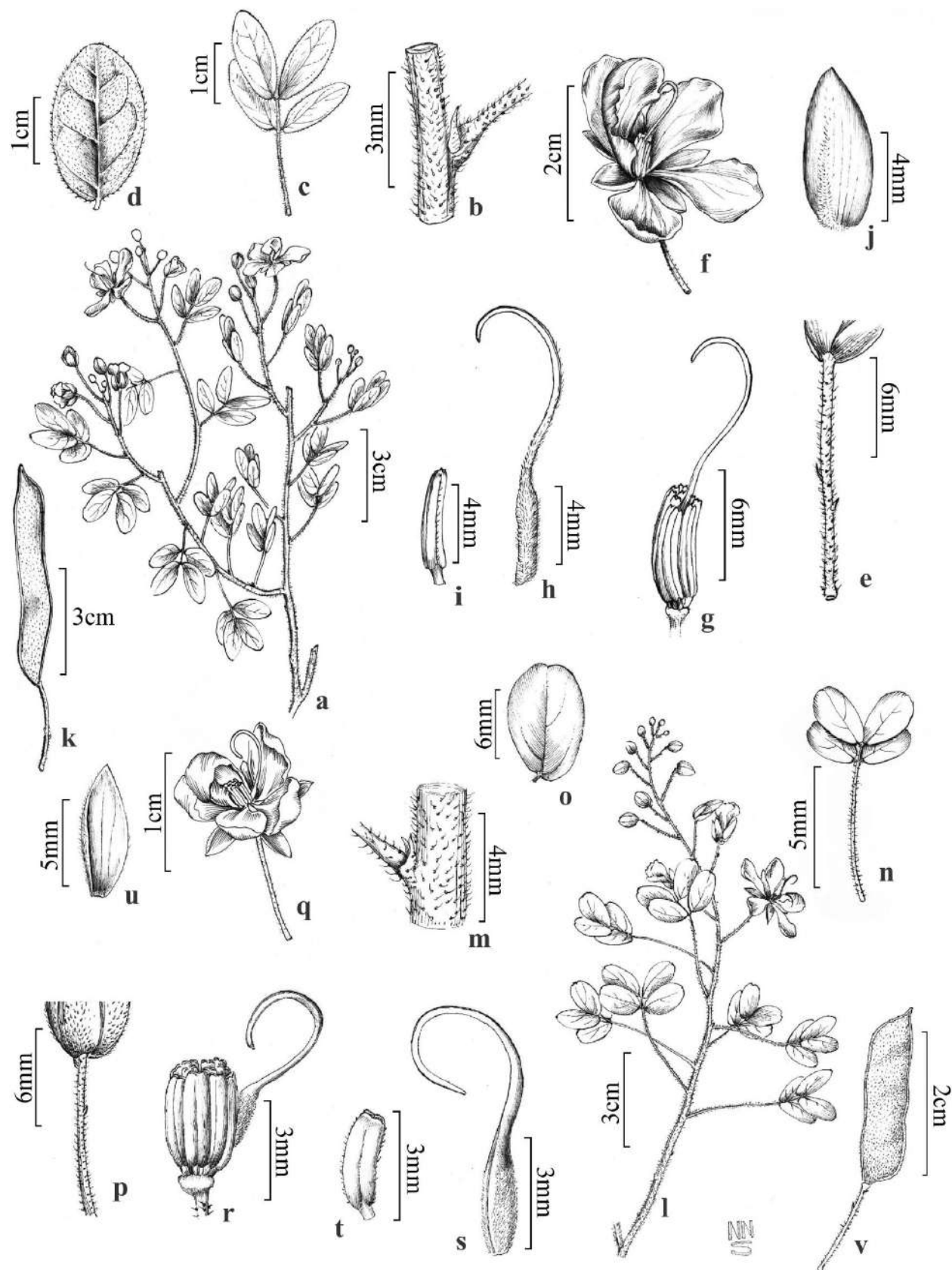


Figure 3. a-k) *Chamaecrista acosmifolia* var. *acosmifolia*: a) flowering branch; b) stipule; c) leaf; d) leaflet; e) pedicel and bracteoles; f) flower; g) androecium and gynoeceum; h) pistil; i) stamen; j) sepal; k) fruit. l-v) *Chamaecrista amiciella*: l) flowering branch; m) stipule; n) leaf; o) leaflet; p) pedicel and bracteoles; q) flower; r) androecium and gynoeceum; s) pistil; t) stamen; u) sepal; v) fruit. a-k from C.L.S.B. Correia 359; l-v from C.L.S.B. Correia 327.

Shrubs erect, branched until 3 m tall; branches cylindrical, erect, epidermis vinaceous on the young branches, discretely exfoliating and brown on the old branches. Indumentum glabrescent, constituted of trichomes glandular and tector, thin, yellow to dark castaneous, rigid, erect, sparse, c. 1 mm long, distributed on the branches, petioles, inflorescence axis, pedicels, buds and sepals. Stipules vinaceous to brown, filiform, obsolete, 0.5–1 × c. 0.5 mm, caducous. Leaves 2.2–6.1 cm long; pulvinus brown, sparsely pilose, 1–2 mm diam.; petiole 10–22 mm long, c. 3–5 times longer than the rachis; without extrafloral nectaries; rachis 2–7 mm long; leaflets discolorous, 2 pairs, chartaceous, pilose, 15–25 × 7–14 mm, elliptic to obelliptic, apex acute to emarginate, base rounded and asymmetric, venation penninervous. Inflorescences racemose grouped in panicles, terminal, 6–34 flowers; inflorescence axis 5–10 cm long; bracts vinaceous to brown, lanceolate, 1.5–2 × 0.5–1 mm; pedicel 7–24 mm long; bracteoles green vinaceous, lanceolate, 0.5–1 × 0.5 mm, located on the middle of pedicel. Buds green-vinaceous, rounded, 1–5 mm long. Flowers c. 2.5 cm diam.; sepals green glaucous to yellowish-green, ovate to oblong, abaxial surface pilose, striated, 6–9 × 2.5–5.5 mm; petals golden yellow, two external, obovate to orbicular, 12–14 × 8–10 mm, two internal, oblong to obelliptic, 8–15 × 3–9 mm, cuculus falcate, bent around the stamens, 10–13 × 18.5–20 mm; stamens yellow, 3–6 mm long; ovary green glaucous to yellowish, tomentose, 2–6 mm long; style yellow, 8–11 mm long. Legumes oblong, linear, green to green-vinaceous when young, mature brown, 12–64 × 2–9 mm; valves coriaceous, setulose. Seeds ellipsoid when young, quadrangular to rhomboid when mature, brown to vinaceous, glossy, pitted at base, 4–6 × c. 4 mm.

Material examined: BRAZIL, BAHIA: Paulo Afonso, Estação Ecológica Raso da Catarina, Trilha sentido Baixa da onça, 09°52'21" S and 38°37'88" W, 521 m, 30.XI.2010, fr., C.L.S.B. Correia et al. 310 (HUNEB); Trilha sentido Pedra da janela, 09°39'55" S and 38°28'02" W, 570 m, 30.XII.2010, fl.; fr., C.L.S.B. Correia et al. 359 (HUNEB); Baixa da onça, 09°52'21" S and 38°37'88" W, 521 m, 24.III.2010, fl.; fr., C.L.S.B. Correia et al. 110 (HUNEB).

Chamaecrista acosmifolia is a Brazilian endemic species having been recorded to Minas Gerais, Goiás and Mato Grosso, where it occurs in Caatinga and Cerrado at altitudes of 500–600 m (Irwin & Barneby 1978, Queiroz 2009). Irwin & Barneby (1978) recognized three varieties for the species, two of which occur in the Caatinga: *C. acosmifolia* (Benth.) H.S. Irwin & Barneby var. *euryloba* (H.S. Irwin & Barneby) H.S. Irwin & Barneby, with records only for Bahia, and *C. acosmifolia* (Benth.) H.S. Irwin & Barneby var. *acosmifolia*, distributed in Bahia, Piauí and Maranhão. In the study area, only the *acosmifolia* variety was catalogued; it is rare, flowers and fruits in November, December and March, and occurs in ecotonal areas with rocky soil at altitudes of 521–570 m.

In the study area, the taxon can be recognized by two pairs of elliptic to obelliptic leaflets, but can be confused with *C. belemii* var. *belemii* because both have leaves with two pairs of leaflets and racemose terminal inflorescences. However, the two taxa can be differentiated by size and shape of their leaflets (6–25 × 4–13 mm, ovate to obovate in *C. belemii* var. *belemii* vs. 15–25 × 7–14 mm, elliptic to obelliptic in *C. acosmifolia* var. *acosmifolia*) and size of their fruits (6–38 mm long in *C. belemii* var. *belemii* vs. 12–64 mm long in *C. acosmifolia* var. *acosmifolia*).

