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Original Paper

# Flora of Ceará, Brazil: Vitaceae

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**Abstract**

We examined here the diversity and distribution of Vitaceae species in Ceará state, Brazil, as part of the "Flora of Ceará Project: knowing to conserve", analyzing the morphological characters of specimens collected in the field, those available in the ALCB, BHCB, EAC, CEN, EAFM, HCDAL, HST, HUEFS, HUVA, HVASF, IAN, IPA, K, MBM, MOSS, NY, P, R, UEC, and US herbaria or in the specialized literature. We include here an identification key, occurrence maps, morphological descriptions, and comments concerning their ecology. The main morphological features for species delimiting were leaf type and symmetry, trichome and tendril types, presence or absence of streaks on branches, stipule, flower bud and fruit shape. Eleven species of Vitaceae included within two genera were recorded in Ceará: *Cissus albida*, *C. blanchetiana*, *C. campestris*, *C. erosa*, *C. gongylodes*, *C. subrhomboidea*, *C. sulcicaulis*, *C. tinctoria*, *C. verticillata*, *C. xerophila*, and *Clematicissus simsiana*. The species were registered in 45 municipalities, with *C. erosa* and *C. verticillata* being widely distributed. Those species inhabit different phytoecological areas in Ceará, although preferentially growing in Stepic Savanna (Caatinga). Six species occur in nine legally protected conservation areas. Ceará state holds 40.74% of the registered species of the family found in northeastern Brazil.

**Key words**: *Cissus*, climbers, Northeastern Brazil, Vitales.

**Resumo**

Examinamos aqui a diversidade e distribuição de espécies de Vitaceae no estado do Ceará, Brasil, como parte do projeto "Flora do Ceará: conhecer para conservar", analisando caracteres morfológicos de amostras obtidas em campo, em coleções depositadas em herbários (ALCB, BHCB, EAC, CEN, EAFM, HCDAL, HST, HUEFS, HUVA, HVASF, IAN, IPA, K, MBM, MOSS, NY, P, R, UEC, US) ou publicadas em literaturas especializadas. Chave de identificação, descrições morfológicas, comentários sobre a ecologia e mapas de ocorrência dos táxons foram incluídos. Os principais caracteres para o reconhecimento das espécies foram o tipo e simetria das folhas, tipos de tricomas e gavinhas, presença ou ausência de estrias nos ramos e formas da estípula, botão floral e fruto. No território cearense ocorrem 11 espécies de Vitaceae pertencentes a dois gêneros: *Cissus albida*, *C. blanchetiana*, *C. campestris*, *C. erosa*, *C. gongylodes*, *C. subrhomboidea*, *C. sulcicaulis*, *C. tinctoria*, *C. verticillata*, *C. xerophila* e *Clematicissus simsiana*. As espécies foram registradas em 45 municípios, sendo *C. erosa* e *C. verticillata* as que apresentaram distribuição mais ampla. As espécies habitam diferentes unidades fitoecológicas no Ceará, no entanto, crescem preferencialmente na Savana Estépica (Caatinga). Seis espécies ocorrem em nove diferentes Unidades de Conservação. O estado do Ceará detém 40,74% das espécies registradas da família no nordeste brasileiro.

**Palavras-chave**: *Cissus*, lianas, Nordeste do Brasil, Vitales.

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## Introduction

The order Vitales is composed of only the Vitaceae family, which, in turn, comprises 14 genera and 850 species distributed in pantropical as well as temperate regions globally (Stevens, continuously updated). *Cissus* L. is the largest genus of the family, and its 300 species have disjunction intercontinental pantropical distributions, being encountered in all of the principal tropical regions (Liu *et al.* 2013). Of the 78 New World species, 64 are found in South America (Rodrigues *et al*. 2014).

The representatives of Vitaceae are climbing plants (woody or herbaceous), rarely shrubs or trees; monoecious or rarely dioecious; with tendrils; leaves alternate, simple or compound, stipulate, petiolate; inflorescence in cymes, panicles, or thyrses; flowers pedicellate or subsessile, hypogynous, bisexual, rarely functionally unisexual, actinomorphic; sepals 4–5, united; petals 4–5, valvar, united at the apex (*Vitis* L.) or free, deciduous at anthesis, or (rarely) persistent on the fruit; stamens 4–5; nectariferous disk absent or present and intrastaminal; ovary superior, 2-carpelar, 2–4-locular, ovules 2 per locule; berry or amphisarcous fruit; seeds 1–4 (Lombardi 2016; Picanço & Lombardi 2020).

Generic boundaries have been problematic in Vitaceae, and particularly in *Cissus*, as the genus shows extraordinary morphological diversity and complex geographic distributions (Rodrigues *et al.* 2014). Based on plastid (*trnL* intron, *trnL-F* intergenic spacer, *rps*16) and nuclear DNA sequences (ribosomal internal transcribed spacer - ITS), as well as in the morphological characteristics of the South American *Cissus* species, the genus was considered non-monophyletic and composed of three clades: *Cissus striata*, *Cissus trianae*, and *Cissus* core (Rodrigues *et al.* 2014). New combinations for the South American species of the clade *Cissus striata* under *Clematicissus* Planch. (Lombardi 2015) apparently resolved this problem, however, *Cissus trianae* Planch. should remain in the genus (Zhang *et al.* 2015).

The *Cissus* core is inferred to have originated in Africa and to have diverged from its relatives in Vitaceae in the Late Cretaceous (Liu *et al*. 2013). The geographic disjunction between New and Old World taxa of the *Cissus* core has been estimated to have originated in the Late Eocene, with diversification in the Americas beginning in the Oligocene (Rodrigues *et al.* 2014). Those authors also highlighted that while there is leaf shape plasticity within species and individuals, this feature is still considered useful for infrageneric classifications.

Some species of Vitaceae, popularly known as grapes, are consumed *in natura* as well as in the manufacture of jams and juices, or in the production of wine; others are cultivated as ornamentals, such as the Japanese ivy [*Parthenocissus tricuspidata* (Siebold & Zucc.) Planch.] commonly seen blowing on buildings and walls (Souza & Lorenzi 2019). Histochemical and pharmacological examinations of species of the genus *Cissus* have revealed the presence of tannins, flavonoids, alkaloids and polysaccharides with medicinal (Oliveira 2006; Navarro 2009), antimicrobial and anti-inflammatory (Garcia *et al.* 2000), and antidiabetic properties (Beltrame *et al.* 2002). *Cissus verticillata* (L.) Nicolson & C.E.Jarvis, commonly known as "plant insulin", has hypoglycemic activity (Souza & Guarim Neto 2009), and is still used in traditional medicinal practices in Pará state, Brazil (in association with other plants) to treat the sequels of strokes (Barbosa *et al*. 2002).

Vitaceae is represented in Brazil by three genera (*Cissus*, *Clematicissus*, and *Vitis*) comprising 51 native and cultivated species (18 of which are endemic) that are widely distributed in all Brazilian phytogeographic domains (Picanço & Lombardi 2020). Those representatives of the family in Brazil have been the focus of various taxonomic studies, such as by Baker (1871) in the *Flora Brasiliensis* and additional floristic surveys undertaken in various states [including Acre (Lombardi 2008), Alagoas (Lyra-Lemos *et al*. 2010), Amazonas (Araújo *et al.* 2020), Goiás and Tocantins (Lombardi 1998), Minas Gerais (Lombardi 1996, 2009a, 2012), Pará (Lombardi 2016), Pernambuco (Lombardi 2009b), São Paulo (Lombardi 2002a) and Sergipe (Lombardi 2013), as well as in the Federal District (Lombardi 2002b)].

Although Vitaceae is an important group in the flora of Ceará state, studies there focusing on the species of this family have been scarce, and rarely mentioned in floristic surveys (see Silva *et al.* 2012; Loiola *et al.* 2015, 2020; Silveira *et al.* 2020a, b). In the continuity of the studies within the "Flora of Ceará Project: Knowing to Conserve", a floristic survey of Vitaceae species was undertaken to contribute to a better understanding of their diversity and distribution in Ceará.

## Material and Methods

The morphological analyses were based on specimens obtained during field expeditions conducted as part of the Flora do Ceará Project: Knowing to Conserve (2012–2019), which were subsequently deposited in the ALCB, BHCB, CEN,

EAC, EAFM, HCDAL, HUEFS, HUVA, HVASF, IAN, IPA, K, MBM, NY, MOSS, P, R, UEC and US herbaria (acronyms according to Thiers [continuously updated] and HST, not indexed).

Specimen identifications were performed with the aid of the specialized literature (Lombardi 2000, 2013, 2016; Araújo *et al*. 2020) and confirmed by the analysis of images of type collections available on the NY, P and R herbaria, Reflora - Virtual Herbarium (2021+), and Flora do Brasil online sites (Picanço & Lombardi 2020).

