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Original Paper

Flora of Ceará State, Brazil: Caryocaraceae, Hypericaceae, and Rhizophoraceae

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Abstract

We examined the diversity and distribution of Caryocaraceae, Hypericaceae, and Rhizophoraceae in Ceará State, Brazil. Floristic treatments were carried out based on comparative analyses of the morphological characters of specimens from several Brazilian herbaria (ALCB, EAC, HCDAL, HST, HUEFS, HVASF, IAN, MBM, MOSS, SP, UEC and UFMT), the scientific literature, and photographs of type collections. Each family is represented here by a single species. *Caryocar coriaceum* occurs predominantly in the southern portion of Ceará State in typical open (cerrado) and forested savannas (cerradão). *Vismia guianensis* is widely distributed and occurs in several vegetation types, but mainly ombrophilous forests and savannas. *Rhizophora mangle* has a narrow distribution range, being recorded in coastal vegetation with fluvial and/or lacustrine influences (mangrove swamps). All three species were recorded in designated Conservation Areas. An identification key for the species, morphological descriptions, commentaries on their conservation, habitats and phenologies, as well as photographs and illustrations are provided.

Key words: *Caatinga*, diversity, floristic, taxonomy.

Resumo

Este estudo detalha a diversidade e distribuição de Caryocaraceae, Hypericaceae e Rhizophoraceae ocorrentes no estado do Ceará. Um tratamento florístico foi realizado com base na análise de caracteres morfológicos de espécimes de diferentes herbários (ALCB, EAC, HCDAL, HST, HUEFS, HVASF, IAN, MBM, MOSS, SP, UEC e UFMT), bibliografias e fotos de coleções-tipos. Cada família está representada por uma espécie. *Caryocar coriaceum* ocorre predominantemente na porção sul do estado do Ceará na savana (cerrado) e savana florestada (cerradão). *Vismia guianensis* apresenta distribuição mais ampla ocorrendo em diferentes tipos de vegetação, mas, principalmente em floresta ombrófila (mata úmida) e savana. *Rhizophora mangle* é mais restrita ao litoral e foi registrada somente em vegetação sob influencia fluvial e/ou lacustre (manguezais). As três espécies foram registradas em Unidades de Conservação do Ceará. Chave de identificação das espécies, descrições morfológicas, comentários sobre conservação, habitat e fenologia, bem como fotos e ilustrações são fornecidos.

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

Introduction

Malpighiales is one of the richest orders of flowering plants, comprising 36 families and approximately 16,000 species distributed globally (Xi *et al*. 2012; APG IV 2016). Its representatives are important components of the plant diversity found in tropical forests, especially in the woody understory (Davis *et al*. 2005). The wide morphological diversity of the group, ranging from holoparasites with giant flowers (Rafflesiaceae) to trees in temperate regions, as well as herbs with tiny flowers, results in a challenging classification

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(Endress *et al*. 2013) of not always well established relationships (Davis & Chase 2004; Matthews & Endress 2008, 2011; Endress *et al.* 2013).

Most studies related to Malpighiales undertaken in Brazil have focused on their taxonomy and/or floristic surveys of different families, especially of Euphorbiaceae (Secco *et al.* 2012), Malpighiaceae (Almeida *et al*. 2018), Hypericaceae (Marinho *et al.* 2016; Martins *et al.* 2017; Martins & Shimizu 2018), and Passifloraceae (Costa *et al*. 2015; Costa & Melo 2016). Recent studies of Malpighiales for the Flora of the State of Ceará have focused on Erythroxylaceae (Cordeiro & Loiola 2018), Turneraceae (Rocha *et al*. 2018), Phyllanthaceae (Lima *et al*. 2020), Salicaceae (Nepomuceno *et al*. 2021), and Passifloraceae (Souza *et al*. 2021).

We present here floristic treatments of three families (Caryocaraceae, Hypericaceae, and Rhizophoraceae) as contributions to the project "Flora of Ceará: knowing to conserve". Caryocaraceae is represented in Brazil by 12 species of *Caryocar* L. and four of *Anthodiscus* G.Mey. (Flora do Brasil 2020). Hypericaceae comprises more than 50 species in Brazil, of which 19 are endemic, allocated in the genera *Vismia* Vand. and *Hypericum* L. (Vogel Ely *et al*. 2020; Flora do Brasil 2020). Rhizophoraceae is represented by ten species and four genera in Brazil: *Cassipourea* Aubl. (three spp.), *Paradrypetes* Kuhlm. (two spp.), *Rhizophora* L. (three spp.), and *Sterigmapetalum* Kuhlm. (two spp.) (Flora do Brasil 2020).

Although the Malpighiales families in this study are relevant to the flora of Ceará from ecological and economic perspectives, studies focusing on their representatives are scarce and rarely mentioned on floristic surveys (see Silva *et al.* 2012; Loiola *et al*. 2015, 2020; Silveira *et al*. 2020 a,b). We therefore present here a taxonomic survey of species of Caryocaraceae, Hypericaceae, and Rhizophoraceae (Malpighiales) found in Ceará to contribute to our general knowledge of the diversity of these plant families in that state, and to provide detailed information that can aid in recognizing them.