2. *Chamaecrista amiciella* (H.S. Irwin & Barneby) H.S. Irwin & Barneby, Mem. New York Bot. Gard. 35(2): 661. 1982. Figures 2b; 3l–v

Herbs and subshrubs procumbent, little branched until 1 m tall; branches cylindrical, erect or tortuous, epidermis green on the young branches, brown on the older branches. Indumentum glabrescent, constituted of trichomes glandular and tector, thin, yellow to dark brown, rigid, erect, sparse, c. 1 mm long, distributed on the branches, petioles, inflorescence axis, pedicels, buds and sepals. Stipules green to brown, filiform, obsolete, caducous,

0.5–1 × c. 0.5 mm. Leaves 2.2–4.5 cm long; pulvinus brown, sparsely pilose, 1–2 mm diam.; petiole 7–28 mm long, c. 7 times longer than the rachis; without extrafloral nectaries; rachis 1–4 mm long; leaflets discolorous, 2 pairs, chartaceous, glabrous, ovate to obovate, 4–11 × 3–7 mm, apex emarginate to retuse, base rounded, venation penninervous. Inflorescences racemose, terminal, 6–34 flowered, inflorescence axis 4.5–6.7 cm long; bracts vinaceous to castaneous, lanceolate, 1.5–2 × 0.5–1 mm; pedicel 6–12 mm long; bracteoles green vinaceous, lanceolate, 0.5–1 × 0.5 mm, located on the upper region of the pedicel. Buds green to green-vinaceous, rounded, 1–7 mm long. Flowers c. 1 cm diam.; sepals green glaucous to green-yellowish, ovate to oblong, abaxial surface pilose, striated, 4–6 × 3–5.5 mm; petals yellow, two external, obovate, 9–11 × 4–6 mm, two internal, oblong to obelliptic, 7–9 × 3–4 mm, cuculus falcate, bent around the stamens, 8–9.5 × 9–10 mm; stamens yellow, 2.5–4 mm long; ovary pale green to yellowish, pilose, 1.5–2 mm long; style yellow, 4–6 mm long. Legumes oblong, linear, green when young, mature not seen, 24–27 × 5–6.5 mm, valves chartaceous, setulose. Seeds not seen.

Material examined: BRAZIL, BAHIA: Paulo Afonso, Estação Ecológica Raso da Catarina, Trilha sentido Mata da pororoca, 9°48'32" S and 38°29'30" W, 584 m, 29.XII.2010, fl., C.L.S.B. Correia et al. 327 (HUNEB); Trilha sentido casa II, vindo da Pororoca, 09°49'15" S and 38°29'33" W, 670 m, 14.I.2010, C.L.S.B. Correia et al. 373 (HUNEB); Baixa do Cascavel, 09.VI.11, 09°44'08" S and 38°40'56" W, 606 m, C.L.S.B. Correia et al. 489 (HUNEB).

Chamaecrista amiciella is endemic to the Caatinga and has been recorded in southern Ceará, western Paraíba and northern Bahia, where it occurs on sandy soil at altitudes between 150–500 m (Irwin & Barneby 1978, Queiroz 2009). In the ESRC the species is rare and occurs on sandy soil at altitudes of 580–660 m. It was collected with flowers and fruits in January, December and June.

The size of the leaflets (4–11 mm) and diameter of the flowers (ca. 1 cm), distinguish it from other species occurring in the area.

3. *Chamaecrista belemii* (H.S. Irwin & Barneby) H.S. Irwin & Barneby var. *belemii*, Mem. New York Bot. Gard. 35(2): 644. 1978. Figures 2c; 4a–k

Shrubs erect, profusely branched until 1.5 m tall; branches cylindrical, erect a tortuous, epidermis brown on the young branches, exfoliating and pale to greyish on the old branches. Indumentum glabrescent, constituted of trichomes glandular and tector, thin, brown to black and little orange to white, flexible, erect, sparse, c. 1.5 mm long, distributed on the branches, margin of stipules, petioles, pulvinus, rachis, pedicel, buds, sepals, ovary, legumes, rarely occurring on margin of leaflets. Stipules vinaceous to brown, lanceolate, obsolete, 0.5–2 × 0.5–1 mm, caducous. Leaves 2.2–4.8 cm long; pulvinus brown, sparsely pilose, c. 1 mm diam.; petiole 7–19 mm long, c. 1.5 times longer than the rachis; without extrafloral nectaries; rachis 4–8 mm long; leaflets discolorous, 2 pairs, chartaceous, glabrous to sparsely pilose, ovate to obovate, 6–25 × 4–13 mm, apex emarginate to rounded, base asymmetrical, venation penninervous. Inflorescences racemose, terminal, sometimes grouped in panicles; 2–8 flowered, inflorescence axis 2–4.5 cm long; bracts green, lanceolate, 1–1.5 mm long; pedicel 4–20 mm long; bracteoles vinaceous, lanceolate to ovate, 0.5–1.5 × c. 0.5 mm, located along the pedicel. Buds green, rounded, 3–7 mm long. Flowers c. 3 cm diam.; sepals green, ovate to obovate, abaxial surface pilose, striated, 7–10 × 3–6 mm; petals golden yellow, two external, obovate to orbicular, 19–23 × 16–18 mm, two internal, obovate, 15–17 × 11–12 mm, cuculus falcate, bent around the stamens, c. 18 × 11–13 mm; stamens yellow, 5–7 mm long; ovary green glaucous to yellowish-green; style yellow, 5–9 mm long. Legumes oblong, linear, green when young vinaceous, brown when mature, 6–38 × 3–8 mm, valves coriaceous, puberule to setulose. Seeds quadrangular to rhomboid, brown to black, glossy and pitted, 3–4 × 1–3 mm.

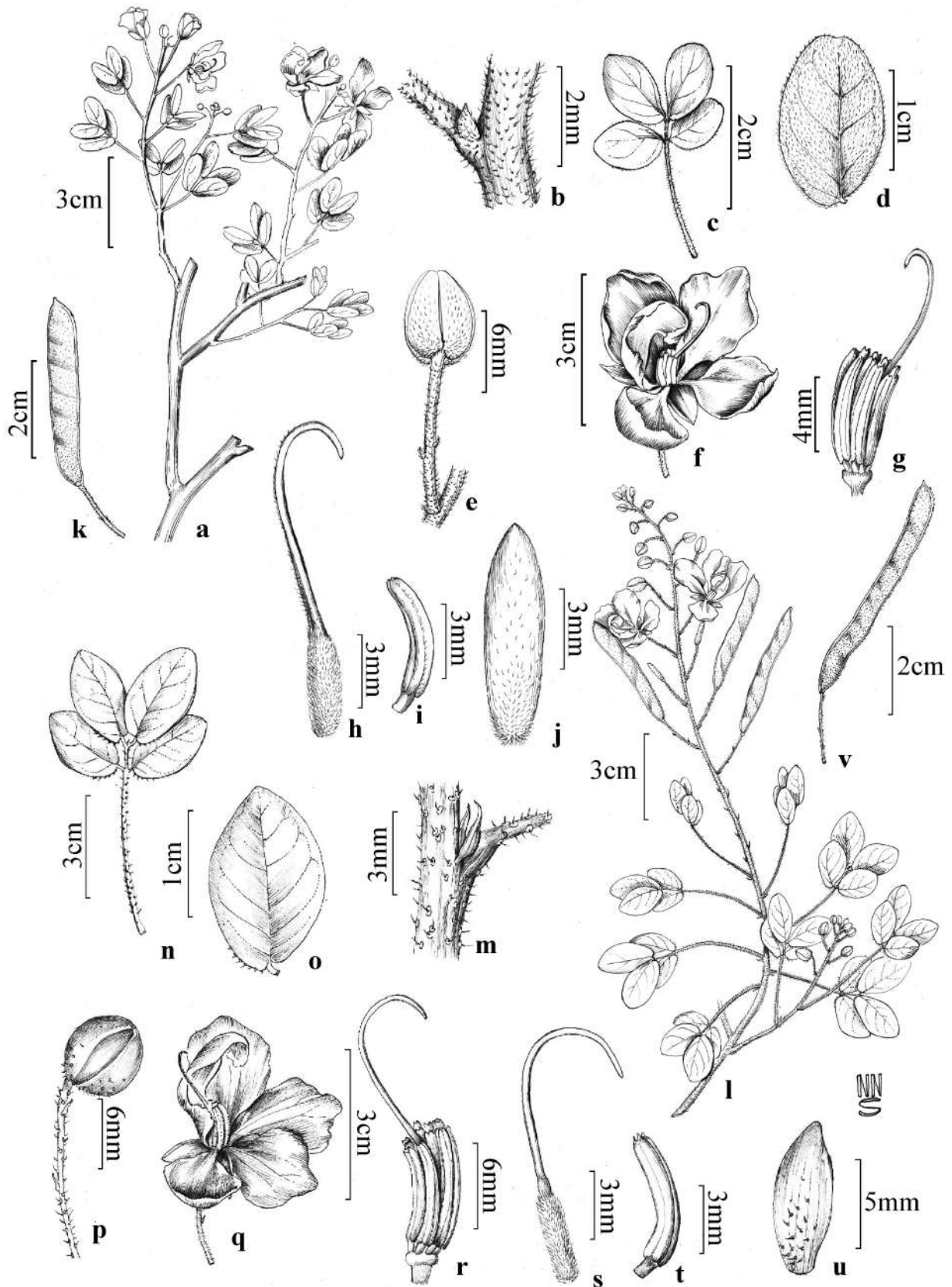


Figure 4. a-k) *Chamaecrista belemii* var. *belemii*: a) flowering branch; b) stipule; c) leaf; d) leaflet; e) bud and bracteoles; f) flower; g) androecium and gynoecium; h) pistil; i) stamen; j) sepal; k) fruit. l-v) *Chamaecrista brevicalyx* var. *brevicalyx*: l) flowering branch; m) stipule; n) leaf; o) leaflet; p) bud and bracteoles; q) flower; r) androecium and gynoecium; s) pistil; t) stamen; u) sepal; v) fruit. a-k from C.L.S.B. Correia 491; l-v from C.L.S.B. Correia 571.