A stereomicroscope Nikon SMZ 1500 was used for the analysis of morphological structures. The descriptions of the family, genera, and species, as well as the identification key were prepared based on samples recorded within Ceará State. The terminologies of the vegetative and fertile morphological characters follow Harris & Harris (2001). Data referring to the growth forms (habits), habitats, phenology (period of flowering/fruiting), and popular names were obtained from the herbarium labels.

The species distribution map shows the occurrence of taxa within the various vegetation types recorded in Ceará state (Fig. 1). When the geographic coordinates associated with the collections were not provided on the herbarium labels, municipality coordinates were determined using the geoLoc tool (CRIA 2021). The vegetation types are based on, and adapted from, Figueiredo (1997); the official nomenclature of the vegetation types follows IBGE (2012): Vegetation Complex of the Coastal Zone (comprises the Pioneer Psamophilous Vegetation, Forest behind Dunes and Lowland Semi-deciduous Forest = Mata de Tabuleiro), Semi-deciduous Seasonal Forest (Mata Seca), Dense Ombrophilous Forest (Mata Úmida), Savanna (Cerrado), Stepic Savanna (Caatinga/Carrasco), and Vegetation under Fluvial and/or Lacustrine Influence (Mata Ciliar).

## Results and Discussion

A total of 11 species were registered for Ceará state: *Cissus albida* Cambess., *Cissus blanchetiana* Planch., *Cissus campestris* (Baker) Planch., *Cissus erosa* Rich., *Cissus gongylodes* (Baker) Planch., *Cissus subrhomboidea* (Baker) Planch., *Cissus sulcicaulis* (Baker) Planch., *Cissus tinctoria* Mart., *Cissus verticillata* (L.) Nicolson & C.E. Jarvis, *Cissus xerophila* Lombardi, and *Clematicissus simsiana* (Schult. & Schult.f.) Lombardi (Figs. 1; 2).

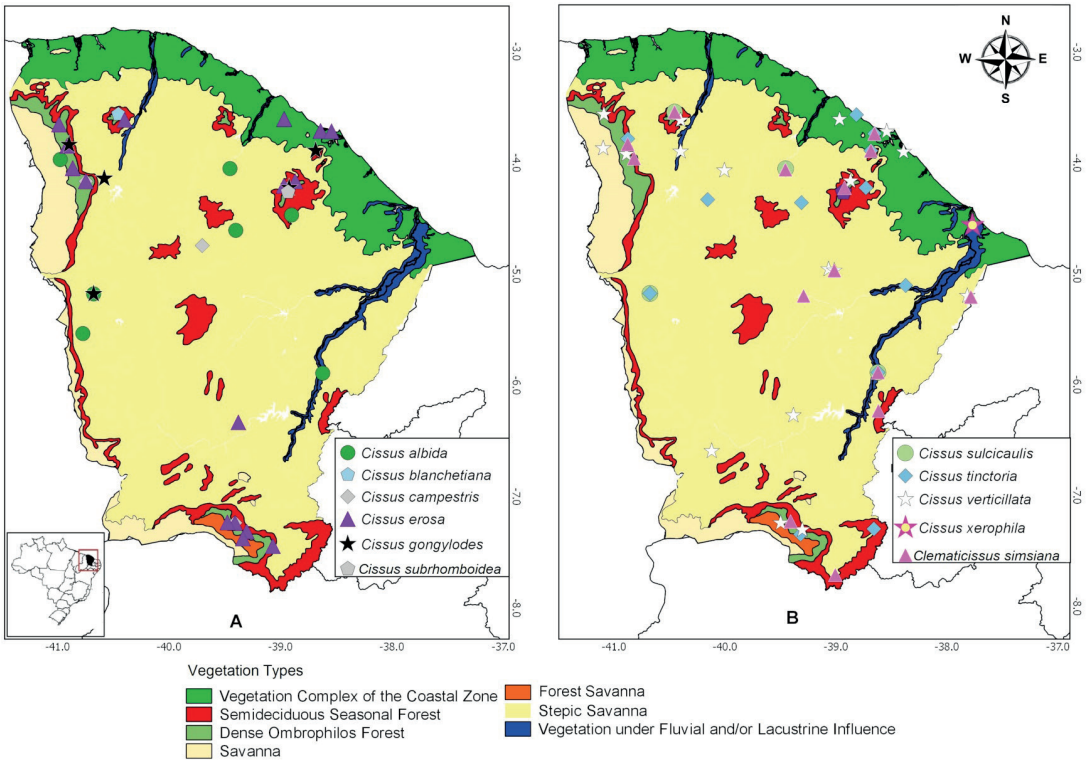


**Figure 1** – Geographic distribution of the Vitaceae species occurring in the state of Ceará.

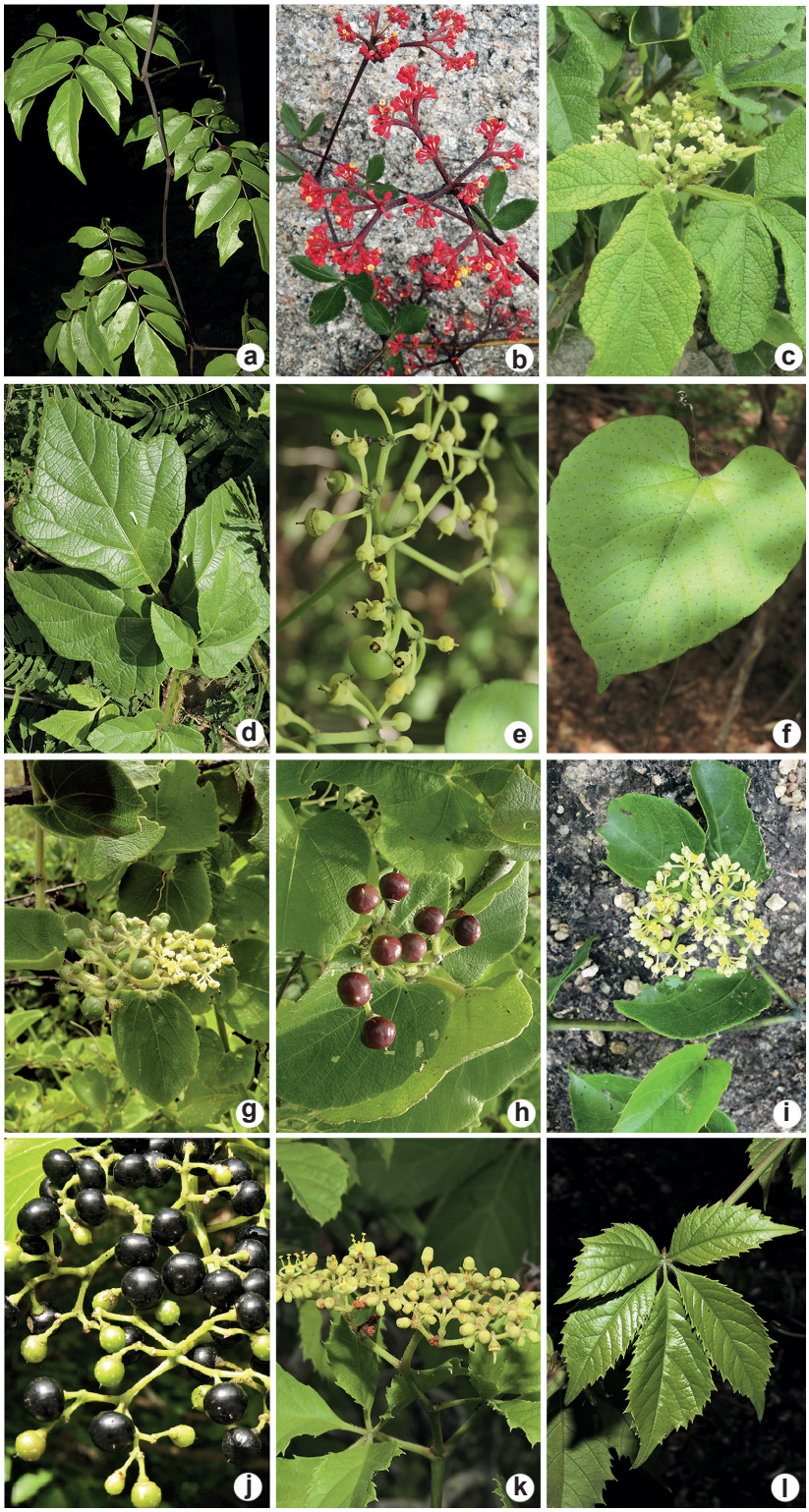


**Figure 2** – a-l. Species of Vitaceae occurring in state of Ceará – a. *Cissus blanchetiana* - branch with leaves; b. *Cissus erosa* - inflorescence; c. *Cissus subrhomboidea* - inflorescence; d. *Cissus sulcicaulis* - leaves; e-f. *Cissus tinctoria* – e. inflorescence; f. leaf; g-i. *Cissus verticillata* – g. inflorescence; h-i. immature fruits; j-l. *Clematicissus simsiana* – j. fruits; k. inflorescence; l. leaves. (photos: a, d-f, j, k. R.T. de Queiroz; b, c, g, h, i. M.I.B. Loiola).

