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## Original Paper

# Diversity of Bignoniaceae in coastal Piauí, Northeast Brazil

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**Abstract**

The present study is a taxonomic treatment of Bignoniaceae from the four municipalities of the coastal region of Piauí state (Cajueiro da Praia, Ilha Grande, Luís Correia, Parnaíba) in Northeast Brazil, based on morphological study of newly collected and existing herbarium material. The study recorded 26 species in 12 genera: *Adenocalymma*, *Anemopaegma*, *Bignonia*, *Cuspidaria*, *Dolichandra*, *Fridericia*, *Handroanthus*, *Lundia*, *Neojobertia*, *Pleonotoma*, *Stizophyllum* and *Tanaecium*. Apart from *Handroanthus impetiginosus*, which belongs to tribe Tecomeae, all other species belong to tribe Bignonieae. Five species (*Adenocalymma apparicianum*, *A. pedunculatum*, *Anemopaegma heringeri*, *A. prostratum*, *Dolichandra hispida*) are new records for the state of Piauí, 15 species are endemic to Brazil, and one has "Vulnerable" conservation status. The results emphasize the importance of taxonomic studies for knowledge of biodiversity and threats to native species, and reinforce the importance of conserving the region's flora. Species descriptions, illustrations, identification keys and information on geographic distribution and habitat are provided.

**Key words**: Bignonieae, Brazilian flora, floristic, *restinga*.

**Resumo**

O presente estudo compreende o tratamento taxonômico de Bignoniaceae dos quatro municípios do litoral do Piauí (Cajueiro da Praia, Ilha Grande, Luís Correia e Parnaíba), nordeste brasileiro, baseado em estudo morfológico de amostras já contidas em herbário e provenientes de novas coletas. Foram registradas 26 espécies distribuídas em 12 gêneros: *Adenocalymma*, *Anemopaegma*, *Bignonia*, *Cuspidaria*, *Dolichandra*, *Fridericia*, *Handroanthus*, *Lundia*, *Neojobertia*, *Pleonotoma*, *Stizophyllum* e *Tanaecium*. Com exceção de *Handroanthus impetiginosus*, que pertence à tribo Tecomeae, todas as espécies pertencem à tribo Bignonieae. Cinco espécies (*Adenocalymma apparicianum*, *A. pedunculatum*, *Anemopaegma heringeri*, *A. prostratum* e *Dolichandra hispida*) são novos registros para o estado, 15 espécies são endêmicas do Brasil e uma espécie apresenta status de conservação vulnerável. Os resultados ressaltam a importância dos estudos taxonômicos para a atualização da diversidade de espécies nativas de Bignoniaceae para o Piauí, bem como o registro de espécies ameaçadas reforça a importância da conservação da flora da região. São apresentadas chaves para identificação de espécies, descrições, ilustrações, dados de distribuição e habitat.

**Palavras-chave**: Bignonieae, flora brasileira, florística, restinga.

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## Introduction

The family Bignoniaceae Juss. consists of approximately 840 species and 80 genera distributed in tropical and subtropical regions of the world and is especially diverse in South America (Judd *et al.* 2002; Gentry 1980; Olmstead *et al.* 2009; Lohmann & Ulloa 2014). It is one of the most important families in the composition of Neotropical forests, where approximately 80% of the species occur, mainly as lianas (Gentry 1972). There are five major regions of distribution: Central America and western South America, the Guyana region, the lowlands of Amazonia, the Cerrados and Caatingas of Brazil and the Brazilian coastal region, including the Atlantic Forest. Brazil is the most important distribution center of the family (Gentry 1979; Barroso *et al*. 1991), comprising 416 species and 33 genera in three tribes (Bignonieae, Crescentieae and Tecomeae), which differ in habit and fruit morphology (Bureau & Schumann 1897; Gentry 1980; BGF 2018).

The family occurs in different environments ranging from open savannahs to humid evergreen forests (Gentry 1980; Lohmann & Ulloa 2007). The plants are characterized by their woody habit, mostly lianas, trees or semi-shrubs, with cylindrical or angular branches, with usually opposite compound leaves, rarely alternate and simple. In the lianas, the leaves are bi- or tri-foliolate with the terminal leaflet modified into tendrils (Lohmann & Taylor 2014). The leaf indumentum may vary widely within the same species and can include a mixture of glandular and non-glandular trichomes. The inflorescence may be racemose or thyrsoid and the calyx may be campanulate, cupular, or spathaceous. The fruit is dehiscent with winged seeds (Fisher *et al*. 2004; Cipriani 2006; Pereira & Mansano 2008).

Significant taxonomic studies conducted on the family in Brazil include: Lohmann & Pirani (1996, 1998, 2003), Scudeller (2004), Chagas Júnior *et al*. (2010) and Machado & Romero (2014) for Minas Gerais state; Rizzini *et al*. (1997), Pereira & Mansano (2008) for Rio de Janeiro state; Silva-Castro & Queiroz (2003), Silva *et al*. (2018) for Bahia; Santos *et al.* (2013) for Pernambuco state; Almeida *et al.* (2015) for Mato Grosso state; Zuntini & Lohmann (2016) for Espírito Santo; Fonseca & Lohmann (2017) for eastern Brazil; and Lohmann *et al.* (2018) for Pará state.