Material examined: BRAZIL, BAHIA: Paulo Afonso, Estação Ecológica Raso da Catarina, Cãnon Baixa da onça, 09°52'21" S and 38°37'88" W, 521 m, 24.III.2010, fl., C.L.S.B. Correia et al. 112 (HUNEB); Trilha do pau preto, sentido casa abandonada, 09°41'41" S and 38°34'56" W, 616 m, 18.V.2010, fr., A.A.S. Lopes et al. 933 (HUNEB); Cãnon Baixa da onça, 09°52'21" S and 38°37'88" W, 521 m, 30.VI.2010, fl., C.L.S.B. Correia et al. 131 (HUNEB); 09.VI.2011, fl., C.L.S.B. Correia et al. 491 (HUNEB); 01.IX.2011, fl.; fr., C.L.S.B. Correia et al. 554 (HUNEB); 27.IX.2011, fr., R.R. Varjão et al. 155 (HUNEB); Trilha ao lado da casa sede, sentido curral, 09°39'84" S and 38°28'06" W, 592 m, 28.X.2010, fl., C.L.S.B. Correia et al. 323 (HUNEB); 23.XI.2010, fl., C.L.S.B. Correia et al. 267 (HUNEB); 23.XI.2010, fl., C.L.S.B. Correia et al. 293 (HUNEB); 26.VII.2011, fr., C.L.S.B. Correia et al. 511 (HUNEB); Trilha sentido Baixa da onça, 09°52'21" S and 38°37'88" W, 521 m, 30.XI.2010, fr., C.L.S.B. Correia et al. 311 (HUNEB); 30.XI.2010, fl., C.L.S.B. Correia et al. 313 (HUNEB); 09.VI.2011, fl., C.L.S.B. Correia et al. 318 (HUNEB); Trilha sentido Pedra da janela, 09°39'55" S and 38°28'02" W, 570 m, 30.XII.2010, fl., C.L.S.B. Correia et al. 357 (HUNEB).

The taxon is endemic to the Caatinga and has been recorded for the states of Bahia, Sergipe and Pernambuco on sandy soils at altitudes of 200 to 600 m (Queiroz 2009). Two varieties are recognized, both of which occur in the Caatinga, but only the *belemii* variety occurs in the study area. The taxon is very common in the ESRC, occurring in areas of shrubby to sub-shrubby Caatinga on sandy to rocky soil at ca. 616 m. It flowers from March to July and September to December, and fruits from May to September and in December.

Chamaecrista belemii var. *belemii* can be recognized in the area as a profusely branched shrub with the branches being generally tortuous and woody, epidermis pale and exfoliate on the older branches and leaves with two pairs of ovate to obovate leaflets. In the study area the taxon can be confused with *C. acosmifolia* (see comments in *C. acosmifolia*).

4. *Chamaecrista brevicealyx* (Benth.) H.S.Irwin & Barneby var. *brevicealyx*, Mem. New York Bot. Gard. 35(2): 660. 1982. Figures 2d; 4l-v

Shrubs to subshrubs erect, branched until 2.5 m tall; branches cylindrical, erect, epidermis pale to whitish on the young branches, exfoliating, brown on the old branches. Indumentum hispid-papillose, constituted of trichomes glandular and tector, thin and thick, colour less to whitish or brown to black, erect, sparse, c. 0.5 mm long, distributed on the branches, pulvinus, petiole, margin of leaflets, stipules, bracts, bracteoles, pedicel, buds and sepals. Stipules green vinaceous to brown, filiform, obsolete, 1–3 × 0.5–1 mm long, caducous. Leaves 3.2–9.7 cm long; pulvinus black, glabrous, 1–1.5 mm diam.; petiole 21–56 mm long, c. 7 times longer than the rachis; without extrafloral nectaries; rachis 3–8 mm long; leaflets discolorous, 2 pairs, chartaceous to membranous, glabrous, ovate to suborbicular, 9–35 × 4–21 mm, apex acute to emarginate, base cuneate to cordate, venation penninervous. Inflorescences racemose, terminal, long, 12–26 flowered; inflorescences axis 4–21 cm long; bracts vinaceous, ovate to deltoid, 1–4 × 1–1.5 mm; pedicel 4–24 mm long; bracteoles vinaceous, ovate to deltoid, 1–3 × 0.5–1 mm, located near the receptacle. Buds vinaceous to yellowish, rounded, 2–11 mm long. Flowers c. 3 cm diam; sepals yellow to yellowish-green, lanceolate, abaxial surface sparsely pilose, striated, 9–10 × 4–6 mm; petals yellow, two external and two internal, obovate, 12–16 × 5–8 mm, cuculus spatulate to suborbicular, bent around the stamens, 18–22 × 8–11 mm; stamens yellow, 5–9 mm long; ovary green glaucous to yellowish-green, tomentose, 4–5 mm long; style yellow, 12–16 mm long. Legumes oblong, linear, when young green to vinaceous, brown when mature, 35–63 × 5–7 mm, valves chartaceous, pubescent to setulose. Seeds ellipsoids young, rhomboid to trapezoids when mature, brown to black, glossy and pitted, 5–6 × 3–4 mm.

Material examined: BRAZIL, BAHIA: Paulo Afonso, Estação Ecológica Raso da Catarina, Trilha da Mata da Pororoca, 09°48'72" S and 38°29'51" W, 698 m, 25.X.2010, fl., C.L.S.B. Correia et al. 236 (HUNEB); 04.IV.2011, fl., C.L.S.B. Correia et al. 427 (HUNEB); Trilha sentido Mata da Pororoca, 09°48'32" S and 38°29'30" W, 584 m, 24.XI.2010, fl.; fr., C.L.S.B. Correia et al. 296 (HUNEB); Trilha principal depois da Mata da Pororoca sentido matinha, 09°39'58" S and 38°27'61" W, 635 m, 22.XI.2010, fl., C.L.S.B. Correia et al. 255 (HUNEB); Trilha sentido casa II do ICMbio, 09°49'15" S and 38°29'33" W, 667 m, 24.XI.2010, fr., C.L.S.B. Correia et al. 276 (HUNEB); Trilha sentido Mata da Pororoca, depois da 1° encruzilhada, vindo da casa I do ICMbio, 9°47'57" S and 38°29'30" W, 584 m, 29.XII.2010, fl., C.L.S.B. Correia et al. 364 (HUNEB); Trilha sentido Mata da Pororoca, 09°48'32" S and 38°29'30" W 584 m, 24.III.2010, fl., C.L.S.B. Correia et al. 98 (HUNEB); 24.III.2010, fl., C.L.S.B. Correia et al. 100 (HUNEB); 19.V.2010, fr., M.V.V. Romão, et al. 619 (HUNEB); 29.XII.2010, fl., C.L.S.B. Correia et al. 338 (HUNEB); Trilha sentido casa II do ICMbio, 09°49'15" S and 38°29'33" W, 667 m, 24.XI.2010, fl., C.L.S.B. Correia et al. 282 (HUNEB); Trilha sentido Mata da Pororoca, vindo da casa I do ICMbio, 9°45'29" S and 38°29'29" W, 584 m, 04.II.2011, fl., C.L.S.B. Correia et al. 382 (HUNEB); 04.II.2011, fl., C.L.S.B. Correia et al. 385 (HUNEB); 04.II.2011, fl., C.L.S.B. Correia et al. 386 (HUNEB); 08.IX.2011, fl., C.L.S.B. Correia et al. 569 (HUNEB); 25.X.2011, fl.; fr., C.L.S.B. Correia et al. 598 (HUNEB); Trilha sentido casa II do ICMbio, vindo da Mata da Pororoca, 09°49'14" S and 38°29'31" W, 670 m, 14.I.2011, fl., C.L.S.B. Correia et al. 374 (HUNEB); 25.III.2011, fl., C.L.S.B. Correia et al. 393 (HUNEB); 25.III.2011, fl., C.L.S.B. Correia et al. 398 (HUNEB); 04.V.2011, fl., C.L.S.B. Correia et al. 458 (HUNEB); 04.V.2011, fr., C.L.S.B. Correia et al. 450 (HUNEB); Trilha sentido sul da Estação ca. 10 km da Mata da Pororoca, 09°43'18" S and 38°29'30" W, 580 m, 08.IX.2011, fl., C.L.S.B. Correia et al. 558 (HUNEB); Trilha sentido sul da Estação ca. 8 km da Mata da Pororoca, 09°42'16" S and 38°29'31" W, 579 m, 08.IX.2011, fr., C.L.S.B. Correia et al. 571 (HUNEB).