The species were encountered in 45 municipalities in different phytoecological habitats in both dry and wet environments, although occurring predominantly in Stepic Savanna (Caatinga) dryland deciduous vegetation. *Cissus erosa* and *C. verticillata* are widely distributed, and both have records in 16 municipalities; the former was recorded in six different vegetation types. *Cissus xerophila* was registered in one municipality and *Cissus blanchetiana* in two. Six species were encountered in nine different legally protected conservation areas.

## Taxonomic treatment

**Vitaceae** Juss., Gen. Pl. [Jussieu] 267. 1789.

Liana, trichomes unbranched or malpighiaceous, glandular or eglandular; branches terete, 3 or 4-angular, striate or not, lenticels present or not. Tendrils opposite to leaves, branched or not. Leaves simple or compound, alternate, petiolate, stipulate. Inflorescence umbelliform; peduncles hispid, puberulent, glabrescent to glabrous. Flower bud ellipsoid, conical or rounded. Flowers actinomorphic; calyx 4–5-merous, synsepalous; petals 4–5, aestivation valvate, apopetalous, red, greenish-white, greenish-yellow, yellow or greenish; androecium dialystemonous with 4 stamens, anthers latrorse, extrorse or introrse with connective deltoid, cuneiform ou narrowly-triangular, bithecae; disk intrastaminal lobate or sulcate; style single, central, stigma 1, punctiform or slightly capitate. Berry, glabrous, purple or yellow (*Clematicissus simsiana*).

**Identification key of Vitaceae species occurring in the state of Ceará**

1. Leaves simple.
   2. Branches striate; flower bud rounded..... 10. *Cissus xerophila*
   2’. Branches not striate; flower bud conical or ellipsoid.
      3. Flower bud conical; tendril never branched.....8. *Cissus tinctoria*
      3’. Flower bud ellipsoid; tendril unbranched, rare bifurcate or absent.
         4. Leaves symmetric; stipules falcate.....9. *Cissus verticillata*
         4’. Leaves asymmetric; stipules triangular..... 3. *Cissus campestris*

1’. Leaves compound or compound and rarely simple 3-lobate in the same branch.
   5. Leaves 3-foliolate.
      6. Plant with trichomes malpighiaceous and glandular mixed with unbranched eglandular; petiole terete, glabrescent; central petiolule 5–7 mm long; flower bud ellipsoid; petals red outside, yellow inside .....4. *Cissus erosa*
      6’. Plant with trichomes unbranched, glandular and eglandular; petiole triangular or subtriangular, pubescent or glabrescent; central petiolule 2–3 mm or 10–20 mm long; flower bud conical; petals greenish-white, greenish-yellow, yellow or greenish on both sides.
         7. Branches 4-angular, winged or not.
            8. Branches winged; central petiolule 10–20 mm; berry botuliform or subpyriform . .....7. *Cissus sulcicaulis*
            8’. Branches not winged; central petiolule 2–3 mm; berry pyriform with scattered lenticels..... 5. *Cissus gongylodes*
         7’. Branches terete or 3-angular.
            9. Tendrils bifurcate; peduncles hispid; berry pyriform..... 1. *Cissus albida*
            9’. Tendrils unbranched; peduncles puberulent; berry globose..... .....6. *Cissus subrhomboidea*
   5’. Leaves digitate 5-foliolate, rarely simple 3-lobate, bi- or tripinnate.
      10. Plant with trichomes unbranched; leaves digitate 5-foliolate, rarely simple 3-lobate; berry globose .....11. *Clematicissus simsiana*
      10’. Plant with trichomes malpighiaceous; leaves bi- or tripinnate; berry botuliform..... .....2. *Cissus blanchetiana*

**1**. ***Cissus albida*** Cambess., Fl. Bras. Merid. (A. St.-Hil.). i. 344 (1828). Figs. 1a; 3a-d

Liana, trichomes unbranched, glandular or eglandular; branches terete or 3-angular, not striate, hispid. Tendrils bifurcate, hispid. Leaves compound, 3-foliolate; stipules ca. 5 mm long, falcate, hispid, ciliate; petioles 2.3–8 cm long, not winged, terete, canaliculate, hispid or hirsute; central petiolule 4–17 mm long, not winged, others 2–5 mm long, not winged, canaliculate, hispid; leaflets elliptic or ovate, central 3.2–8.5 × 2.3–6.4 cm, others 2.6–7 × 1.8–6.3 cm, base attenuate or rounded, apex acute, margin serrate, papery, puberulent to glabrescent or glabrous. Inflorescence 2.5–4 × 2–3.4 cm, umbelliform; peduncle 10–15 mm long, hispid, green; bracts 3–4 × 0.5 mm, triangular, glabrous, ciliate; pedicels 3–5 mm long, sericeous. Flower bud conical; calyx 1–1.5 × 2–2.5 mm, truncate at base, sparsely hispid; corolla in bud ca. 2 × 1.5 mm; petals greenish-white; anthers ca.1 mm long, latrorse, connective deltoid; disk 4-sulcate, concave at apex, with depression around the style; style ca. 1.5 mm long, terete; stigma slightly capitate. Berry 7–9 × 4–5 mm, pyriform, glabrous, purple.

**Examined material**: Canindé, Iguaçú, próximo ao Riacho das Pedras, 04°36'25"S, 39°24'08"W, 26.VI.2008, fl., *M.F. Moro & M.O.T. Menezes 492* (EAC). Capistrano, Serra de Baturité, Fazenda Araçanga, 27.VI.1996, fl. and fr., *J.B.L.P. Medeiros & L.W. Lima-Verde 108* (EAC). Crateús, RPPN Serra das Almas, 3.III.2003, fl., *R.C. Costa* 22 Probio (EAC). General Sampaio, RPPN Francy Nunes, 04°03'10"S, 39°27'15"W, 28.IV.2007, fl., *M.F. Moro et al. 58* (EAC). Jaguaribe, Maçiço do Pereiro, orla da mata, 05°53'26"S, 38°37'18"W, 12.IV.2011, fl., *A.M. Miranda & K. Manso 6298* (ALCB, EAC, HUEFS). Novo Oriente, Baixa Fria, Planalto da Ibiapaba, 9.III.1991, fl. and fr., *F.S. Araújo 358* (EAC, IPA).

*Cissus albida* is a well-defined species and has peculiar characteristics as compound leaves, 3-foliolate; stipules falcate, and inflorescence umbelliform. It is similar to *C. subrhomboidea* in branches terete or 3-angular, but differs in tendrils bifurcate (*vs*. unbranched), peduncles hispid (*vs*. puberulent), and fruit pyriform (*vs*. globose).

The species is endemic to Brazil, occurring at elevations between 400–1,800 masl (Lombardi 2000), in the states of Piauí, Ceará, Pernambuco, Bahia, Minas Gerais, Goiás, and Rio de Janeiro, in the Caatinga, Cerrado, and Atlantic Forest phytogeographic domains (Picanço & Lombardi 2020). The species has been recorded in six municipalities in Ceará in Stepic Savanna vegetation known as Caatinga and Carrasco (Fig. 1a).

The species was flowering in March, April, and June; and fruiting in March and June.

**2. *Cissus blanchetiana*** Planch., Monogr. Phan. [A.DC. & C.DC.] 5(2): 556 (1887).

Figs. 1a; 2a; 3e-f

Liana, trichomes malpighiaceous, eglandular; branches terete, not striate, glabrescent. Tendrils bifurcate, hispid. Leaves compound, bi- or tripinnate; stipules ca. 5 mm long, deltoid, pubescent, ciliate; petioles ca. 5 cm long, terete, canaliculate, glabrous; petiolule 1–5 cm long, not winged, canaliculate, glabrous; leaflets simple or bifoliolate, elliptic, leaflets of first order 5–6 × 2.8–3.2 cm, 2–3 pairs by leaf, rachis 2.6–5 cm long, leaflets of second order 2.2–2.5 × 1.5–1.9 cm, base rounded, apex acute, margin serrate, papery, glabrous. Inflorescences 2–3.1 × 3–4.3 cm, umbelliform; peduncles ca. 3 cm long, glabrous, green; bracts ca. 1.5 × 1 mm, triangular, glabrous, ciliate; pedicels 2–4 mm long, sericeous. Flower buds conical; calyx 1.5–2 × 2–3 mm, rounded at base, glabrescent; corolla in bud 2–3 × 1.5 mm; petals greenish-yellow; anthers ca. 1 mm long, extrorse, connective deltoid; disk slightly concave at apex; style ca. 1 mm long, conic; stigma slightly capitate. Berry 11–20 × 9–12 mm, botuliform, glabrous, purple.