Currently, there is no published systematic study of Bignoniaceae for Piauí state, although 83 species in 22 genera have been recorded for this state in the Brazilian flora (BGF 2018). The data for Piauí are from herbarium and general floristic studies such as Farias (2003), Lemos (2004), Mesquita & Castro (2007), de Oliveira *et al.* (2007), Santos-Filho (2009), Andrade *et al.* (2012, 2014), Amaral & Lemos (2015), Chaves (2005), and Santos-Filho *et al.* (2016).

Piauí is located in an ecotonal zone that lies between the Amazonian humid evergreen forest to the west, the seasonal Cerrados to the southwest and south and the semiarid deciduous Caatinga vegetation to the east. As a result, the plant communities of the state are rich in species and have variable phytophysiognomies that are influenced especially by climatic differences arising from their location (SEMA 2005). Although the coast of Piauí is the least extensive in the northeast region, it includes habitats that have been little investigated by taxonomists and ecologists, and is a priority area for research due to the increasing impact of human development. The objective of this study was to carry out a taxonomic survey of the species of Bignoniaceae occurring in this region, providing descriptions, an identification key, geographic distribution, and illustrations showing diagnostic characteristics.

## Material and Methods

Access to genetic patrimony for this project has been officially registered by the Universidade Federal do Piauí on the data base of the Sistema Nacional de Gestão do Patrimônio Genético e do Conhecimento Tradicional Associado (Ministério do Meio Ambiente, Conselho de Gestão do Patrimônio Genético) under the registration code A8B44BB.

Field expeditions were conducted from August 2014 to August 2018 in the four coastal municipalities of Piauí (Cajueiro da Praia, Ilha Grande, Luis Correia, and Parnaíba). The climate of this region is megathermic according to the classification of Köppen-Geiger (Alvares *et al.* 2014), with summer rains and warm winters, minimum annual average temperatures of 20 ºC and maxima of 32 ºC (Aguiar 2004) and an annual average precipitation of 1,223 mm (Radam 1973; Cepro 2010). The topography mainly comprises re-worked tabular surfaces (low plateaux), the flat relief including gently undulating areas with elevations ranging from 150 to 250 m (Jacomine *et al.* 1986). The soils of the region are hydromorphic, gleyed, dystrophic, with marine and alluvial quartz sands (Radam 1973; Cepro 2010). The landscape

is formed by quaternary sediments and three geomorphological units are recognized: beach zone and dunes, fluvial-marine plain, and river plain (Chaves *et al*. 2007). The vegetation is composed of shrubs and low trees characteristics of *restinga*, dune, and Caatinga vegetation (Cepro 2010), and herbaceous species especially on dunes adjacent to mangrove areas and in seasonally flooded or non-flooded *campos* (natural grassland-herbaceous vegetation) (Santos-Filho *et al*. 2010).

During the collecting expeditions, samples were collected and preserved following Fidalgo & Bononi (1984) and plants photo-documented with a Sony Cyber Shot 16.1 megapixels digital camera. Preserved specimens were deposited at the HDELTA herbarium (Herbarium Delta do Parnaíba, Universidade Federal do Delta do Parnaíba, Parnaíba, Piauí). Identifications were obtained from specialized bibliography including Gentry (1980), Lohmann & Taylor (2014) and Lohmann *et al*. (2018), and morphological comparison was made with herbarium specimens and images deposited at the TEPB herbarium (Herbarium Graziela Barroso, Universidade Federal do Piauí, Teresina, Piauí), the Virtual Herbarium of the Flora and Fungi–REFLORA (BR), and the online herbarium of the New York Botanical Garden (NY). Morphological descriptions were made following the terminology of Hickey (1973), Rizzini *et al.* (1997), Lohmann & Pirani (1996, 1998, 2003), Silva-Castro & Queiroz (2003), Rodrigues (2012), Oliveira (2013), Santos *et al*. (2013), Machado & Romero (2014), and Silva *et al.* (2018).

The descriptions of the taxa were worked up using material collected in the study area and examined in the HDELTA herbarium with the use of a LEICA EZ4D stereomicroscope. Information on flowering and fruiting seasons and habitats of the species were based on field observations. The phytogeographic distribution data are in accordance with the Brazilian Flora Species List (*Bignoniaceae* in BGF 2018). Lists of threatened species were consulted using the National Flora Conservation Center (CNC-Flora 2013), the Fundação Biodiversitas (2017), and the Brazilian Ministry of the Environment (MMA 2007).