Chamaecrista brevicealyx is endemic to Brazil, being distributed in Northern Minas Gerais and Northeastern Brazil in the states of Bahia, Pernambuco, Piauí and Paraíba. The species includes two varieties: *C. brevicealyx* (Benth.) H.S.Irwin & Barneby var. *brevicealyx* and *C. brevicealyx* (Benth.) H.S.Irwin & Barneby var. *eliptica* (H.S.Irwin & Barneby) H.S.Irwin & Barneby (Irwin & Barneby 1978). The distribution of the *brevicealyx* variety coincides with the species, while the *eliptica* variety occurs in Northern Bahia (Irwin & Barneby 1978, Queiroz 2009). In the study area the species is represented only by the *brevicealyx* variety, which is very common. It was found with flowers in May to September and fruits from May to November.

In the study area the taxon can be clearly differentiated from the others by viscous branches, epidermis pale to whitish and exfoliate on the older branches and terminal, racemose inflorescences with axis 4–21 cm long.

5. *Chamaecrista carobinha* (H.S.Irwin & Barneby) H.S.Irwin & Barneby, Mem. New York Bot. Gard. 35: 661. 1982. Figures 2e; 5a-j

Herbs procumbent, sarmentose, little branched; branches cylindrical, erect to tortuous, epidermis green on the young branches, green-vinaceous on the old branches. Indumentum glabrescent, constituted of trichomes glandular and tector, thin, colourless to whitish and vinaceous to brown, flexible, erect and wavy, tangles, 0.5–1 mm long, distributed on the branches, pulvinus, petioles, stipules, rachis, leaflets, pedicels, bracts, bracteoles and sepals. Stipules green to green-vinaceous, filiform, obsolete, 2–4 × 0.5–1 mm long, persistent. Leaves 1.7–8.7 cm long; pulvinus green to vinaceous, pilose, 0.5–2 mm diam.; petiole 7–30 mm long, c. 1.5 times longer than the rachis; without extrafloral nectaries; rachis 4–20 mm long; leaflets discolorous, 2 pairs, chartaceous, puberulous, ovate to elliptic, 7–32 × 5–24 mm, apex rounded to emarginate, base asymmetrical to

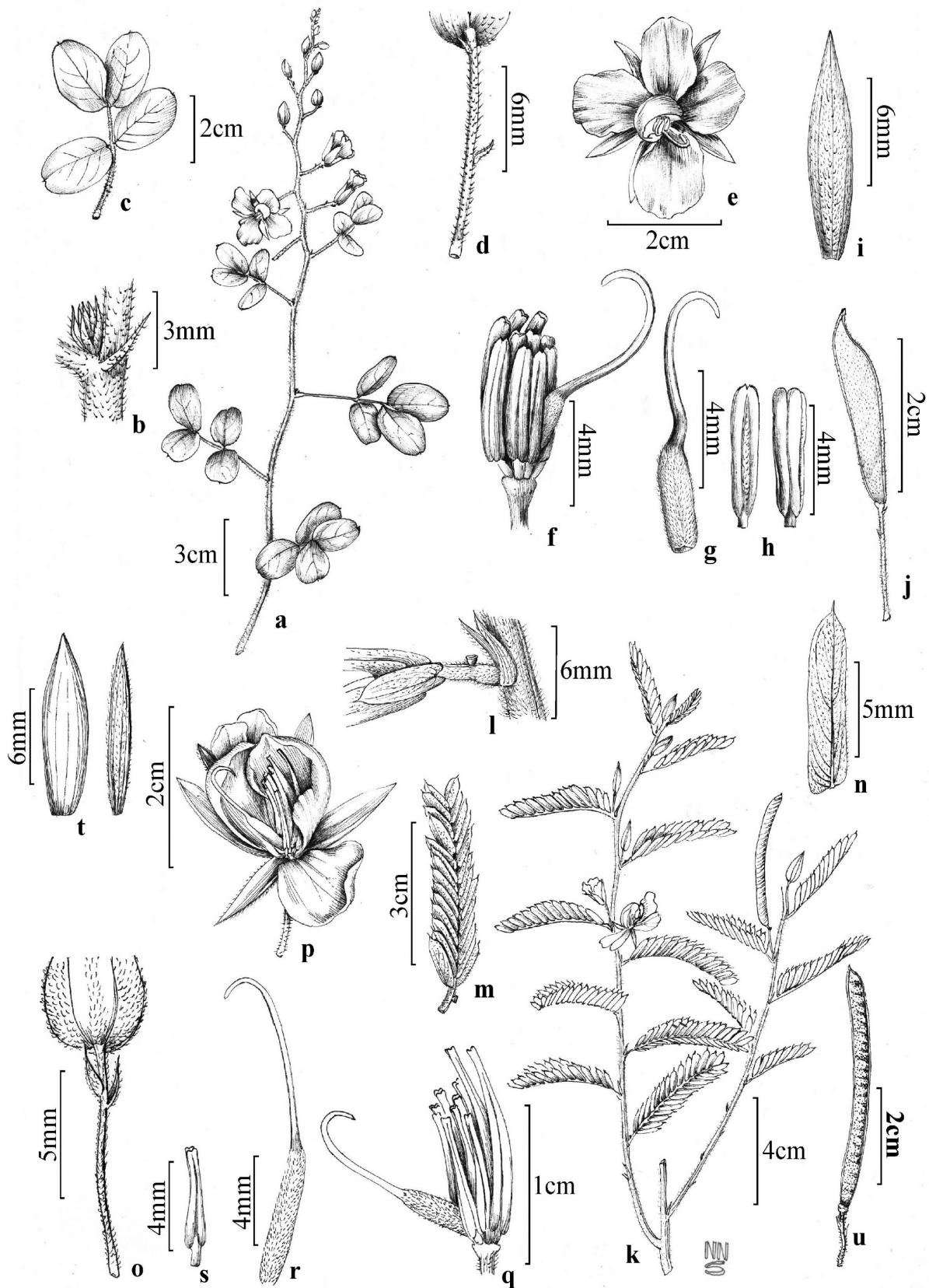


Figure 5. a-j) *Chamaecrista carobinha*: a) flowering branch; b) stipule; c) leaf; d) pedicel with bracteoles; e) flower; f) androecium and gynoecium; g) pistil; h. stamen; i) sepal; j) fruit. k-u) *Chamaecrista nictitans* var. *disadena*: k) flowering branch; l) detail of stipule and extrafloral nectary; m) leaf; n) leaflet; o) pedicel with bracteoles; p) flower; q) androecium and gynoecium; r) pistil; s) stamen; t) sepal; u) fruit. a-j from C.L.S.B. Correia 498; k-u from C.L.S.B. Correia 160.

rounded, venation penninervous. Inflorescences racemose, terminal, lax, 18–22 flowered; inflorescences axis 9–20 cm long; bracts green-vinaceous, filiform to lanceolate, 4–5 × 0.5 mm.; pedicel 4–16 mm long; bracteoles green, lanceolate to deltoid, 0.5–1 × 0.5 mm, located next to the receptacle. Buds green, acute, 2–11 mm long. Flowers c. 2.5 cm diam; sepals green to yellowish-green, lanceolate to ovate, abaxial surface pilose, striated, 5–9 × 2–3.5 mm; petals yellow, two external, oblong, 2.5–3 × 1–2.5 mm, two internal, orbicular, 2–2.5 × 1.5–2 mm, cuculus falcate, bent around the stamens, 2.5–3 × 1.5–2 mm; stamens yellow to glaucous green, 3–5 mm long; ovary glaucous green, canescent, 1.5–2 mm long; style green to yellowish, 1–1.5 mm long. Legumes oblong, slightly curved, when young green, mature not seen, 26–29 × 5–6 mm; valves chartaceous, puberulous, sparsely setulose. Seeds not seen.

Material examined: BRAZIL, BAHIA: Paulo Afonso, Estação Ecológica Raso da Catarina, Trilha sentido casa II vindo da Mata da Pororoca, 09°49'15" S and 38°29'33" W, 667 m, 08.VI.2011, fl., C.L.S.B. Correia et al. 484 (HUNEB); 01.VII. 2011, fl.; fr., C.L.S.B. Correia et al. 498 (HUNEB); 01.IX.2011, fl., C.L.S.B. Correia et al. 549 (HUNEB).

Chamaecrista carobinha is endemic to Caatinga and has been recorded from North Bahia and the South Piauí (Irwin & Barneby 1978, Queiroz 2009). The species is rare in the study area and was collected in well-preserved areas with sandy soil at ca. 661 m with flowers in June, July and September and fruits in September.

The species can be easily recognized in the area by its herbaceous habit procumbent to sarmentose with two pairs of ovate to elliptic leaflets (7–32 × 5–24 mm), and terminal, lax, racemose inflorescences, with axis 9–20 cm long.