**Examined material**: Meruoca, lagedo da Serra da Meruoca, 13.III.1958, fr., *T.N. Guedes 550* (IAN). Pacoti, Pico Alto, Serra de Baturité, 11.XI.1998, fl., *E.B. Souza et al.* (EAC 28262).

**Additional examined material**: BRAZIL. PARAÍBA: Pilões, Serra do Espinho, 06º51'57"S, 35º34'57"W, 7.III.2012, fl., *M.L. Guedes et al. 19472* (ALCB, HUEFS). PERNAMBUCO: Altinho, Sítio Serrote, Inselbergue "Pedra do Padre", 13.V.2012, fr., *M. Sobral-Leite et al. 1271* (UFP).

The species differs from the others occurring in Ceará by having compound leaves, bi- or tripinnate; trichomes malpighiaceous and eglandular; tendrils bifurcate; flowers with petals greenish-yellow and berry botuliform.

*Cissus blanchetiana* is endemic to Brazil and has been recorded in the states of Bahia, Ceará, Paraíba, Pernambuco, Sergipe, Minas Gerais, Espírito Santo, in the Caatinga and Atlantic Forest phytogeographic domains (Picanço & Lombardi 2020). Its distribution in Ceará is restricted, having been recorded in only two municipalities in Dense Ombrophilous Forest (Fig. 1a).

The species was flowering in November and fruiting in March.

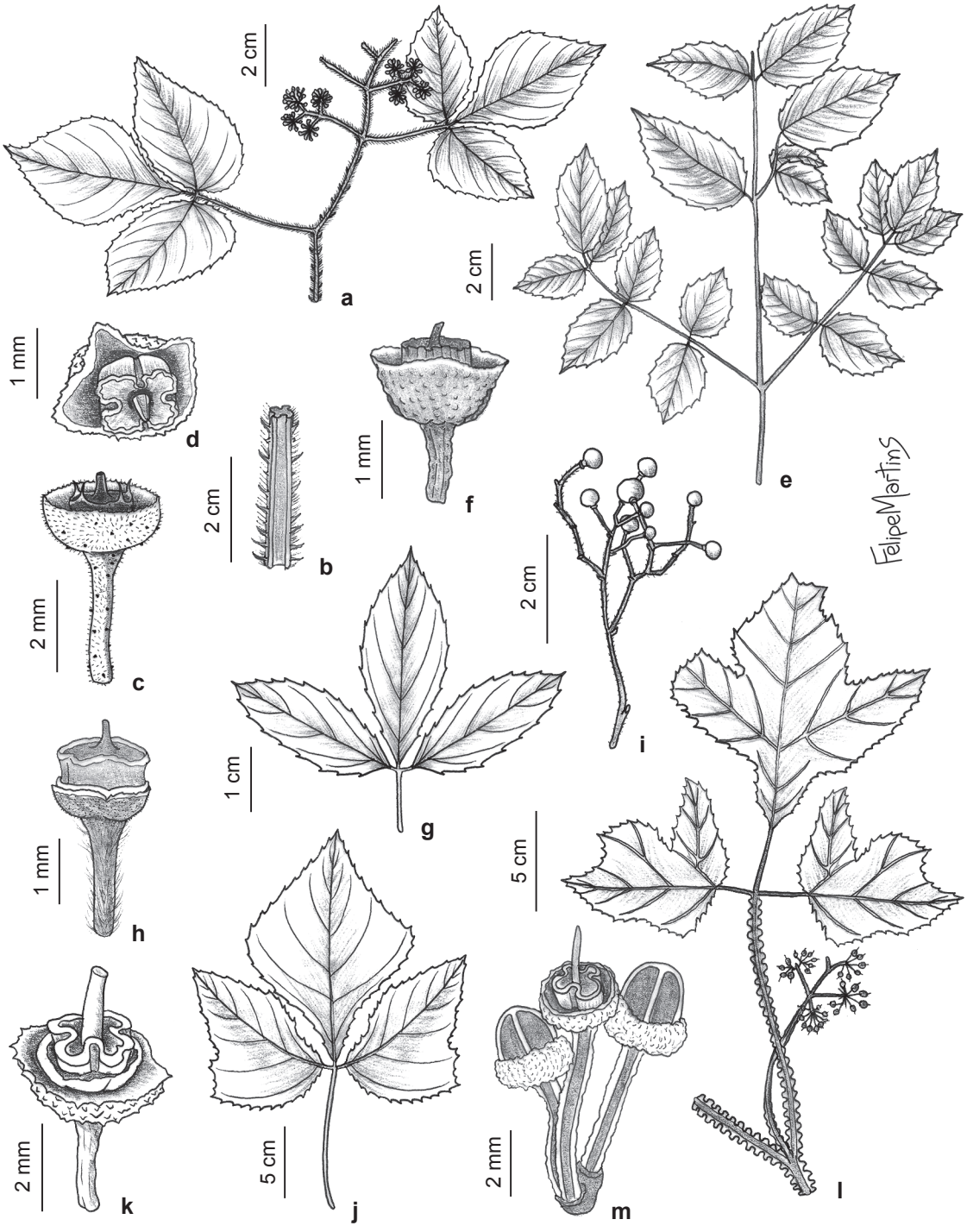


**Figure 3** – a-d. *Cissus albida* – a. detail of a branch bearing the inflorescence; b. detail of the branch highlighting the indumentum; c. open flower; d. top view of flower, highlighting the disk. e-f. *Cissus blanchetiana* – e. branch with compound leaves; f. open flower highlighting the disk and style. g-i. *Cissus erosa* – g. young leaf; h. open flower highlighting the disk; i. infrutescence. j-k. *Cissus gongylodes* – j. leaf; k. open flower highlighting the disk and style. l-m. *Cissus sulcicaulis* – l. detail of a branch, highlighting the winged petioles; m. flower buds and open flower highlighting the disk and style. [a-d. *Costa* (EAC 35008); e-f. *Souza et al.* (EAC 28262); g-i. *Loiola & André Neto 2834*; j-k. *Loiola et al. 1593*].

**3. *Cissus campestris*** Planch., Monogr. Phan. [A.DC. & C.DC.] 5(2): 536 (1887). Fig. 1a

Liana, trichomes unbranched, eglandular; branches terete or angular, not striate, puberulent or glabrous. Tendrils unbranched, rare bifurcate or absent, puberulent. Leaves simple, asymmetric; stipules ca. 2 mm long, triangular, glabrous, ciliate; petioles 2–8 mm, not winged, canaliculate, puberulent or glabrous; blade ca. 7.6 × 3 cm, subtrullate in the vegetative branches, subelliptic in the reproductive branches, base rounded, apex acute, rounded, or acuminate, margin denticulate, papery, glabrous on both faces. Inflorescences 1.6–4 × 1.2–2.4 cm, umbelliform; peduncles ca. 2–2.8 cm long, puberulent, green; bracts ca. 2 × 1 mm, deltoid, glabrous, ciliate; pedicels 1–2 mm long, glabrous. Flower bud ellipsoid; calyx 0.5–1 × 1.5–2 mm, rounded at base, glabrous; corolla in bud 1–2 × 1 mm; petals greenish-yellow; anthers ca. 1 mm long, latrorse, connective cuneiform; disk slightly concave at apex; style ca. 1 mm long, terete; stigma punctiform. Berry 4–7 × 3–4 mm, globose, glabrous, purple.

**Examined material**: Crato, fl., *Fr. Alemão & M. de Cysneiros 259* (P). Guaraciaba do Norte, Serra da Ibiapaba, 29.I.1968, fl., *D. Andrade-Lima 68-5210* (IPA). Madalena, Gruta Casa de Pedra, 04°44'41"S, 39°42'11"W, 10.VI.2018, fl. and fr., *E.D. Lozano et al. 4185* (MBM).

**Additional examined material**: BRAZIL. BAHIA: Riachão das Neves, estrada para o Aterro Sanitário, 13º46'49"S, 44º54'39"W, 6.IV.2005, fr., *J.G. Carvalho-Sobrinho et al. 455* (HUEFS).

*Cissus campestris* is characterized by leaves asymmetric, papery, glabrous on both faces, branches not striate and bracts deltoid. It is similar to *C. verticillata* in simple leaves, tendrils unbranched or bifurcate (sometimes absent in *C. campestris*), inflorescences umbelliform, flower buds ellipsoid, anthers latrorse, and berry globose, but differs in blade subtrullate on the vegetative branches, subelliptic on reproductive branches (*vs*. blade ovate, wide ovate to cordiform) and stipule triangular (*vs*. falcate).