Material and Methods

The study was based on the analysis of collections deposited in the ALCB, EAC, HCDAL, HST, HUEFS, HVASF, IAN, MBM, MOSS, SP, UEC, and UFMT herbaria acronyms according to Thiers (2021, continuously updated), as well as the Sérgio Tavares Herbarium (HST) (non-indexed). Species identifications were based on morphological characters, comparative analysis of herbarium specimens, as well as images of type-collections, and were complemented with relevant bibliographies. The names of the species' authors follow the IPNI (2021). The species descriptions follow the terminology of Harris & Harris (2001).

Vegetation types cited are in accordance with Figueiredo (1997) and the Technical Manual of Brazilian Vegetation (IBGE 2012). A species distribution map was prepared indicating their occurrence by vegetation type, delimiting squares of 0.5° longitude × 0.5° latitude (following Rebouças *et al*. 2020). Specimens without indications of their original coordinates were georeferenced using the coordinates of the municipalities cited, using the "geoLoc" tool (CRIA 2020). Information on the vegetation type, popular names, and flowering and fruiting periods were obtained from the specimen labels.

Results and Discussion

Each family cited here is represented by a single species in Ceará State (Fig. 1). Caryocaraceae is represented by *Caryocar coriaceum* (Fig. 2a-c), a species largely restricted to the southern region of Ceará, occurring predominantly in savanna and forested savanna vegetations. Hypericaceae is represented only by *Vismia guianensis* (Fig. 2d-f). It is the taxon with the largest number of records in this study, occurring preferentially in ombrophilous and savanna forests. Rhizophoraceae is represented by *Rhizophora mangle* (Fig. 2g-i), a species occurring only in mangrove ecosystems. All species can be found in designated Conservation Areas in Ceará State, namely: the Araripe Plateau Environmental Protection Area (*Caryocar coriaceum*), the Rio Pacoti Environmental Protection Area (*Rhizophora mangle*), the Araripe-Apodi National Forest (*Caryocar coriaceum* and *Vismia guianensis*), the São Gonçalo do Amarante Botanical Garden (*Vismia guianensis*), and the Ubajara National Park (*Vismia guianensis*).

Taxonomic treatment

1. Caryocaraceae Szyszył.

Trees or rarely shrubs or subshrubs. Stipules 2–4, caducous or not. Leaves, petiolate, trifoliolate, opposite or alternate, the margins of the leaflets usually serrate, dentate or crenate or rarely entire, often with stipels at the base of leaflets. Inflorescences terminal, in racemes

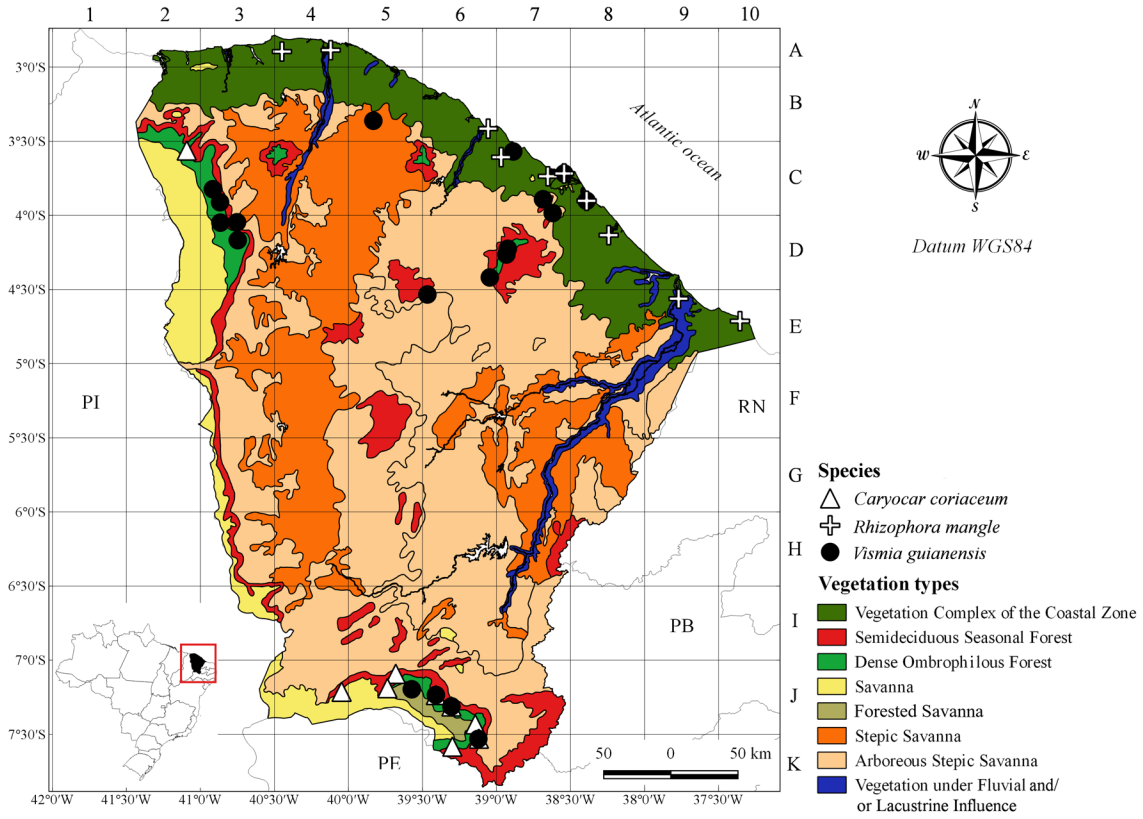

Figure 1 – Geographic distribution of Caryocaraceae, Hypericaceae, and Rhizophoraceae in Ceará State, Brazil.