6. *Chamaecrista nictitans* Moench subsp. *disadena* (Steud.) H.S.Irwin & Barneby var. *disadena* (Steud.) H.S.Irwin & Barneby, Mem. New York Bot. Gard. 35(2): 660. 1 (1982). Figures 2f, 5k-u

Herbs to subshrubs erect, little branched until 1 m tall; cylindrical branches, erect, epidermis green on the young branches, vinaceous on the old branches. Indumentum tomentose, constituted of trichomes tector, thin, blank to colourless, flexible, erect and adpressed, slender, c. 0.5 mm long, distributed in the branches, petioles, stipules, rachis, leaflets, bracts, bracteoles, pedicels, buds and sepals. Stipules green to vinaceous, lanceolate, showy, 3–8 × 1–2 mm, persistent. Leaves 2.4–8.6 cm long; pulvinus brown, sparsely pilose, 1–2.5 mm diam.; petiole 6–8 mm long, equal or less than the rachis; 1 extrafloral nectary, vinaceous to brown, shortly stipitate, caliciform, 1–3 mm long, with head more dilated than the stipe, located next to the middle of the petiole; rachis 6–38 mm long; interfoliolar segments 1–4 mm long; leaflets discolorous, 18–21 pairs, chartaceous, pilose, oblong, 6–19 × 3–5 mm, apex acute, base cuneate, venation penninervous, midrib little excentric dividing the leaflet in a ratio of 1:1–1.5 at the base. Inflorescences fasciculate, supra-axillary, 2–5 flowered or reduced to a one flower; inflorescence axis 1.5–3.5 cm long; bracts green-vinaceous, lanceolate, 2–4 × 1–1.5 mm; pedicel 2–10.5 mm long; bracteoles green-vinaceous, lanceolate, 2–3 × c. 1 mm, located next to the middle of the pedicel. Buds green, acute, 5–15 mm long. Flowers c. 3 cm diam.; sepals green to yellowish-green, deltoid to lanceolate, the external pilose on the abaxial surface, internal glabrous, 13–16 × 2–5 mm; petals yellow to orange, two external, orbicular, 12–17 × 6–13 mm, two internal oblong, 11–12 × 3–4 mm, cuculus falcate, bent around the stamens, 12–14 × 8–9 mm; stamens yellow to yellowish-green, 6–15 mm long; ovary yellow, velutinous, 1–2 mm long; style light green to yellow, 13–15 mm long. Legumes oblong, linear, when young green to vinaceous, mature brown, 1.8–8.7 × 1–3 mm; valves chartaceous, glabrous to sparsely pilose. Seeds trapezoids, green-vinaceous, sparsely pitted, 1–1.5 × 0.3–0.5 mm.

Material examined: BRAZIL, BAHIA: Paulo Afonso, Estação Ecológica Raso da Catarina, Trilha sentido Mata da Pororoca, 9°48'32" S

and 38°29'30" W, 584 m, 24.III.2010, fl.; fr., C.L.S.B. Correia et al. 99 (HUNEB); Trilha sentido Pedra da janela, 09°39'55" S and 38°28'02" W, 570 m, 01.VII.2010, fl.; fr., C.L.S.B. Correia et al. 160 (HUNEB); Trilha por trás da casa sede do ICMbio, 09°39.84.2" S and 38°28'0.06" W, 592 m, 20.VIII.2010, fl.; fr., C.L.S.B. Correia et al. 218 (HUNEB); Trilha sentido Mata da Pororoca, vindo da casa I do ICMbio, 9°45'29" S and 38°29'29" W, 584 m, 29.XII.2010, fl., C.L.S.B. Correia et al. 343 (HUNEB); 29.XII.2010, fl., C.L.S.B. Correia et al. 367 (HUNEB); 14.I.2011, fl.; fr., C.L.S.B. Correia et al. 379 (HUNEB); 08.VI.2011, fl., C.L.S.B. Correia et al. 464 (HUNEB); Trilha sentido casa II, 09°49'15" S and 38°29'33" W, 667 m, 08.VI.2011, fl.; fr., C.L.S.B. Correia et al. 468 (HUNEB); 01.IX.2011, fl.; fr., C.L.S.B. Correia et al. 551 (HUNEB); Trilha principal sentido Mata da Pororoca, 9°45'29" S and 38°29'29" W, 584 m, 08.VI.2011, fl., C.L.S.B. Correia et al. 481 (HUNEB); Trilha sentido Sul da Estação, ca. 10 km da Pororoca, 09°43'18" S and 38°29'30" W, 580 m, 08.IX.2011, fl.; fr., C.L.S.B. Correia et al. 556 (HUNEB); 08.IX.2011, fl., C.L.S.B. Correia et al. 560 (HUNEB); 08.IX.2011, fl., C.L.S.B. Correia et al. 563 (HUNEB).

Chamaecrista nictitans is widely distributed in the Americas, occurring from the United States to Argentina, and includes four subspecies and 11 varieties, of which only *disadena* and *pilosa* occur in the Caatinga. In the study area, the species is represented by *Chamaecrista nictitans* var. *disadena* (Irwin & Barneby 1982, Queiroz 2009). This taxon is quite common in the ESRC, and is found in more degraded areas on sandy-clayey soil at altitudes of 570 to 696 m. It was collected with flowers and fruits from December to March and June to September.

In the study area, *Chamaecrista nictitans* subsp. *disadena* var. *disadena* resembles *C. repens* (Vogel) H.S.Irwin & Barneby var. *multijuga* (Benth.) H.S.Irwin & Barneby, with both possessing leaves with more than 15 pairs of leaflets and supra-axillary inflorescences. Nevertheless, *Chamaecrista nictitans* subsp. *disadena* var. *disadena*, can be differentiated by stipitate extrafloral nectaries with more dilated head than the stipe and leaflets with midrib slightly excentric in a ratio of 1:1–1.5 at the base (vs. robust extrafloral nectaries with head less dilated than the stipe and leaflets with midrib strongly excentric in a ratio of 1:2–2.5 at the base, in *C. repens* var. *multijuga*).

7. *Chamaecrista ramosa* (Vogel) H.S.Irwin & Barneby var. *ramosa*, Mem. New York Bot. Gard. 35(2): 884. 1982. Figure 6a-k

Subshrubs erect to procumbent, branched until 1 m tall; branches cylindrical, erect, epidermis vinaceous to purple on the young branches, brown on the old branches. Indumentum villous, constituted to trichomes tector, thin, blank to brown, flexible, adpressed, sparse, c. 0.5 mm long, distributed on the branches, stipules, petioles, sepals and legumes. Stipules green, deltoid to cordiform, showy, 3–6 × 2–4 mm, persistent. Leaves 7–15 cm long; pulvinus vinaceous, sparsely pilose, c. 8 mm diam.; petiole furrowed, 2–5 mm long; 1 extrafloral nectary, vinaceous to brown, stipitate, caliciform, c. 1 mm long, located on the petiole; rachis 0.5–1 mm long; leaflets discolorous, 2 pairs, chartaceous, pilose, obovate, 5–10 × 2–4 mm, apex rounded, base cuneate to truncated; venation paralelinervous. Inflorescences axillary, reduced to a single flower; bracts vinaceous, lanceolate to deltoid, 1.5–3 × 1–2.5 mm; pedicel 12–26 mm long; bracteoles brown, ovate to deltoid, 0.5–2 × 1–2 mm, located near the flower receptacle. Buds vinaceous, lanceolate, 9–14 mm long. Flowers c. 2 cm diam.; sepals green to green-vinaceous, lanceolate to elliptic or ovate to deltoid, abaxial surface pilose, multistriated, 5–11 × 2.5–5 mm; petals yellow, two external, spatulate to elliptic, 10–13.5 × 8–9 mm, two internal, obovate to orbicular, 11–15 × 7–9 mm, cuculus suborbicular to falcate, bent around the stamens, 13–14.5 × 20–23 mm; stamens yellow, 4–8.5 mm long; ovary green glaucous, panoso, 6 mm long; style green, 4–6 mm long. Legumes oblong, linear, little incurved, when young vinaceous and mature castaneous glaucous, c. 30 × c. 6 mm; valves chartaceous,