*Cissus campestris* is widely distributed in northern, northeastern, southern, and midwestern Brazil, and in Paraguay (Lombardi 2000; Picanço & Lombardi 2020). In the northeastern region it was recorded only in Bahia and Ceará. It has been recorded in three municipalities in Ceará, in Stepic Savanna and Savanna vegetation (Fig. 1a).

The species was flowering in January and June; and fruiting in June.

The fruits are edible when ripe, but not pleasant (Côrrea 1975).

**4. *Cissus erosa*** Rich., Actes Soc. Hist. Nat. Paris 1: 106 (1792). Figs. 1a; 2b; 3g-i

Liana, trichomes malpighiaceous and glandular mixed with unbranched, eglandular; branches angular, not striate, puberulent to glabrescent, scattered lenticels. Tendrils unbranched, glabrous. Leaves compound, 3-foliolate; stipules ca. 4 mm long, deltoid, puberulent, ciliate; petioles 0.7–1.2 cm long, slightly winged, terete, canaliculate, glabrescent; central petiolule 5–7 mm long, slightly winged, puberulent, others ca. 1 mm long, slightly winged, canaliculate, hispid; leaflets elliptic, obovate or oblanceolate, central 4–10.2 × 1.7–4.7 cm, others 3.5–8 × 1.2–4.8 cm, base cuneate to rounded, apex acute, margin denticulate or serrate, papery, puberulent to glabrescent or glabrous. Inflorescences 4–4.5 × 2–3 cm, umbelliform; peduncles 2–9 cm long, glabrescent, green; bracts ca. 2 × 1 mm, triangular, glabrous, on both faces, ciliate; pedicels 5–10 mm long, sericeous to glabrescent. Flower bud ellipsoid; calyx 0.5–1 × 1–1.5 mm, rounded at base, sericeous basally; corolla in bud 1.5–2 × 1–1.5 mm, petals red on the outside and yellow on the inside; anthers ca. 1 mm long, latrorse, connective deltoid; disk 4-lobed, slightly concave at apex; style terete, ca. 1 mm long; stigma slightly capitate. Berry 4–7 × 4–6 mm, globose, glabrous, purple.

**Examined material**: Barbalha, Chapada do Araripe, Sítio Santa Rita, 30.III.2000, fl., *E.B. Souza et al.* (EAC 29975). Brejo Santo, Chapada do Araripe, 07°26'38"S, 39°04'08"W, 11.I.2010, fl. and fr., *A.P. Fontana 6264* (HVASF). Caucaia, Parque Botânico do Ceará, 03°42'51"S, 38°38'30"W, 29.VI.2018, fl. and fr., *V.S. Sampaio et al. 465* (EAC). Crato, Flona do Araripe, 26.V.1999, fl. and fr., *L.W. Lima-Verde et al. 1463* (EAC, HUEFS). Caldas, 23.V.2011, fr., *E. Melo et al.* 9755 (HCDAL, HUEFS). Fortaleza, Barra do Ceará, 6.VII.1960, fl., *L. Almeida* (EAC 2012). Guaraciaba do Norte, Serra da Ibiapaba, 15.VI.1979, fl., *A. Fernandes et al. 6572* (EAC, UEC). Guaramiranga, 2.VI.2004, fl., *V. Gomes & A. Xavier 206* (EAC). Iguatu, RPPN Trussu, 06°19'52"S, 39°22'45"W, 21.V.2009, fl., *B.G. Lima 476* (MOSS). Meruoca, Serra da Meruoca, 03°36'57"S, 40°24'01"W, 27.IV.2019, fl., *M.I.B. Loiola & J. André Neto* 2834 (EAC). Pacoti, Volta do Rio, 04°09'56"S, 38°52'07"W, 29.IV.2017, fr., *J.C.M.S.M. Sobczak 493* (EAC). Santana do Cariri, estrada para o Crato, 07°13'52"S, 39°28'40"W, 25.V.2011, fr., *E. Melo 9863* (HUEFS). São Benedito, à margem da estrada da Serra de Ibiapaba, 6.I.1942, fl., *P. Bezerra 384* (EAC). São

Gonçalo do Amarante, Jardim Botânico, 03°36'26"S, 38°58'05"W, 1.V.2011, fl., *A.S.F. Castro 2476* (EAC). Tianguá, entrada para o Sítio do Bosco, 03°39'19"S, 40°59'17"W, 27.IV.2012, fl., *M.I.B. Loiola et al. 1603* (EAC). Ubajara, 03°50'43"S, 40°54'49"W, 26.IV.2012, fl. and fr., *M.I.B. Loiola et al. 1535* (EAC).

*Cissus erosa* is the only species recorded for Ceará with compound 3-foliolate leaves and petals red on the outside and yellow on the inside. The species is also characterized by trichomes malpighiaceous and glandular mixed with unbranched, eglandular; branches angular, not striate, puberulent to glabrescent, with scattered lenticels.

*Cissus erosa* is widely distributed from Mexico to South America and in the Caribbean region (Lombardi 2000). It has been reported in all Brazilian states (except Santa Catarina and Rio Grande do Sul), in the Amazon, Caatinga, Cerrado, Atlantic Forest, and Pantanal phytogeographic domains (Picanço & Lombardi 2020). It has been collected in 15 municipalities in Ceará in Semideciduous Forest, Ombrophilous Dense Forest, Savanna, Stepic Savanna, Forested Savanna, and the Vegetation Complex of the Coastal Zone (Fig. 1a).

The species was flowering from January to July, except in February; fruiting in January, and from April to June.

**5. *Cissus gongylodes*** (Baker) Burch. & C.DC. *ex* Planch., Monogr. Phan. [A.DC. & C.DC.] 5(2): 550 (1887). Figs. 1a; 3j-k

Liana, trichomes unbranched, glandular and eglandular; branches not winged, 4-angular, thick, not striate, glabrescent, scattered lenticels. Tendrils bifurcate, glabrous. Leaves compound, 3-foliolate; stipules ca. 1 mm long, deltoid, glabrous, ciliate; petioles 8–12.5 cm long, winged, subtriangular, canaliculate, glabrous; central petiolule 2–3.5 cm long, winged, puberulent, others ca. 2 cm long, slightly winged, canaliculate, puberulent; leaflets suboblong, central 9.3–14.5 × 8–14 cm, others 8.2–13.5 × 6.5–9.7 cm, base attenuate, apex acute, margin denticulate, papery, puberulent or glabrous adaxially and puberulent abaxially. Inflorescences 3–4 × 4–5.5 cm, umbelliform; peduncles 1.8–2.5 cm long, puberulent; bracts ca. 4–6 × 2–3 mm, triangular, glabrous, ciliate; pedicels 3–6.5 mm long, puberulent. Flower bud conical; calyx 1.5–2 × 2–3 mm, rounded at base, glabrous; corolla in bud ca. 1.5 × 2 mm; petals greenish-white; anthers 0.8–1 mm long, extrorse, connective deltoid; disk cruciform, sulcate, concave at apex and depressive in the center; style terete, 1–2 mm long; stigma slightly capitate. Berry 9–11 × 6–7 mm, pyriform, scattered lenticels, glabrous, purple.

**Examined material**: Crateús, Serra das Almas, trilha das Arapucas, 26.V.2005, fl. and fr., *A.A. Soares & I.O. Barros* (EAC 35589). Maranguape, Serra de Maranguape, 22.VII.1994, fl., *A.S.F. Castro 21* (EAC). Pacoti, Serra de Baturité, Sítio Cocão, 17.VI.1989, fr., *M.A. Figueiredo* (EAC 17028). Reriutaba, Campo Lindo, 04°08'30"S, 40°34'55"W, 26.VII.2009, fr., *A.S.F. Castro 2210* (EAC).

*Cissus gongylodes* is characterized by branches not winged and not striate, glabrescent, with scattered lenticels. It is similar to *C. sulcicaulis* in trichomes unbranched, glandular and eglandular; branches 4-angular; tendrils bifurcate and leaves 3-foliolate. It differs mainly by having anthers extrorse (*vs*. latrorse), and the berry pyriform with scattered lenticels (*vs.* berry botuliform or subpyriform).

*Cissus gongylodes* is a South American species, occurring in Colombia, Venezuela, Peru, Brazil, and Bolivia (Lombardi 2000). It is widely distributed in Brazil, occurring in all of the Brazilian geopolitical regions and in the Amazon, Caatinga, Cerrado, Atlantic Forest, and Pantanal phytogeographical domains (Picanço & Lombardi 2020). The species has been recorded in four municipalities in Ceará, in Semi-deciduous Forest and Stepic Savanna vegetation (Fig. 1a).

The species was flowering in April, May, and July; fruiting from May to July.

The species is ornamental (Lombardi 2000) and its fruits are edible (Phillips 1991).