(i.e., without a terminal flower) or botryoid (i.e., with a terminal flower). Flowers dichlamydeous, bisexual, actinomorphic; sepals 5(–6), imbricate, gamosepalous; petals 5(–6), imbricate, caducous, free, or rarely slightly connate at base, or connate at the apex to form a calyptra (*Anthodiscus*); stamens numerous (55–750), filaments frequently caducous; anthers rimose; nectary disc present or absent; ovary superior, 4–8(–20)–locular; one ovule per locule; styles 4–8(–20), filiform, stigma reduced. Fruit a drupe, indehiscent, mesocarp generally fleshy and oleaginous, endocarp rigid and ribbed or muricate, tuberculate or spinulose; seeds 1–8(–20), pyrenes uniseminate, usually reniform (Prance & Silva 1973; Prance & Pirani 2020).

Caryocaraceae comprises only two genera: *Anthodiscus* G. Mey with 18 species, and *Caryocar* L. with nine species (Stevens 2001, continuously updated). The family is exclusively neotropical, predominantly encountered in forest formations in the Amazon region. *Caryocar brasiliense* (occurring in all regions of Brazil) and *Caryocar coriaceum* (registered in the central-western and northeastern regions of that country), both popularly called "pequi" or "pequizeiro" (Flora do Brasil 2020), are the best known species of the genus as their seeds are surrounded by a yellowish aril widely used in Brazil cuisine (Souza & Lorenzi 2019).

1.1. *Caryocar coriaceum* Wittm., *Fl. bras.* (Martius) 12(1): 352 (1886). Figs. 1; 2a-c; 3a-c

Trees 4.5−12 m tall. Leaves compound, alternate; stipules caducous; petiole 3.1–4.5 cm long; terminal petiolule 4–5 mm long, lateral petiolules ca. 3 mm long; leaflets 4.2–6.1 × 3.5–4.2 cm, obovate to slightly elliptic, apex retuse or acute, base acute, margins serrate, coriaceous, glabrous, secondary veins on the abaxial surface prominent. Inflorescence 6–13 cm long, a raceme, subcylindrical to quadrangular. Flowers pentamerous, bisexual, dichlamydeous; sepals 8–9 × 2–4 mm, rounded, green; petals 2–2.5 × 1.5–2 cm, rounded, yellowish-white; stamens 3–3.5 cm long, numerous, anthers yellow. Ovary 4–4.5 mm long, superior, globose, with 1–4 locules.