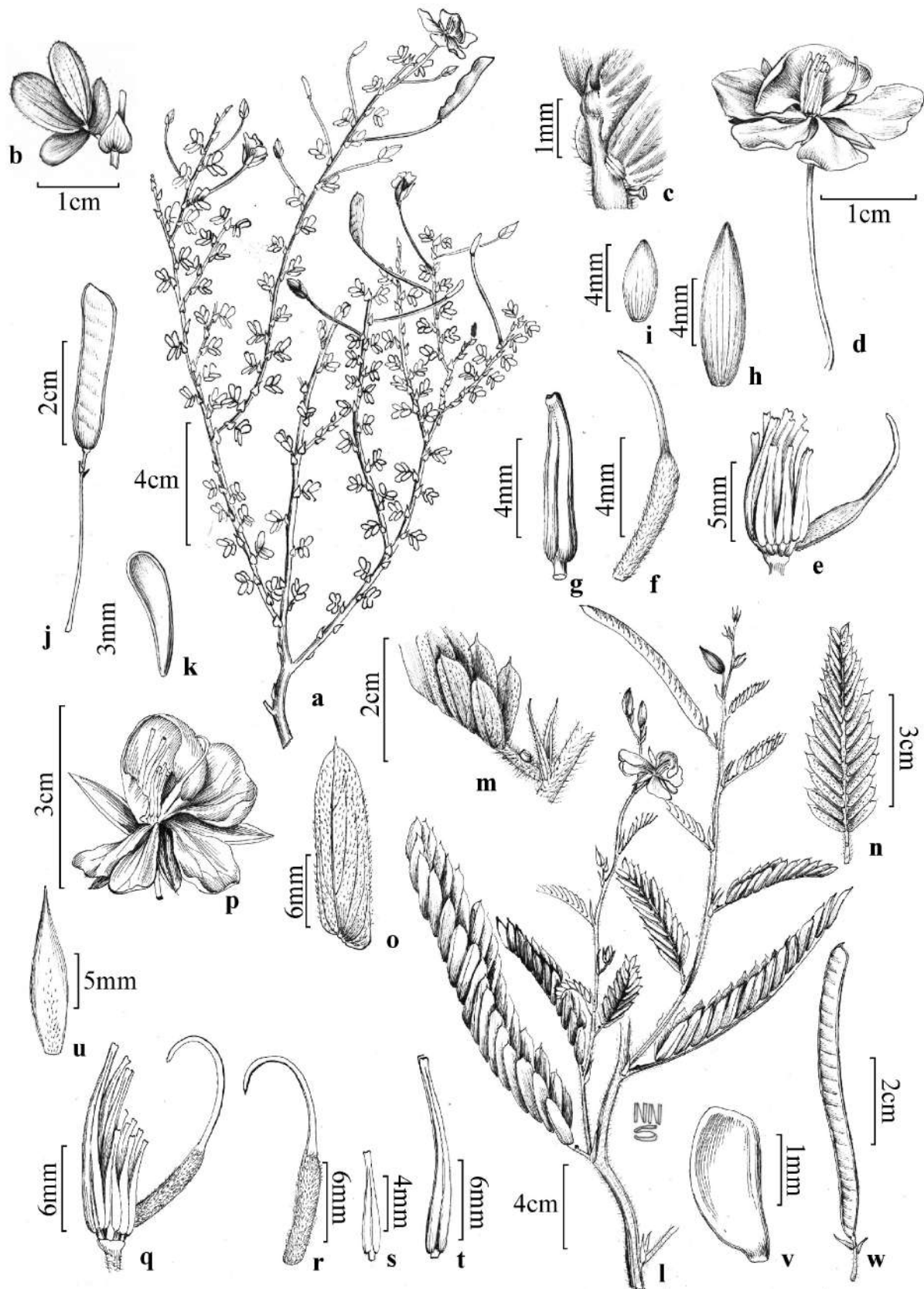


Figure 6. a-k) *Chamaecrista ramosa* var. *ramosa*: a) flowering branch; b) leaf; and stipule; c) detail of nectary; d) flower; e) androecium and gynoecium; f) pistil; g) stamen; h) external sepal; i) internal petal; j) fruit and pedicel with bracteoles; k) seed. l-w) *Chamaecrista repens* var. *multijuga*: l) flowering branch; m) detail of stipule and nectary; n) leaf; o) leaflet; p) flower; q) androecium and gynoecium; r) pistil; s) stamen; t) bigger stamen; u) sepal; v) seed; w) fruit and pedicel with bracteoles. a-k from C.L.S.B. Correia 570; l-w from C.L.S.B. Correia 494.

glabrous to puberulous. Seeds spatulated, brown, smooth and eventually pitted, $2-6 \times 1.5-2$ mm.

Material examined: BRAZIL, BAHIA: Paulo Afonso, Estação Ecológica Raso da Catarina, Trilha sentido sul da Estação, 8 km após a Mata da Pororoca, $09^{\circ}42'16''$ S and $38^{\circ}29'31''$ W, 579 m, 08.IX.2011. fl.; fr., C.L.S.B. Correia et al. 561 (HUNEB); 08.IX.2011. fl.; fr., C.L.S.B. Correia et al. 570 (HUNEB).

The species occurs in South America and includes six varieties (Irwin & Barneby 1982). This species is inserted in *C. sect. Xerocalyx* that possesses taxa with limits that are considered artificial. In 2005 based on morphological data Fernandes & Nunes recognized only four varieties for the species. A biosystematic study of *C. sect. Xerocalyx* is in progress and should certainly help to more naturally delimit the taxa of this section. In the study area, the species is represented only by the *ramosa* variety, which is rare. This variety occurs from north South America to east Brazil (Irwin & Barneby 1982, Queiroz 2009).

In the study area, the taxon can be easily recognized by erect procumbent to subshrub habit with leaves having 2 pairs of leaflets with paralelinervous venation and by isolated axillary flowers.

8. *Chamaecrista repens* (Vogel) H.S.Irwin & Barneby var. *multijuga* (Benth.) H.S.Irwin & Barneby, Mem. New York Bot. Gard. 35(2): 660. 1982. Figures 2g; 6l-w

Subshrubs erect, branched until 1.5 m tall; branches cylindrical, erect, epidermis green on the young branches, vinaceous on the old branches. Indumentum vilous, constituted to trichomes tector, thin, blanks to colourless, flexible, erect and adpressed, slender, c. 1 mm long, distributed on the branches, pulvinus, stipules, petioles, rachis, leaflets, bracts, bracteoles, buds, pedicels, sepals and young legumes. Stipules green to green-vinaceous, lanceolate, little showy, $6-8 \times 0.5-1$ mm, persistent. Leaves $1.6-12.1$ cm long; pulvinus black, pilose, $1-2$ mm diam.; petiole furrowed, $6-14$ mm long; 1 extrafloral nectary, vinaceous to brown, sessile to shortly stipitate, discoid to caliciform, c. 1 mm long, head less dilated than stipe, located little above the middle of the petiole; rachis $8-113$ mm long; interfoliolar segments $1-4$ mm long; leaflets discolorous, $8-17$ pairs, chartaceous, pilose, $6-21 \times 1-7$ mm, oblong, apex cuspidate, mucronate, base truncated, venation palminervous, midrib little excentric dividing the leaflet in a ratio of $1:2-2.5$ at the base. Inflorescences fasciculate, supra-axillary, 5 flowered or reduced to a single flower; pedicel $1.5-3.5$ cm long; bracts green-vinaceous, lanceolate, $2-4 \times 1-1.5$ mm; bracteoles green-vinaceous, lanceolate, $2-3 \times c. 1$ mm, located next to the receptacle. Buds green, lanceolate, $5-15$ mm long. Flowers c. 3 cm diam.; sepals green to yellowish-green, deltoids to elliptical, abaxial surface pilose, striated, $15-18 \times 3-6$ mm; petals yellow to orange, one external, orbicular, c. 22×21 mm, three internal, oblong, $11-17 \times 6-7$ mm, cuculus falcate, assymmetric, bent around the stamens, $18-20 \times 19-22$ mm; stamens yellow to yellowish-green, $5-16$ mm long; ovary yellow, tomentose, $8-9$ mm long; style glaucous green to yellow, $6-8$ mm long. Legumes oblong, linear, pilose, when young vinaceous, mature brown, $38-76 \times 2-4$ mm; valves chartaceous, sparsely puberulous. Seeds trapezoids, brown, pitted, $2-3.5 \times 1-4$ mm.

Material examined: BRAZIL, BAHIA: Paulo Afonso, Estação Ecológica Raso da Catarina, Trilha sentido Baixa da onça, $09^{\circ}52'21''$ S and $38^{\circ}37'88''$ W, 521 m, 29.VI.2010. fl.; fr., C.L.S.B. Correia et al. 129 (HUNEB); Casa sede do ICMbio, $09^{\circ}39.84''$ S and $38^{\circ}28'06''$ W, 592 m, 06.V.2011. fl.; fr., R.R. Varjão et al. 99 (HUNEB); 01.VII.2011. fl.; fr., C.L.S.B. Correia et al. 492 (HUNEB); 01.VII.2011. fl.; fr., C.L.S.B. Correia et al. 494 (HUNEB); 01.VII.2011. fl.; fr., C.L.S.B. Correia et al. 496 (HUNEB); 27.VII.2011. fl.; fr., C.L.S.B. Correia et al. 519 (HUNEB); Trilha principal próximo a casa do Sr. Divá, $09^{\circ}48'33''$ S and $38^{\circ}29'31''$ W, 614 m, 27.VII.2011. fl., C.L.S.B. Correia et al. 530 (HUNEB); Trilha para

cara feia próximo ao curral do dentinho, $09^{\circ}47'29''$ S and $38^{\circ}30'31''$ W, 588 m, 31.VIII.2011. fl., C.L.S.B. Correia et al. 537 (HUNEB).

Chamaecrista repens was reported by Irwin & Barneby (1982), as endemic to South American with two varieties: *C. repens* var. *multijuga* and *C. repens* var. *repens*. Of these two varieties, only *multijuga* occurs in the Caatinga, and is distributed in the Northeastern Region of Brazil to Minas Gerais (Irwin & Barneby 1982, Queiroz 2009). In the study area, *C. repens* var. *multijuga* is very common, occurring in anthropized areas on sandy-clayey soil at altitudes of 406 to 592 m. Flowers and fruits were recorded from May to August.