**6. *Cissus subrhomboidea*** Planch., Monogr. Phan. [A.DC. & C.DC.] 5(2): 547 (1887). Figs. 1a; 2c

Liana, trichomes unbranched, glandular and eglandular; branches terete or 3-angular, not striate, glabrescent. Tendrils unbranched, glabrous. Leaves compound, 3-foliolate; stipules ca. 3 mm long, deltoid, puberulent, ciliate; petioles 5–5.6 cm long, not winged, canaliculate, slightly pubescent; central petiolule winged, ca. 4 mm long, puberulent, others slightly winged, ca. 2 mm long, tomentose; leaflets subovate, central 3.5–7 × 2.5–4.3 cm, others 2.6–4 × 1.7–3 cm, base attenuate, apex acute, margin denticulate, papery, puberulent adaxially, tomentose abaxially.

Inflorescences 3.4–4 × 2.5–3 cm, umbelliform; peduncles 4–10 mm long, puberulent; bracts ca. 2 × 1 mm, triangular, puberulent, ciliate; pedicels 5–7 mm long, puberulent. Flower bud conical; calyx ca. 0.5 × 1 mm, basally truncate, fleshy, puberulent; corolla in bud ca. 2 × 1 mm, petals green to yellow; anthers ca. 1mm, extrorse, connective deltoid; disk cruciform, concave at apex; style ca. 1 mm long, terete; stigma punctiform. Berry 8–9 × 9 mm, globose, glabrous, purple.

**Examined material**: Guaramiranga, Pico Alto, 20.VII.2004, fr., *E.R. Silveira* (EAC 34293).

**Additional material examined**: BRAZIL. MARANHÃO: Lorêto, "Ilha Balsas" region between the Balsas & Parnaiba Rivers, ca. 40 km S of Loreto, between the two branches of Riacho das Trairas, 10.II.1970, fl., *G. Eiten & L.T. Eiten* 10538 (US).

*Cissus subrhomboidea* is characterized by central petiolule winged and others slightly winged and stipules deltoid, puberulent and ciliate. Is similar to *C. albida* by having branches terete or 3-angular and leaves 3-foliolate but differs in tendrils unbranched (*vs*. bifurcate); peduncles puberulent (*vs*. hispid), and berry globose (*vs*. pyriform).

*Cissus subrhomboidea* is distributed in Brazil and Paraguay (Lombardi 2000). In Brazil, the species is widely distributed, but has not been recorded in the southern region (Picanço & Lombardi 2020). It was collected in only one county in Ceará, in Ombrophilous Dense Forest vegetation (Fig. 1a).

The species was fruiting in July.

**7. *Cissus sulcicaulis*** Planch., Monogr. Phan. [A.DC. & C.DC.] 5(2): 547 (1887). Figs. 1b; 2d; 3l-m

Liana, trichomes unbranched, glandular and eglandular; branches winged, 4-angular, not striate, sparsely puberulent. Tendrils bifurcate, glabrous. Leaves compound, 3-foliolate; stipules ca. 10 mm long, deltoid, puberulent, ciliate; petioles 6.2–9.8 cm long, winged, triangular, canaliculate, winged, sparsely pubescent; central petiolule 10–20 mm long, slightly winged, others 5–7 mm long, slightly winged, puberulent; leaflets rhombic or elliptic, central 6.4–11.5 × 5–12.3 cm, others 5–9.5 × 3–4.7 cm, base attenuate, apex acute, margin denticulate or lobed, papery, hispid adaxially, hispid to glabrescent abaxially. Inflorescences 3.8–4 × 2.8–3 cm, umbelliform; peduncles 1.5–2 cm long, puberulent; bracts 1–3 × 0.5–1 mm, triangular, puberulent, ciliate; pedicels 2–4 mm long, puberulent. Flower bud conical; calyx ca. 1.5 × 2.5 mm, truncate at base, puberulent; corolla in bud ca. 2 × 1.5 mm, petals greenish-yellow, glabrous, papillose; anthers ca. 1 mm long, latrorse, connective deltoid; disk cruciform, sulcate, concave at apex and depressive in the center; style ca. 1 mm long, terete; stigma punctiform. Berry 6–11 × 4–6 mm, botuliform to pyriform, glabrous, purple.

**Examined material**: Crateús, Grajáu, fl., *A.A. Soares 55* (EAC). General Sampaio, RPPN Elias Andrade, 04°03'10"S, 39°27'15"W, 3.V.2011, fl., *E.V. Salgado* (EAC 49272). Jaguaribe, Maciço do Pereiro, 05°53'26"S, 38°37'18"W, 12.IV.2011, fl., *A.M. Miranda & K. Manso 6298* (HST). Madalena, Riacho Teotônio, 04°45'19"S, 39°41'57"W, 11.VI.2018, fl., *E.D. Lozano et al. 4207* (MBM). Meruoca, Maciço da Meruoca, Sítio Santo Inácio, 03°32'30"S, 40°27'18"W, 11.V.2015, fl. and fr., *J.E.M. Nascimento 245* (EAC). Tianguá, estrada entre Tianguá e Ubajara, 03°47'30"S, 40°58'38"W, 7.VI.2012, fl. and fr., *M.I.B. Loiola et al. 1904* (EAC). Ubajara, entrada do Parque Nacional de Ubajara, 03°50'17"S, 40°53'53"W, 26.IV.2012, fl., *M.I.B. Loiola et al. 1593* (EAC).

**Additional material examined**: BRAZIL. MARANHÃO: Lorêto, "Ilha de Balsas" region, between the rios Balsas and Parnaiba, about 30 km S of Loreto, ca. 6 km S of main of Fazenda Sao Raimundo, trail from "Veados" to São Raimundo, 5.IV.1962, fl., *G. Eiten & L.T. Eiten 4059* (US).

*Cissus sulcicaulis* is a very distinct species in the study area and is characterized by having branches 4-angular, winged, leaflets rhombic or elliptic, and berry botuliform or subpyriform.

*Cissus sulcicaulis* is a South American species occurring in Brazil, Bolivia, Paraguay, and Argentina (Lombardi 2000). In Brazil, it has been recorded in the Amazon, Caatinga, Cerrado and Atlantic Forest phytogeographical domains (Picanço & Lombardi 2020). It is known from six municipalities in Ceará, in Stepic Savanna and Semi-deciduous Forest vegetation (Fig. 1b).

The species was flowering from April to June and fruit in May. The leaflets are cooked to treat edema and rheumatism; its fruits are acidic, but edible (Côrrea 1931). The species vernacular name is *roma*.

**8. *Cissus tinctoria*** Martius in Spix & Martius, Reise Bras. 1: 368 (1823). Figs. 1b; 2e-f; 4a-c

Liana, trichomes unbranched, eglandular; branches terete, not striate, puberulent to glabrescent, scattered lenticels. Tendrils never branched, glabrous. Leaves simple, symmetric; stipules ca. 5 mm long, triangular, glabrous, ciliate; petioles 2.7–

4.5 cm long, not winged, canaliculate, puberulent; blade 7–7.7 × 4.8–6 cm, oblong to cordiform, base cordate or subcordate, apex acuminate, margin denticulate, membranaceous, glabrous adaxially, puberulent abaxially. Inflorescences 5–7.5 × 4.5–5.2 cm, umbelliform; peduncles 2.4–3.9 cm long, puberulent; bracts ca. 1 mm long, triangular, ciliate, puberulent; pedicels 4–5 mm long, glabrous. Flower bud conical; calyx ca. 1 × 2 mm, truncate at base, glabrous; corolla in bud ca. 2 × 1.5 mm, petals greenish-yellow, glabrous; anthers ca. 1 mm long, latrorse, connective cuneiform; disk 4-sulcate, concave at apex; style ca. 1 mm long, terete; stigma punctiform. Berry 3.5–5 × 4–5 mm, globose, glabrous, purple.

**Examined material**: Barbalha, Riacho do Meio, 07°21'13"S, 39°19'13"W, 28.IV.2009, fl. and fr., *J.R. Maciel 1032* (HVASF). Crateús, RPPN Serra das Almas, 7.V.2002, fr., *F.S. Araújo & J.R. Lima 1427* (EAC, HUEFS). Canindé, Fazenda Imburanas da Volta, 04°21'32"S, 39°18'42"W, 19.V.2014, fl., *A.S.F. Castro 2807* (EAC). Caucaia, Parque Botânico do Ceará, 22.V.1998, fl., *M.S. Lopes* (EAC 26483). Frecheirinha, Palmeira, 03°46'58"S, 40°52'37"W, 24.IV.2014, fl. and fr., *M.I.B. Loiola 2270* (EAC). Jaguaribe, Maciço do Pereiro, 05°53'26"S, 38°37'18"W, 11.IV.2011, fl. and fr., *A.M. Miranda & K. Manso 6289* (ALCB, HST). Maranguape, Serra da Aratanha, Sítio São José, 9.V.1941, fl., *P. Bezerra* (EAC 253). Mauriti, São Miguel, 07°18'09"S, 38°39'32"W, 5.V.2010, fl., *A.P. Fontana 6621* (HVASF). Morada Nova, Fazenda Serraria, Manga do Cedro, 23.IV.1997, fl., *M.A. Figueiredo* (EAC 25385). Redenção, Fazenda Piroás, 04°13'33"S, 38°43'50"W, 17.III.2018, fl. and fr., *J.C.M.S.M. Sobczak 769* (EAC). Santa Quitéria, Fazenda Itatiaia, 26.IV.1984, fl., *A. Fernandes et al*. (EAC 12515). São Gonçalo do Amarante, Estação Ecológica do Pecém, 03°34'00"S, 38°49'00"W, 22.IV.2000, fl., *H. Magalhães 189* (EAC).