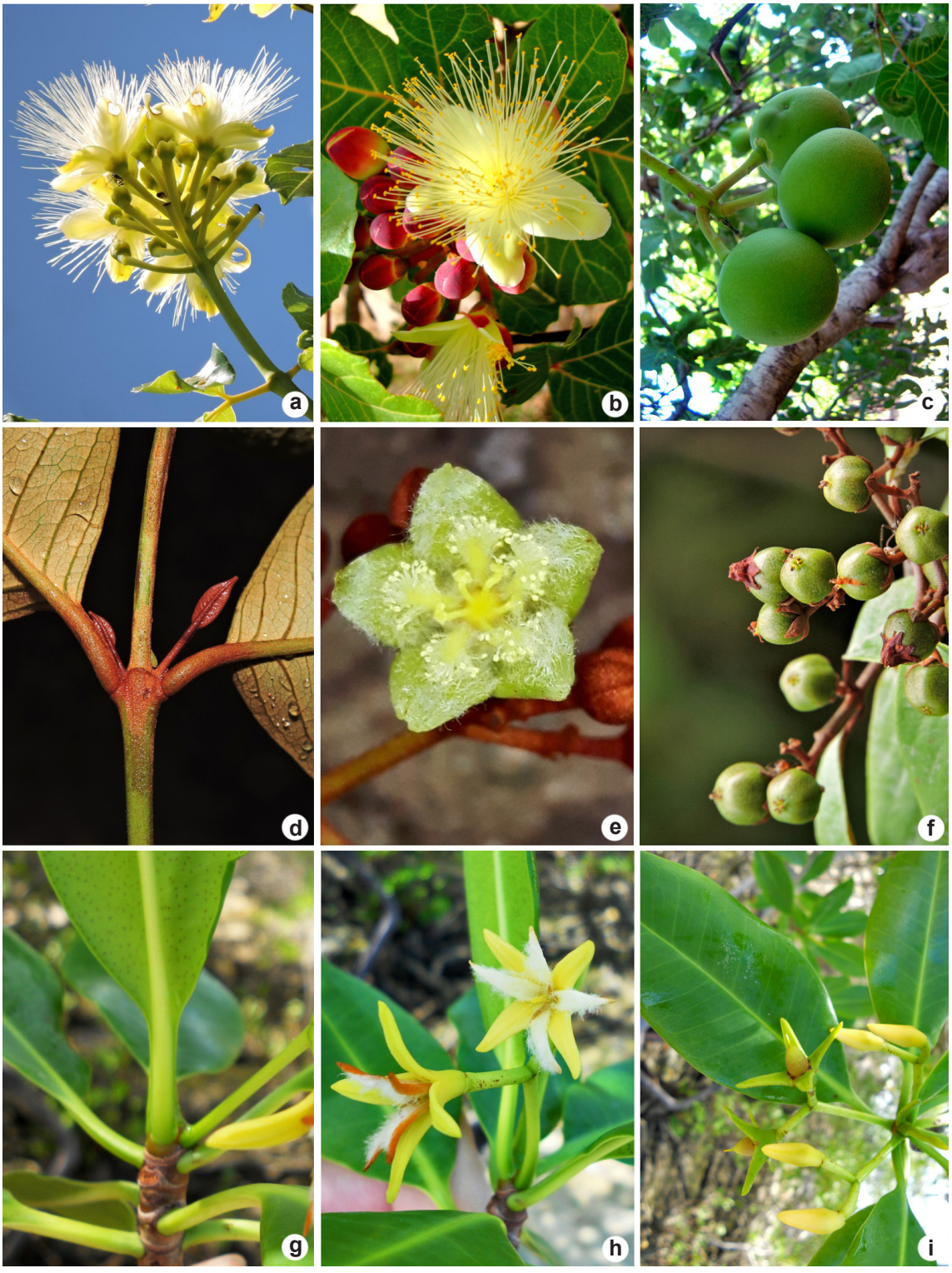

Figure 2 – Diversity of Caryocaraceae, Hypericaceae, Rhizophoraceae in Ceará State, Brazil. a-c. *Caryocar coriaceum* – a. inflorescence. b. flowers. c. fruits. d-f. *Vismia guianensis* – d. detail of leaf attachment (opposite distichous). e. flower. f. fruits. g-i. *Rhizophora mangle* – g. detail of leaf attachment (opposite decussate). h. flowers. i. developing fruits. Credits: a, d-f. R.T. Queiroz, g-i. L.C. Marinho.