The taxon can be recognized in the study area by leaves with $8-17$ pairs of leaflets, with the midrib extremely excentric in ratio of ca. $1:2-2.5$ at the base and by inflorescence fasciculate, supra-axillary, with up to five flowers or reduced to a single flower. *Chamaecrista repens* var. *multijuga* can be confused with *C. nictitans* var. *disadana*, because both possess leaves with more than 8 pairs of leaflets and supra-axillary inflorescences. However, the two taxa can be differentiated by morphology of the extrafloral nectary and the position of the midrib of the leaflets, as mentioned in *C. nictitans* var. *disadana*.

9. *Chamaecrista swainsonii* (Benth.) H.S.Irwin & Barneby, Mem. New York Bot. Gard. 35(2): 701.1982. Figures 2h; 7a-k

Subshrubs erect, little branched until 0.6 m tall; branches quadrangular, fractiflex, epidermis green on the young branches, vinaceous to brown on the old branches. Indumentum vilous, constituted by trichomes tector, thin, whitish, flexible, erect, sparse, c. 0.5 mm long, distributed on the branches, stipules, petioles, rachis, leaflets, bracts, bracteoles, pedicels, sepals and legumes. Stipules green speckled green purple on the base, past brown, acuminate to aristate, venation prominent on face adaxial, extremely showy, $4-14 \times 5-17$ mm, persistent. Leaves $2.4-6.2$ cm long; pulvinus brown, glabrous, c. 1 mm diam; petiole furrowed, $2-13$ mm long, c. 7 times greater than the rachis; $2-9$ extrafloral nectary, green glaucous, stipitate, caliciform, located on petiole and on the rachis, one each interfoliolar segments, $0.4-1.0$ mm long; rachis grooved, carrying a nectary, $14-42$ mm long; interfoliolar segments $2-6$ mm long; leaflets discolorous, $4-8$ pairs, coriaceous, pubescent, $8-24 \times 2.1-8.3$ mm, oblong, apex cuspidate to spinescent, base rounded, venation palminervous, prominent. Inflorescences axillary, reduced to a single flower; bracts green, purple speckled on the base, past brown, lanceolate to elliptical, $4-5 \times c. 0.5$ mm; pedicel $24-34$ mm long; bracteoles green to green-vinaceous, elliptical to lanceolate, $1-3.5 \times c. 0.5$ mm, located above the middle of the pedicel. Buds green to yellowish-green, ovate to lanceolate, $9-14$ mm long. Flowers c. 2 cm diam.; sepals green to yellowish-green, sparsely pilose, striated, lanceolate to deltoid, $1-14 \times 3-8$ mm; petals yellow glaucous to orange, two external, oblong to orbicular, $8-13.5 \times 6-9.5$ mm, two internal, spatulate to ovate, $10-11.5 \times c. 5.5$ mm, cuculus oblong to falcate, bent around the stamens, $11-13.5 \times 10-11.5$ mm; stamens yellow, $4-8.5$ mm long; ovary green, tomentose, 4 mm long; style green, $4-5.5$ mm long. Legumes oblong-linear, linear, pilose, green to green-vinaceous when young, mature brown, $12-47 \times 2-6$ mm; valves chartaceous, harsh. Seeds quadrangular to trapezoid, castaneous, pitted, $3-4 \times 2.5-3$ mm.

Material examined: BRAZIL, BAHIA: Paulo Afonso, Estação Ecológica Raso da Catarina Trilha sentido Pororoca, $9^{\circ}45'29''$ S and $38^{\circ}29'29''$ W, 584 m, 24.III.2010. fr., C.L.S.B. et al. 102 (HUNEB); 19.V.2010. fr., M.V.V. Romão et al. 608 (HUNEB); 19.V.2010. fr., M.V.V. Romão et al. 616 (HUNEB); Trilha sentido Pedra da janela, $09^{\circ}39'55''$ S and $38^{\circ}28'02''$ W, 570 m 30.VI.2010. fl.; fr., R.R.O. Lima et al. 06 (HUNEB); 30.XII.2010. fl., C.L.S.B. Correia et al. 360 (HUNEB); 25.VII.2011. fl., C.L.S.B. Correia et al. 503 (HUNEB); Trilha sentido casa II, vindo da Pororoca, $09^{\circ}49'15''$ S and $38^{\circ}29'33''$ W, 667 m, 14.I.2011. fl., C.L.S.B. Correia et al. 370 (HUNEB); 04.II.2011. fr., C.L.S.B. Correia et al. 390

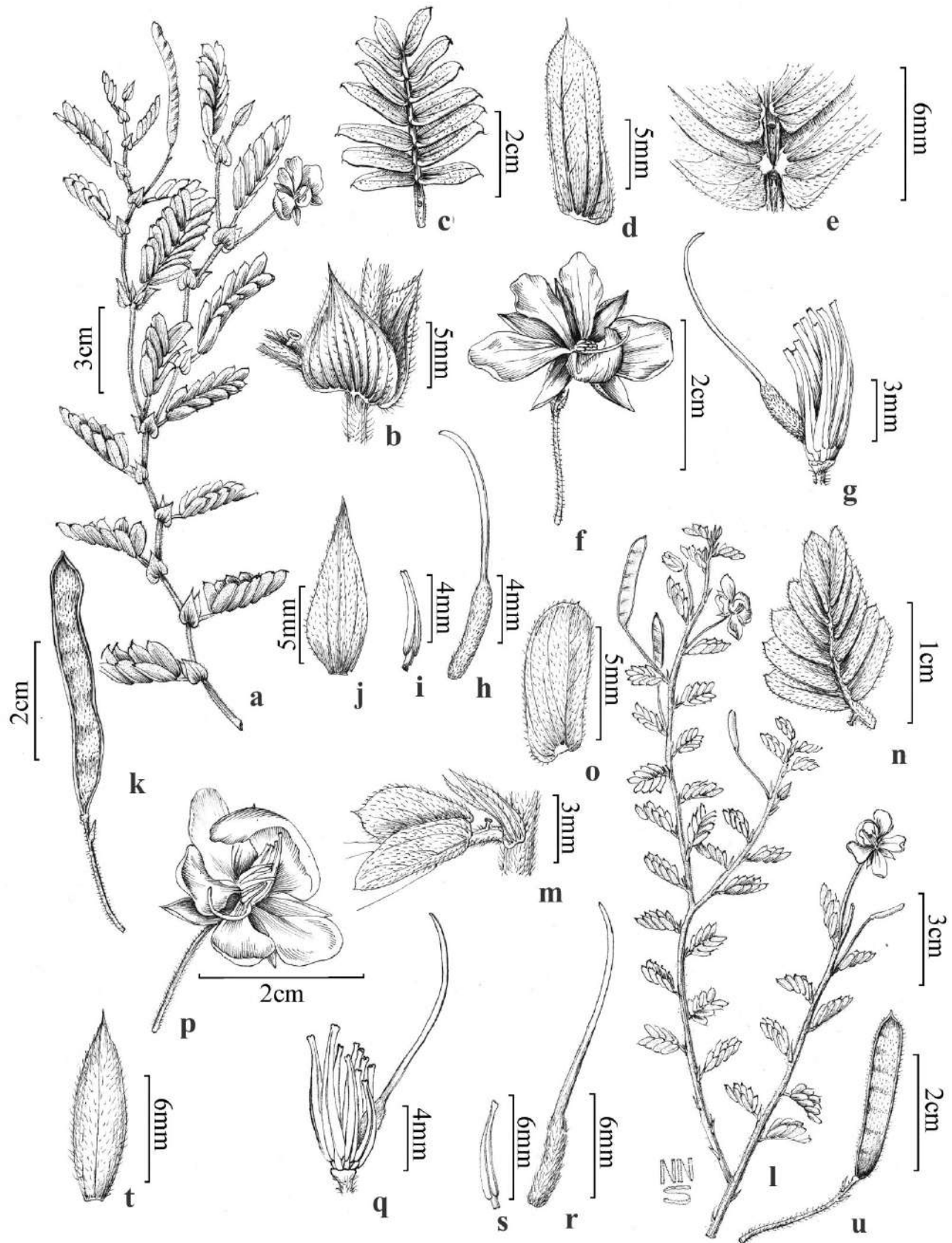


Figure 7. a-k) *Chamaecrista swainsonii*: a) flowering branch; b) stipule; c) leaf; d) leaflet; e) location of extrafloral nectary; f) flower; g) androecium and gynoecium; h) pistil; i) stamen; j) sepal; k) fruit and pedicel with bracteoles. l-u) *Chamaecrista tenuisepala*: l) flowering branch; m) detail of stipule and nectary; n) leaf; o) leaflet; p) flower; q) androecium and gynoecium; r) pistil; s) stamen; t) sepal; u) fruit and pedicel with bracteoles. a-k from C.L.S.B. Correia 390; l-u from C.L.S.B. Correia 548.

(HUNEB); 04.V.2011, fl., C.L.S.B. Correia et al. 448 (HUNEB); 08.VI.2011, fr., C.L.S.B. Correia et al. 483 (HUNEB); 01.IX.2011, fl.; fr., C.L.S.B. Correia et al. 550 (HUNEB); Trilha principal antes da Pororoca vindo da casa base, 09°39'54.8" S and 38°27'59.8" W, 618 m, 27.IX.2011, fl.; fr., C.L.S.B. Correia et al. 586 (HUNEB).