*Cissus tinctoria* is characterized by the presence of leaves oblong to cordiform with base cordate or subcordate and tendrils never branched. It is similar to *C. campestris* and *C. verticillata* by having simple leaves and branches terete not striate, and can be distinguished from both species by flower buds conical (*vs*. ellipsoid).

The species is distributed in Brazil and Bolivia (Lombardi 2000). It occurs in the northern, northeastern, southeastern, and midwestern geopolitical regions of Brazil in the Amazonia, Caatinga, Cerrado, and Atlantic Forest phytogeographic domains (Picanço & Lombardi 2020). It has been recorded in 12 municipalities in Ceará, in Semi-deciduous Forest, Stepic Savanna, and the Vegetation Complex of the Coastal Zone (Fig. 1b).

The species was flowering and fruiting from March to May, and the species vernacular name is *insulina*.

**9. *Cissus verticillata*** (L.) Nicolson & C.E.Jarvis, Taxon 33(4): 727 (1984).

Figs. 1b; 2g-i; 4d-e

Liana, trichomes unbranched, eglandular; branches terete, not striate, pubescent to glabrescent. Tendrils unbranched or rare bifurcate, glabrous. Leaves simple, symetric; stipules ca. 2 mm long, falcate, pubescent, slightly ciliate; petioles 1–2.5 cm long, not winged, canaliculate, pubescent or glabrous; blade 2.7–8.5 × 1.2–5.1 cm, ovate, wide ovate to cordiform, base cordate or truncate, apex rounded or acuminate, margin denticulate, papery, glabrous. Inflorescences 2–4.5 × 1.1–3 cm, umbelliform; peduncles 1.3–3 cm long, pubescent or glabrous; bracts ca. 2 mm long, triangular, pubescent or glabrous, ciliate, usually caducous; pedicels 3–5 mm long, glabrous. Flower bud ellipsoid; calyx ca. 1 × 2 mm, truncate at base, glabrous; corolla in bud 1.5–2 × 1 mm; petals greenish-yellow, glabrous; anthers ca. 1 mm long., latrorse, connective cuneiform; disk slightly concave at apex; style ca. 1 mm long, terete; stigma slightly capitate. Berry ca. 5 × 5 mm, globose, glabrous, purple.

**Examined material**: Aiuaba, Estação Ecológica de Aiuaba, 06°36'01"S, 40°07'15"W, 10.XII.2013, fl., *J.R. Lemos & P. Matias* (EAC 38370). Aquiraz, Dunas próximo ao Rio Pacoti, 9.VII.2005, fl. and fr., *A.S.F. Castro 1582* (EAC). Barbalha, Macaúba, 07°18'40"S, 39°18'15"W, 2.VIII.2012, fl., *S. Zank 1794* (EAFM). Cariri, fl., *F. Freire Allemão & M. Cysneiros 259* (R). Fortaleza, Campus do Pici, 03°43'02"S, 38°32'35"W, 20.X.2011, fl. and fr, *F. Monte & Bruno* (EAC 49900). Groaíras, Marrecas, 03°53'52"S, 40°24'05"W, 7.IV.2017, fl., *E.B. Souza et al. 4548* (EAC, HUEFS, HUVA). Ibiapina, Sítio Santa Tereza, 29.V.1996, fl., *H. Ferreira* (EAC 24751). Iguatu, Rua Evaldo Gouvêia, 06°21'34"S, 39°17'55"W, 12.XII.2016, fl., *M.A.M Bandeira* (EAC 60145). Meruoca, Serra da Meruoca, 03°36'57"S, 40°24'01"W, 27.IV.2019, fl., *M.I.B. Loiola & J. André Neto 2836* (EAC). Pacoti, Volta do Rio, 04°09'50"S, 38°52'09"W, 30.IV.2017, fr., *J.C.M.S.M. Sobczak 590* (EAC). Quixeré, Fazenda Mato Alto, 12.VI.1996, fr., *M.A. Figueiredo et al. 618* (EAC, IPA). Russas, Comunidade Lagoa dos Cavalos, Lote da Telma, 04°57'38"S, 39°04'02"W, 10.XII.2018, fl. and fr., *L.Q.V. Braga & Neto* (EAC 62453). São Gonçalo do Amarante, Varjota, Pecém, 03°36'26"S, 38°58'05"W, 15.V.2011, fl., *A.S.F. Castro 2490* (EAC). Sobral, Distrito de Taperuaba, Refúgio de Vida Silvestre Pedra da Andorinha, 04°04'05"S, 40°00'23"W, 8.XI.2017, fl.

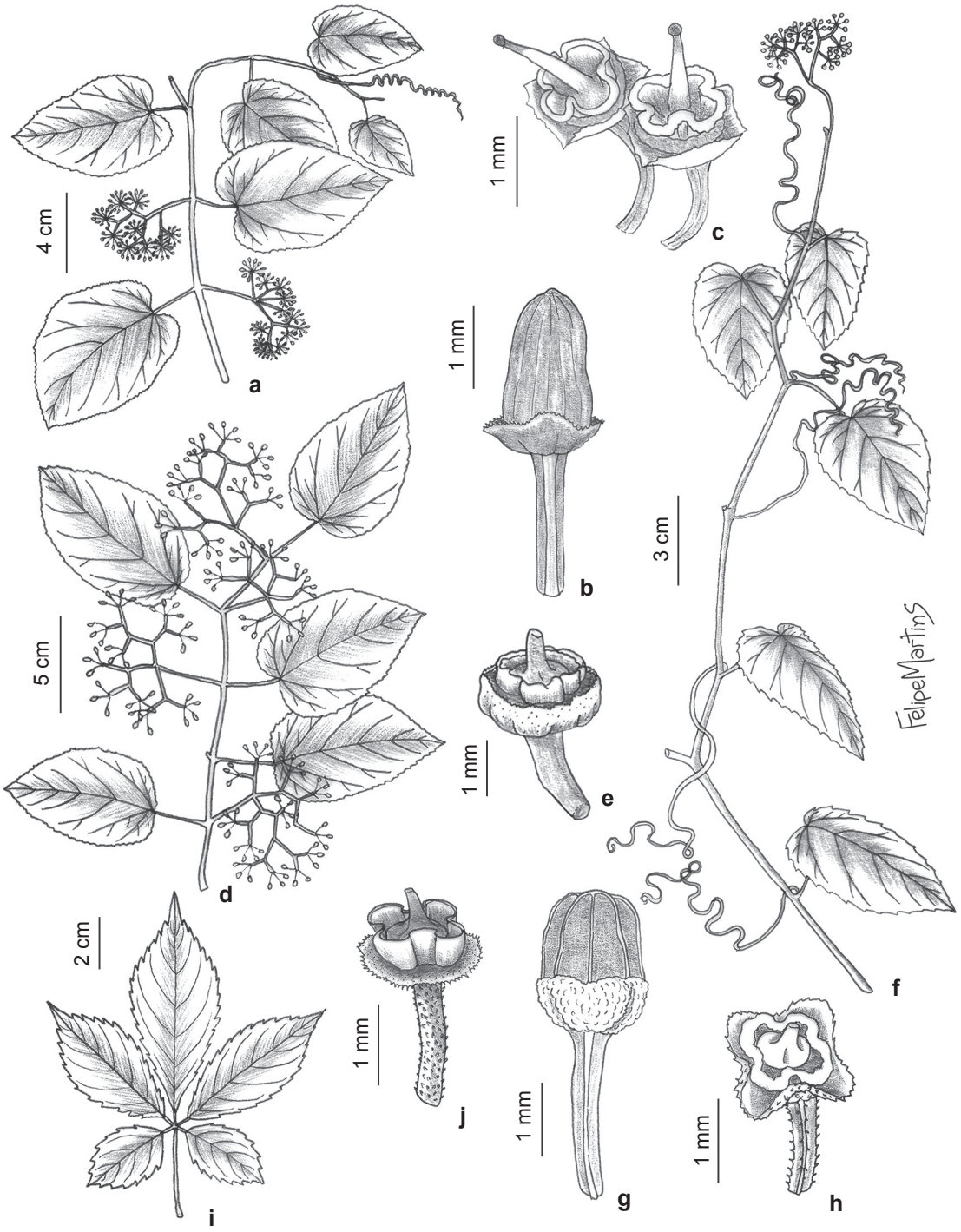


**Figure 4** – a-c. *Cissus tinctoria* – a. reproductive branch; b. flower bud; c. open flowers highlighting the disk. d-e. *Cissus verticillata* – d. reproductive branch; e. open flower highlighting the disk and style. f-h. *Cissus xerophila* – f. reproductive branch; g. flower bud; h. top view of open flower. i-j. *Clematicissus simsiana* – i. leaf; j. open flower highlighting the disk. [a-c. *Sobczak 769*; d-e. *Monte & Bruno* (EAC 49900); f-h. *Fernandes & Nunes* (EAC 21399); i-j. *Araújo 113*].