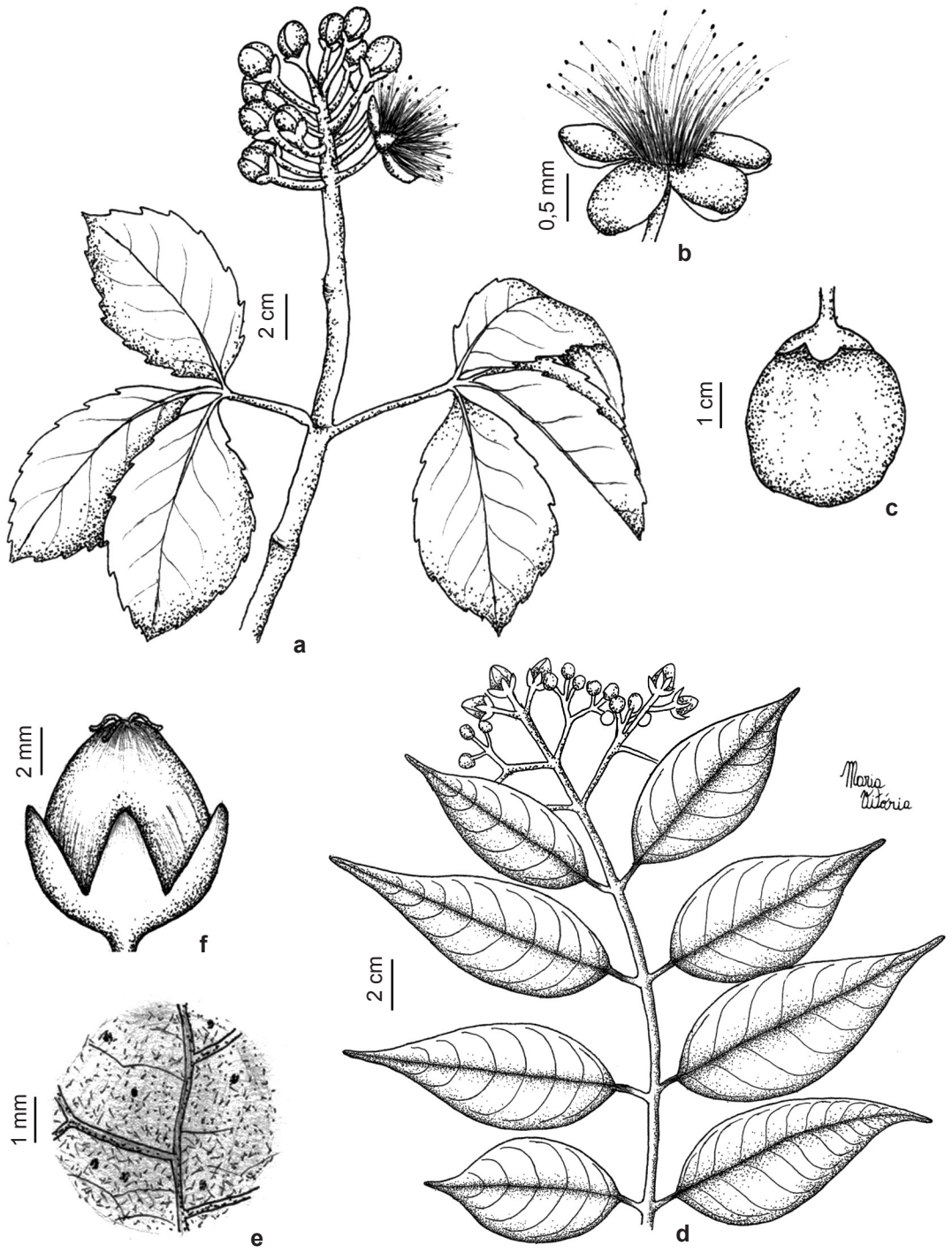

Figure 3 – Caryocaraceae of Ceará State, Brazil. a-c. *Caryocar coriaceum* – a. branch with inflorescences. b. flower. c. fruit. Hypericaceae of Ceará State, Brazil. d-f. *Vismia guianensis* – d. branch with flower buds. e. detail of the nigrescent dots on the abaxial surface of the leaf. f. fruit. [a-c. I.R. Costa (EAC 32719, HCDAL 1936); d-f. M.L. Guedes et al. 25250 (ALCB)].

Drupe 4.2–6 × 3.5–5 cm, globose, uniseminate, mesocarp fleshy, yellow, endocarp spiny.
Material examined: CEARÁ: Barbalha, Floresta Nacional do Araripe-Apodi, 10.X.2000, fl., *I.R. Costa* (EAC 32719, HCDAL 1936). Crato, Floresta Nacional do Araripe-Apodi, 20.VIII.1998, fl., *D.P. Lima 13578* (EAC, HST, IAN, UFMT); estrada Crato-Exu, em frente à casa do IBAMA, 14.VIII.2011, fl., *M.I.B. Loiola 1364* (EAC). Jardim, Chapada do Araripe, Fazenda Queimadas, 23.X.2008, fr., *R.G. Ferreira 37* (EAC). Santana do Cariri, APA Chapada do Araripe, 21.X.2010, buds and fl., *I.M. Andrade* (HUEFS 174432).

Caryocar coriaceum is a tree, easily recognized by its leaves compound, alternate, and coriaceous, flowers with numerous stamens, drupe with a fleshy and yellow mesocarp and spiny endocarp. The species is endemic to Brazil, being found in the savannas of the states of Goiás and Tocantins, and in northeastern states including Bahia, Ceará, Maranhão, and Piauí (Prance & Pirani 2020). In Ceará State, the species has been found in nine municipalities, predominantly in the southern portion of the state in the Araripe Plateau. The species has been recorded mainly in neotropical savanna (cerrado) and forested savanna (cerradão) environments, but also occurs in ombrophilous forests (mata úmida), stepic savanna (caatinga), and semideciduous seasonal forest (mata seca). The species has been recorded in two established Conservation Areas in Ceará: the Araripe Plateau Environmental Protection Area and the Araripe-Apodi National Forest. Collected with flowers and fruits throughout the year. Bees often visit the flowers of this species.

The species is used as edible fruits, hardwoods, industrial oil (Oliveira *et al*. 2018).

The popular names are pequi, piqui, pequi-branco, piqui-preto.

2. Hypericaceae Juss.

Trees, shrubs, or annual herbs; exudate present or absent. Leaves sessile or petiolate, simple, alternate, opposite, spiraled, margins entire, membranous to coriaceous, glabrous or with streaks and/or punctuations present or absent; without stipules. Inflorescence terminal or axillary, paniculate, flowers cymose or solitary, rarely cauliflorous. Flowers subsessile to pedicellate, bisexual, dichlamydeous, actinomorphic; sepals (4–)5(–6), free or connate at base, persistent, glabrous or indumented, striae and/or punctuations present or absent; petals (4–)5(–6), free, symmetrical or asymmetrical, glabrous or indumented, striae and/or punctuations present or absent; 5–∞-stamens, isolated, 3–5-fasciculated, or arranged in a continuous ring around the ovary, persistent or deciduous, staminodes present or absent, anthers rimose; ovary superior, 3–5-carpelar, 1 or 5-locular; ∞-ovules per locule; styles (2–)3–5(–8), free or connate at base, stigma distich, capitate or horseshoe-shaped. Fruit a septicidal capsule or berry; seeds ∞, striated, striate-scalariform, wrinkled or foveolate (Vogel Ely *et al.* 2020).