Chamaecrista swainsonii is endemic to Bahia and occurs in Caatinga, Cerrado and Restinga (Irwin & Barneby 1982, Queiroz 2009). According to Queiroz (2009), in the Caatinga the species occurs at altitudes of 680 to 1000 m. In the ESRC the species is common and was collected on sandy, sandy-clayey and rocky soils with flowers in December to June and fruiting from January to June.

It is characterized in the study area by the presence of quadrangular, fractiflex branches; acuminate to aristate stipules with prominent nervure, and leaves with 4–8 pairs of coriaceous, oblong leaflets with cuspidate to spinescent apex and palminerveous prominent venation.

10. *Chamaecrista tenuisepala* (Benth.) H.S.Irwin & Barneby, Mem. New York Bot. Gard. 35: 707. 1982. Figures 2i; 7l-u

Subshrub erect, little branched until 1 m tall; cylindrical branches, erect, little striated, not exfoliating, epidermis vinaceous to brown on the braches young and old. Indumentum tomentose, constituted by trichomes tector, thin, whitish, flexible, erect and wavy, tangles, c. 0.5 mm long, distributed on the branches, pulvinus, stipules, petioles, rachis, leaflets, pedicels, bracts, bracteoles, sepals, ovary and legumes. Stipules green to green-vinaceous, past brown, lanceolate to deltoid, obsolet, 1–7 × 1–2 mm, persistent. Leaves 1–3 cm long; pulvinus green, pilose, 0.5–1 mm diam.; petiole 2–4 mm long; 1 extrafloral nectary, brown to green-vinaceous, stipitate, caliciform, located on petiole, below pair of proximal leaflets, 1–1.5 mm long; rachis 5–20 mm long; interfoliolar segments 1–3 mm long; leaflets discolorous, 5–6 pairs, chartaceous, pubescent with greater intensity on the face adaxial, 3–13 × 2–4 mm, oblong, apex acuminate to cuspidate, base asymmetrical, venation palminerveous. Inflorescences axillary, reduced to a single flower; bracts green-vinaceous, lanceolate to deltoids, 4–5 × c. 0.5 mm; pedicel 12–36 mm long; bracteoles green, lanceolate, 3–4 × c. 0.5 mm, located along the pedicel. Buds green to yellowish-green, lanceolate to ovate, 7–15 mm long. Flowers c. 1.5 cm diam.; sepals green to yellowish-green, lanceolate to deltoid, abaxial surface pilose, striated, 6–12 × 2–4 mm; petals yellow glaucous, two external, obovate, 13–18 × 8–11 mm, two internal, spatulate, 11–14 × 7–10 mm, cuculus falcate, bent around the stamens, 12–16 × 13–17 mm; stamens yellow, 3.5–11 mm long; ovary green glaucous to whitish, tomentose, 4–7 mm long; style green glaucous, 5–11 mm long. Legumes oblong, linear, green-vinaceous when young, mature brown, 9–42 × 2–6.5 mm; valves chartaceous, pilose, setulose. Seeds trapezoid, brown, pitted at base, 2–2.5 × c. 1 mm.

Material examined: BRAZIL, BAHIA: Paulo Afonso, Estação Ecológica Raso da Catarina, Trilha sentido Pedra da coruja, 09°39'55.9" S and 38°28'02.5" W 01.VII.2010. fl.; fr., C.L.S.B. Correia et al. 157 (HUNEB); Baixa da onça, 09°52'21" S and 38°37'88" W, 521 m, 24.III.2010. fl.; fr., C.L.S.B. Correia et al. 104 (HUNEB); Trilha sentido Mata da Pororoca. 9°48'32" S and 38°29'30" W, 584 m, 24.III.2010. fl.; fr., C.L.S.B. Correia et al. 101 (HUNEB); 29.XII.2010. fl.; fr., C.L.S.B. Correia et al. 340 (HUNEB); 29.XII.2010. fl.; fr., C.L.S.B. Correia et al. 342 (HUNEB); Trilha sentido Mata da Pororoca vindo da casa I, depois da 1° encruzilhada 9°47'57" S and 38°29'30" W, 584 m, 04.II.11. fl., C.L.S.B. Correia et al. 384 (HUNEB); Trilha do Transecto UFRVB, próximo a casa base do ICMBio, 9°48'50" S and 38°28'01" W, 560 m, 17.VIII.2010. fl.; fr., C.L.S.B. Correia et al. 187 (HUNEB); 29.XII.2010. fl.; fr., C.L.S.B. Correia et al. 366 (HUNEB); Trilha sentido casa II vindo da Mata da Pororoca, 09°49'15" S and 38°29'33" W, 667 m, 04.II.11. fl.; fr., C.L.S.B. Correia et al. 388 (HUNEB); 04.IV.11. fl., C.L.S.B.

Correia et al. 429 (HUNEB); 08.VI.11. fl., C.L.S.B. Correia et al. 463 (HUNEB); 24.XI.11. fl.; fr., C.L.S.B. Correia et al. 280 (HUNEB).

The species is endemic to northeastern Brazil, having been recorded to southern Maranhão and Piauí to western Pernambuco and Paraíba (Irwin & Barneby 1982, Queiroz 2009). In the study area, *Chamaecrista tenuisepala* is very common and occurs on sandy, sandy-clayey and rocky soils at altitudes of 520 to 667 m. It was collected with flowers and fruits nearly every month of the year.

Chamaecrista tenuisepala can be recognized in the area by subshrub habit, lanceolated to deltate stipules, stipitate and caliciform extrafloral nectary located on the petiole below the pair of proximal leaflets, leaves with 5–6 pairs of leaflets and isolated axillary flowers of ca. 1.5 cm in diam.

Appendix

LIST OF ADDITIONAL MATERIAL EXAMINED

Amorim, A.M. 6202 (10); Bautista, H.P. 459 (3); Brito, D.S. 68 (6); Castro, A.J. s.n. (6); s.n. (9); Cardoso, D. 527 (3); Cardoso, D. & Silva, I. 41 (3); Cardoso, D. & Guerreiro, M. 1189 (4); Cardoso, D. & Santos, J.M.O. 206 (9); Carvalho, A.M. 3864 (2); Conceição, A.S. 1699 (2); 1689 (2); 1281 (3); 1336 (3); 426 (4); 1630 (4); 1279 (6); 1811 (6); 1640 (6); 1655 (7); 1662 (7); 1650 (9); Conceição, A.S. & Leite, K.R.B. 684 (7); Conceição, A.A. & Marazzi, B. 1129 (1); Correia, C.L.S.B. 93 (2); 94 (2); 92 (7); 88 (9); 95 (9); Costa, A.L. s.n. (7); s.n. (9); Fernandes, A. 3418 (1); s.n. (4); Ferreira, M.C. 474 (3); 264 (6); 24 (9); Ferreira, M.C. & Jost, T. 762 (7); Filho, J. 202 (4); França, F. 3098 (7); Funch, R. & Funch, L.S. 16 (8); Gardner, G. 2122 (4); 1572 (8); 2127 (8); 2125 (10); Ganev, W. 2818 (4); Giulietti, A.M. 2030 (4); Guedes, M.L. & Paulo Filho, D. 7870 (2); Guedes, M.L. 7960 (1); 512 (3); 7328 (6); 3236 (9); Harley, R.M. 54346 (2); 19839 (4); Hatschbach, G. & Ribas, O.S. 77859 (5); Jesus 214 (9); Jesus, N.G. & Lima, L.C.L. 144 (7); Longa, C. 13 (9); Matos, M.L.S. 5 (6); Melo, E. 7485 (1); 1609; (2); Noblick, L.R. & Lemos, M.J. 3552 (3); Nunes, T.S. 1231 (6); Orlandi, R.P. 835 (7); 564 (7); Queiroz, L.P. 3724 (2); 7908 (3); 2945 (3); 4643 (2); 3725 (3); 385 (3); 385 (3); 7290 (4); s.n. (5); 1438 (6); 295 (6); 1358 (6); 7198 (8); 7034 (8); 7198 (8); 2890 (9); 12314 (9); 5259 (9); Queiroz, L.P. & Guedes, M.L. 413 (6); Queiroz, L.P. & Nascimento, N.S. 3497 (3); Rebouças, P.L.O. 8 (7); Ribeiro-Filho, A.A. 117 (7); Rodarte, A. 73 (7); Romão, M.V.V. 63 (6); 158 (6); 234 (6); 299 (6); 321 (6); 525 (6); 551 (7); 442 (9); Saar 28 (9); Salgado, O.A. & Bautista, H.P. 322 (1); Santanna, W. 1474 (6); Santos, R.M. 142 (2); Senra, L.C. 5 (8); Sessegolo, G.C. 175 (2); 138 (3); 44 (4); 81 (7); 93 (7); 275 (8); 74 (10); Viana, B.F. 14 (7).

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Author Contributions

Cláudia Letícia de Souza Barros Correia: Contribution to the acquisition of data; analysis and interpretation of data; work of writing and conception and design work.

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

Conflicts of interest

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

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