and fr., *E.B. Souza et al. 4832* (EAC, HUEFS, HUVA). Quixadá, horto de plantas medicinais IFCE - Campus Quixadá, 04°58'17"S, 39°00'55"W, 27.VI.2013, fl. and fr., *J.M. Negreiro 14* (EAC). Ubajara, Sítio Jaburu, 03°52'05"S, 41°05'56"W, 26.VIII.2013, fl., *A.T.A.C. Pontes & A.G.L. Terra B02* (EAC). Viçosa do Ceará, Mata Fria, 24.V.2000, fr., *A.S.F. Castro 840* (EAC).

*Cissus verticillata* can be recognized by having leaves simple and symmetric, stipules falcate, and petioles 1–2.5 cm long. Four subspecies are recognized for this taxon, but only *C. verticillata* subp. *verticillata* occurs in Brazil. For their morphological differences, refer to the comments in the descriptions of *C. campestris* and *C. tinctoria*.

*Cissus verticillata* is widely distributed in the neotropical region (Lombardi 2000) and is found in all Brazilian phytogeographic domains (Picanço & Lombardi 2020). It has been recorded in 17 municipalities in Ceará, in the Vegetation Complex of the Coastal Zone, Ombrophilous Dense Forest, and Stepic Savanna (Fig. 1b).

The species was flowering from April to August and from October to December; fruiting from April to July, and from October to December.

The species is used as an anti-inflammatory agent (Lombardi 2000), and the vernacular names are *insulina*, *cipó-de-fígado*, *parreira-brava*.

**10. *Cissus xerophila*** Lombardi, Brittonia 56(3): 288 (2004). Figs. 1b; 4f-h

Liana, trichomes unbranched, eglandular; branches terete, striate, pubescent or puberulent, densely lenticelate. Tendrils unbranched, glabrescent to glabrous. Leaves simple, symmetric; stipules ca. 5 mm long, subfalcate, pubescent, margin ciliate; petioles 6–7 mm long, not winged, terete, pubescent; blade 3.3–4.5 × 1.8–3.4 cm, cordiform, base cordate, apex acuminate, margin dentate, papery, puberulent. Inflorescence ca. 1.8 × 1.3 cm, cymes; peduncles ca. 7 mm long, pubescent; bracts ca. 2 mm long, triangular, pubescent, ciliate; pedicels ca. 1 mm long, pubescent. Flower bud rounded; calyx 0.8–1 × 1–1.5 mm, rounded at base, glabrous; corolla in bud 1–1.5 × 1 mm, greenish-yellow; anthers ca. 1 mm long, latrorse, connective deltoid; disk 4-lobate, slightly concave at apex; style ca. 1 mm long, terete; stigma slightly capitate. Berry ca. 4 × 3 mm, globose, glabrous, purple.

**Examined material**: Aracati, 27.IX.1994, fl. and fr., *A. Fernandes & E. Nunes* (EAC 21399).

**Additional material examined**: BRAZIL. MINAS GERAIS: Salto da Divisa, Fazenda Santana, 16º03'21"S, 40º01'59"W, 19.II.2003, fl., *J.A. Lomardi et al. 5077* (BHCB, NY).

*Cissus xerophila* is easily recognized in the study area, as it is the only one that presents simple leaves, branches terete, striate, and flower buds rounded.

*Cissus xerophila* is endemic to Brazil, with disjunct distributions in the states of Ceará, Minas Gerais and Rio de Janeiro (Picanço & Lombardi 2020), being registered in the first two states in the semi-arid domain. It has been recorded in only one municipality in Ceará, in the Vegetation Complex of the Coastal Zone (Fig. 1b).

The species was flowering and fruiting in September.

**11. *Clematicissus simsiana*** (Roem. & Schult.) Lombardi, Phytotaxa 227(3): 296 (2015). Figs. 1b; 2j-l; 4i-j

Liana, trichomes unbranched, eglandular; branches terete, not striate, glabrous. Tendrils unbranched, glabrous. Leaves compounds digitate, 5-foliolate or rarely simple, 3-lobate; stipules 2–2.5 mm long, deltoid, tomentose, ciliate; petioles 2.4–4.4 cm long, terete, not winged, canaliculate, tomentose; central petiolule 4–7 mm long, not winged, others 1–2.5 mm long, not winged, canaliculate, tomentose; leaflets elliptic, central 6.2–7.5 × 2.6–3.2 cm, others 2.5–5.5 × 1.3–2.3 cm, base cuneate, apex acute, margin serrate, membranaceous, pubescent on the veins adaxially, glabrous abaxially. Inflorescences 3–4.2 × 2.5–2.7 cm, umbelliform; peduncles 3.5–5 cm long, tomentose; bracts 1–1.5 mm long, triangular, puberulent, ciliate; pedicels 1–2 mm long, puberulent. Flower buds conical; calyx ca. 0.5 × 1.5 mm, glabrescent to glabrous, greenish-yellow; corolla in bud 1–1.5 × 1 mm; petals greenish-yellow or reddish; anthers ca. 1 mm long, introrse, connective narrowly-triangular; disk 4-lobed, apex flat-topped; style ca. 1 mm long, conic; stigma punctiform. Berry ca. 7 × 6 mm, globose, glabrous, yellow to purple.

**Examined material**: Caucaia, Serra do Juá, 03°44'10"S, 38°39'11"W, 3.II.2013, fr., *A.S.F. Castro 2683* (EAC). Crato, IX.1938, fl. and fr., *G. Gardner 1504* (IPA, K). General Sampaio, 8.VII.2005, fr., *J.R. Lemos 378* (HUEFS). Graça, Sítio Santa Clara, 03°57'43"S, 40°49'04"W, 5.II.2017, fl. and fr., *F.F. Araújo 113* (EAC, HUEFS, HUVA). Icó, Serra do Câmara, 16.IV.2005, fr., *E. Melo 3815* (HUEFS). Jaguaribe, Fazenda Mulung, 8.VI.1943, fl. and fr., *P. Bezerra 529* (EAC). Jati, VPR Ipê, 07°42'58"S, 39°00'24"W, 30.X.2014, fl., *A.P. Fontana 8742* (HUEFS, HTSA). Maranguape, Sítio São José, Serra da Aratanha, 21.XII.1939, fl., *P. Bezerra 93* (EAC). Meruoca, subida da serra, 20.X.1998, fl., *F.S.*

*Cavalcanti 431* (EAC). Pacoti, Sítio Santa Madalena, 9.X.1980, fl. and fr., *P. Martins & E. Nunes* (EAC 8975). Quixadá, Serra do Estevão, 28.IX.1992, fl., *L.P. Félix 5321* (EAC). Quixeramobim, 27.VIII.1992, *E.B. Souza* (EAC 20125). Quixeré, Fazendo Mato Alto, 17.IX.1996, fl. and fr., *E.L. Paula-Zárate & M.I.B. Loiola 305* (EAC). Ubajara, 03°49'52"S, 40°52'40"W, 24.IV.2014, fr., *M.I.B. Loiola 2267* (EAC).

*Clematicissus simsiana* is a very distinct species in the study area, being characterized by leaves compound, digitate, 5-foliolate or rarely simple, 3-lobate, stipules deltoid, tomentose; petals greenish-yellow, and berry globose.

*Clematicissus simsiana* is found in Brazil, Bolivia, Paraguay, and Argentina (Lombardi 2000). In Brazil, it occurs in the Caatinga, Cerrado, and Atlantic Forest phytogeographic domains (Picanço & Lombardi 2020). It occurs in 14 municipalities in Ceará, in Stepic Savanna, Ombrophilous Dense Forest, Semi-deciduous Seasonal Forest, and Lowland Semi-deciduous Forest vegetations (Fig. 1b).

The species was flowering in February, June, September, October, and December; fruiting in February, April, June, July, September and October. The species vernacular name is *calor-de-figo*.

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