Hypericaceae comprises seven genera and approximately 700 species with cosmopolitan distributions (Stevens 2001, continuously updated). In Brazil, there are two genera and 56 species of the family: *Hypericum* comprises 26 species distributed mainly in the southern region of that country; and *Vismia* comprises 30 species (with the largest number in the Amazon region) (Flora do Brasil 2020).

2.1. *Vismia guianensis* (Aubl.) Choisy, Prodr. Monogr. Hyperic. 34 (1821). Figs. 1; 2d-f; 3d-f

Trees up to 4 m tall; branches quadrangular, pubescent with whitish to ferruginous trichomes. Leaves 4.8–14 × 1.9–6 cm, ovate to elliptic, apex acuminate, base attenuate, margins entire, chartaceous, pubescent with ferruginous trichomes and nigrescent dots on the abaxial surface; petiole 1–1.3 cm long. Inflorescence 3.5–5.5 cm long, a cyme, ferruginous. Flowers heterostylous; pedicel 1.4–3 mm long; sepals 4.6–6 × 2–2.3 mm, uneven, elliptic, brownish; petals 5–6 × 2.5–3 mm, obovate, apex rounded, base attenuate, light green; stamens with ∞-fascicles, 2.5–3 mm long, oblong, non-persistent; nectariferous staminodes ca. 1 mm long, rectangular, persistent. Ovary superior, 2–2.5 mm long, oval, locules pluriovulate, styles 3–3.5 mm long, villous, usually persistent. Berry 0.8–1 cm long, rounded to ovoid, with persistent sepals.
Material examined: CEARÁ: Aquiraz, Serrote da Preaoca, 3°54’05”S, 38°23’28”W, 12.XII.2004, fl. and fr., *A.S.F. Castro* (EAC 35525). Aratuba, Sítio Chave, 04°25’06”S, 39°02’42”W, 16.X.1979, buds and fl., *A.J. Castro* (EAC 7161). Barbalha, Floresta Nacional do Araripe-Apodi, trilha para a nascente dos Mundés, 4.VIII.2011, fl., *E.V.R. Ferreira 318* (HVASF). Baturité, 04°32’00”S, 39°28’00”W, 09.XI.2016, buds and fl., *M.L. Guedes et al.* (ALCB 126493). Crato, Floresta Nacional do Araripe, *L.W. Lima-Verde 1698* (EAC, HVASF). Fortaleza, Campus do Pici, 12.IX.1985, fl., *M.F. Mata* (MBM 105930). Graça, 04°02’46”S, 40°45’10”W, 17.X11.2007, buds and fl., *K.L.S. Góes* (HUEFS 134447). Guaraciaba do Norte, descida da Serra Guaraciaba-Reriutaba, 04°10’01”S, 40°44’51”W, 12.VI.1996, fl. and fr., *F.S. Cavalcanti* (EAC 23903).

Guaramiranga, 12.II.1992, fr., *M.A. Figueiredo* (EAC 18486). Ibiapina, mirante, 3°54'39"S, 40°51'16"W, 4.VI.2012, fr., *M.I.B. Loiola 1759* (EAC). Itapipoca, Nazaré, 03°21'42.0"S 39°49'54.1"W, 04.X1.2017, fl. and fr., *J.C.M.S.M Sobczak* (EAC 61568). Maranguape, Serra de Maranguape, 27.I.1990, buds and fl., *F. Barros* (SP 237259). Missão Velha, Fazenda Genipapero, 7°11'46"S 39°34'20"W, 19.VIII.2011, buds and fl., *E. Melo* (HUEFS 177920). Pacatuba, Serra da Aratanha, Sítio Pitaguari, 03°59'03"S, 38°37'13"W, 03.X.1979, fl., *P. Martins* (EAC 7029). Pacoti, Pico Alto, 04°13'30"S, 38°55'23"W, 18.II.2009, buds and fl., *E. Silveira* (EAC 44995). Porteira, estrada Jardim-Bar, Chapada do Araripe, 2.VI.1988, fr., *M.A. Figueiredo* (EAC 15187). São Benedito, Planalto da Ibiapina, Sítio Cigarra, 04°02'55"S, 40°51'54"W, 4.XII.1989, fl., *M.A. Figueiredo* (EAC 18604). São Gonçalo do Amarante, Jardim Botânico de São Gonçalo do Amarante, 03°34'08"S, 38°53'13"W, 22.III.2019, fl., *E.M.P. Lucena et al. 394* (EAC). Tianguá, estrada entre Tianguá e Ubajara, 03°47'30"S, 40°58'38"W, 7.VI.2012, fr., *M.I.B. Loiola et al.1893* (EAC). Ubajara, Sítio Murimbeca, entorno do Parque Nacional de Ubajara, 03°48'35"S, 40°54'56"W, 26.VIII.2012, fr., *M.I.B. Loiola 1943* (EAC), Serra da Ibiapaba, Parque Nacional de Ubajara, 03°50'07"S, 40°54'40"W, 3.V.2012, fl., *L.A. Costa 10* (HUEFS).

Vismia guianensis can be distinguished by its leaves having their abaxial surfaces covered by ferruginous trichomes, cymose, with ferruginous inflorescences, sepals persistent, and berries round or ovoid. *Vismia guianensis* is widely distributed, occurring in Brazil, Guyana, French Guiana, Suriname, Trinidad and Tobago, and Venezuela (Robson 1998). It has been recorded in the central-western, northeastern, northern, and southeastern regions of Brazil in the Amazon, Caatinga, Cerrado, and Atlantic Forest phytogeographic domains (Vogel Ely *et al.* 2020). The species is widely distributed in Ceará, with records in 20 municipalities. It has a wide ecological amplitude, having been recorded in practically all vegetation types, although preferably in ombrophilous and savanna forests at elevations between 19 m and 934 m. *V. guianensis* occurs in the Araripe-Apodi National Park, the São Gonçalo do Amarante Botanical Garden, and the Ubajara National Park. Recorded with flowers and fruits throughout the year.

The popular names are lacre, murici de morcego, pau de lacre, lacre branco.

3. Rhizophoraceae Pers.

Trees or shrubs, with or without rhizophores. Leaves petiolate, simple, alternate, opposite or whorled, margins crenate or entire, generally glabrous; with inter- or intra-petiolar stipules; colleters present on the abaxial surface, deciduous. Bracts at the base or in the central portion of the peduncle. Inflorescences axillary or terminal, cymose, paniculate, racemes, or with solitary flowers. Flowers pedicelate, uni- or bisexual, dichlamydeous, actinomorphic; bracteoles present. Sepals 3–16, gamosepalous, fleshy or leathery, valvar at prefloration, persistent in fruit; petals 3–5 or many, free, convolute prefloration, entire or fimbriate; stamens 3-numerosous, epipetalous; fillets free or connate at base, short or completely absent; anthers rimose, introrse or extrorse; nectariferous disk usually present; ovary superior or inferior, 2- or 6-locular, 2-carpelar, 1–8 ovule per locule; stigmas lobed to sublobed. Fruit a septicidal capsule, drupe or berry; 1 to many seeds, embryos without albumen, in some cases germinating in the fruit (Juncosa & Tomlinson 1988; Costa-Lima 2020).

Rizophoraceae comprises 16 genera and 149 species with pantropical distributions. Four genera and 10 species are registered for Brazil. Most species of the family were recorded in the Brazilian Amazon, except for *Paradrypetes ilicifolia* Kuhml., which occurs only in the southeastern region of that country, and *Rhizophora mangle* L. which is distributed along the coast (Flora do Brasil 2020).

3.1. *Rhizophora mangle* L. Sp. Pl. 1: 443 (1753). Figs. 1; 2g-i; 4a-d

Trees up to 7 m tall; anchor roots arising from the trunk. Leaves 7–9.5 × 3.7–5.2 cm, simple, opposite decussate, elliptic, arranged at the apex of the branches, apex acute to rounded, base cuneate, margins entire, glabrous, with nigrescent dots on the abaxial surface; petiole 1.5–2 cm long. Inflorescences 4–6.8 cm long, dichasial, peduncle 2.5–3.5 cm long; bracteoles 2, 1–1.5 mm long, suborbicular. Flowers tetramerous, bisexual; sepals 7–13 mm long, lanceolate, yellow-green; petals 4.5–9 mm long, cruciferous, externally pilose, whitish; stamens 8; anthers 2–4 mm long, introrse, longitudinally dehiscent, filaments absent. Ovary inferior, 2–locular, 1 ovule per locule; stigmas 2, sessile; nectar disc present. Berry 1.2–3 × 1–1.2 cm long, ovoid, green when young, dark brown at maturity; seeds 1, rarely 2, germinating inside the fruit while still attached to the mother tree, forming propagules.

Material examined: CEARÁ: Acaraú, Fazenda Cacimbas, 9.IV.2008, fl. and fr., *R.G. Ferreira 30* (EAC). Aquiraz, APA do Rio Pacoti, 13.XI.2009, fl. and fr., *K.S.*

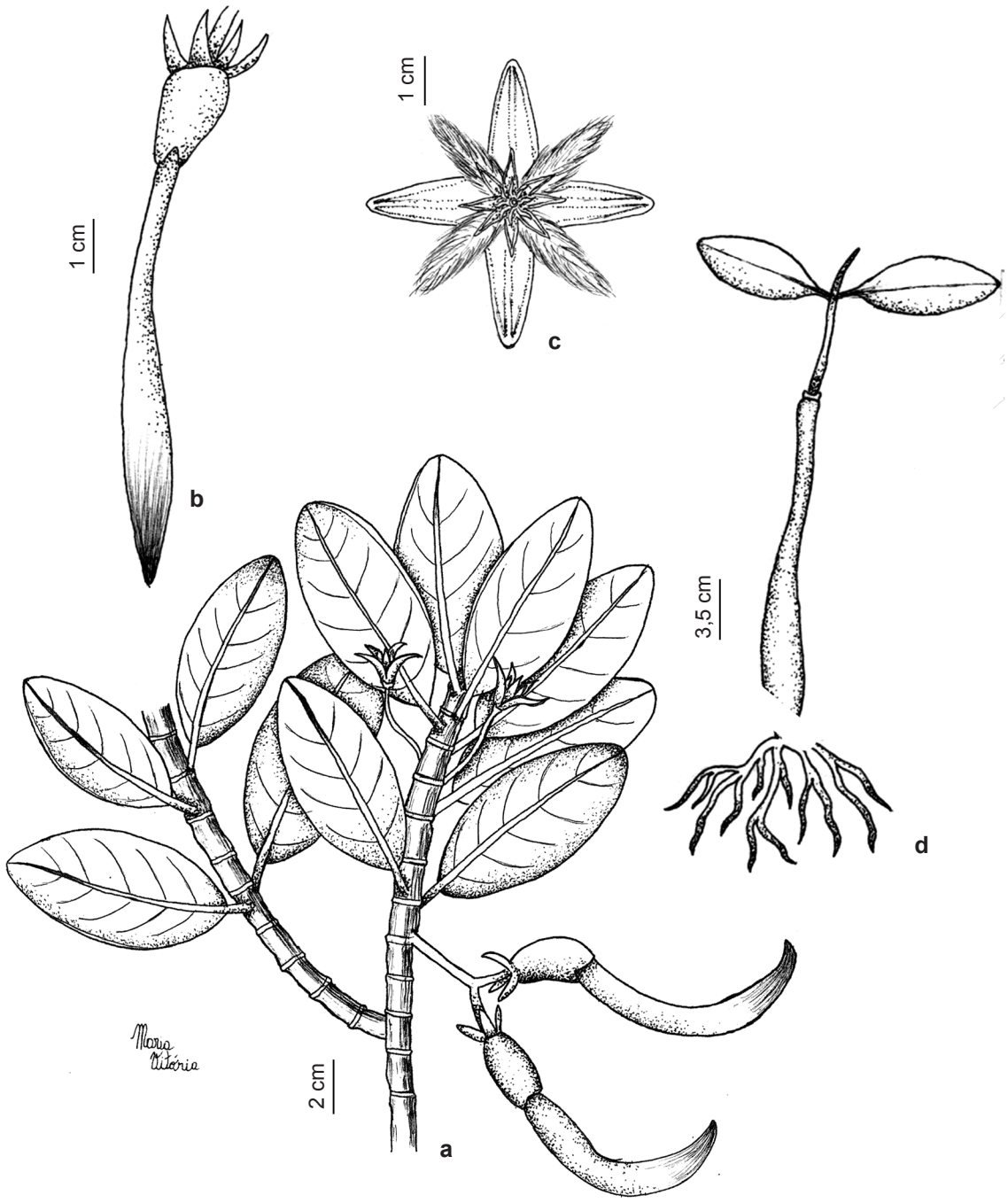

Figure 4 – Rhizophoraceae of Ceará State, Brazil. a-d. *Rhizophora mangle* – a. branch with flowers and propagules. b. propagule detail. c. flower. d. seedling [a-d. G.M. Mori & P.M.F Oliveira (UEC 154244)].

Santos (EAC 64360). Aracati, Cumbe, 20.III.2009, fl. and fr., *M. Freire Pinto* (EAC 44597). Caucaia, Praia de Iparana, 3.VI.2009, fr., *M. Freire* (EAC 44953). Cascavel, 28.II.2013, fl., *L. Macedo* (EAC 54628). Fortaleza, Barra do Ceará, 11.VIII.2007, fl. and fr., *L.P.P. Batista* (EAC 40412). Icapuí, Fazenda Barra Grande, 18.X.2011, fl. and fr., *H.C. Amarante* (MOSS 14362). Jijoca de Jericoacoara, Mangue Seco, 18.III.2005, fl., *A.V. Vieira* (EAC). Paracuru, 12.XII.2010, fl., *G.M. Mori* & *P.M.F Oliveira* (UEC 154244). São Gonçalo do Amarante, Pecém, 12.XII.1998, fl., *D.S. Sampaio* (EAC 27473).

Rhizophora mangle is mainly distinguished by its support system, composed of anchor roots arising from the trunk, and seeds that germinate while the fruit is still attached to the mother tree, forming propagules. *Rhizophora mangle* occurs along the coast of the American continent, the West Indies, and Africa, being one of the six main species forming the mangroves (Fruehauf 2005). The species is adapted to coastal environments and estuaries due to the presence of anchor roots and pneumatophores (Fruehauf 2005). *Rhizophora mangle* roots serve as nurseries for fish and several invertebrates (Nagelkerken *et al*. 2000) and protect the coastline by attenuating the force of the waves and preventing coastal erosion (Souza *et al*. 2018). It is widely distributed in mangrove and sandbank areas along the Brazilian coast, occurring from Pará State to Santa Catarina State (Costa-Lima 2020). In Ceará, the species has been recorded along the entire coast, with emphasis on the Pacoti River Environmental Protection Area (APA). Collected with flowers and fruits from March to October.

The popular names are mangue-bravo, mangue-vermelho, sapateiro.

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