## Results

In the study area, a total of 26 species of Bignoniaceae were recorded in 12 genera and two tribes, Bignonieae (25 species) and Tecomeae (one species, *Handroanthus impetiginosus* Mattos). The genera with most species were *Adenocalymma* Mart. *ex* Meisn. and *Fridericia* Mart., with six and five species, respectively; followed by *Anemopaegma* Mart. *ex* Meisn. with three species; *Cuspidaria* DC., *Dolichandra* Cham., and *Neojobertia* Baill. with two species each; and the remaining genera (*Bignonia* L., *Handroanthus* Mattos, *Lundia* DC., *Pleonotoma* Miers *Stizophyllum* Miers and *Tanaecium* Sw. emend L.G.Lohmann) with a single species each. Among the species, only *Fridericia crassa* (Bureau & K.Schum.) L.G.Lohmann was classified as "vulnerable". In Brazil, 23 species of the family are on the IUCN red list of threatened species (BFG 2018). Five species (*Adenocalymma apparicianum* J.C.Gomes, *A. pedunculatum* (Vell.) L.G.Lohmann, *Anemopaegma heringeri* J.C.Gomes, *A. prostratum* DC., and *Dolichandra hispida* (DC.) L.H. Fonseca & L.G.Lohmann) are new records for Piauí, and *Anemopaegma heringeri* and *Dolichandra hispida* are new records for the Brazilian Northeast.

**Identification key for Bignoniaceae species of coastal Piauí, Brazil**

1. Trees; leaves 5-foliolate, palmate ..... 20. *Handroanthus impetiginosus*
1'. Shrubs or lianas; leaves 2- to 3-foliolate, biternate or triternate or pinnate ..... 2
2. Leaves bi- or triternate ..... 3
2'. Leaves 2–3-foliolate, pinnate ..... 5
3. Prophylls foliaceous, orbicular, glandular; corolla hypocrateriform; calyx tubular with glands ..... 24. *Pleonotoma castelnaei*
3'. Prophylls absent or if present filiform and not glandular; corolla infundibuliform; calyx tubular, non-glandular ..... 4
4. Stem quadrangular; prophylls filiform with bifurcate apex ..... 22. *Neojobertia candolleana*
4'. Stem cylindrical; prophylls absent ..... 23. *Neojobertia mirabilis*
5. Tendrils trifid-uncinate ..... 6
5'. Tendrils simple or bifid, or trifid and not uncinate ..... 7

6. Leaflets ovate, apex acuminate, base obtuse.....14. *Dolichandra quadrivalvis*
6'. Leaflets oblong-elliptic, apex acute, base truncate .....13. *Dolichandra hispida*
7. Corolla yellow, cream, or orange .....8
7'. Corolla vinaceous, lilac, purple, pink, or white .....17
8. Corolla cream, glabrous or lepidote; fruit elliptic-ovoid .....9
8'. Corolla yellow or orange, puberulent; fruit linear, cylindrical .....11
9. Stem puberulent; prophylls absent; leaflets puberulent with white glands and margin entire and revolute.....9. *Anemopaegma prostratum*
9'. Stem glabrous; prophylls foliaceous; leaflets glabrous with margin entire and not revolute.....10
10. Tendrils simple; inflorescence 8–12 cm long; leaf apex acuminate; corolla lobes puberulent..... 7. *Anemopaegma heringeri*
10'. Tendrils trifid; inflorescence 5.4–7 cm long; leaf apex retuse; corolla lobes glabrous .....8. *Anemopaegma laeve*
11. Tendrils simple; leaflets cordate; corolla flat; calyx laciniate; nectariferous disk absent.....21. *Lundia helicocalyx*
11'. Tendrils usually trifid or simple; leaflets lanceolate, elliptic or orbicular; corolla not flat; calyx not laciniate; nectariferous disk present .....12
12. Prophylls absent, corolla orange .....13
12'. Prophylls present; corolla yellow .....14
13. Petioles and petiolules puberulent; leaflets lanceolate .....
.....4. *Adenocalymma pedunculatum*
13'. Petioles and petiolules glabrous; leaflets ovoid to orbicular .....
.....6. *Adenocalymma validum*
14. Inflorescence a raceme; petiolule glabrous; leaflets lanceolate; calyx campanulate .....2. *Adenocalymma divaricatum*
14'. Inflorescence a thyrse; petiolule puberulent; leaflets ovate to elliptic; calyx cupuliform, bilabiate or tubular .....15
15. Prophyll margin ciliate; staminodes less than 3 mm long
.....5. *Adenocalymma pubescens*
15'. Prophyll margin not ciliate; staminodes more than 3 mm long .....16
16. Calyx bilabiate, glabrous; corolla glands absent .....
.....3. *Adenocalymma involucratum*
16'. Calyx 5-toothed, puberulent; corolla glands present
.....1. *Adenocalymma apparicianum*
17. Branches fistulose, calyx urceolate.....
..... 25. *Stizophyllum perforatum*
17'. Branches not fistulose, calyx not urceolate ... 18
18. Stem quadrangular .....19
18'. Stem cylindrical .....20
19. Prophylls bromeliad-like; leaflets elliptic to ovate.....
.....10. *Bignonia corymbosa*
19'. Prophylls not bromeliad-like; leaflets cordiform to obovoid .....
..... 16. *Fridericia crassa*
20. Lateral leaflets strongly asymmetric, with dendritic trichomes.....21
20'. Lateral leaflets not strongly asymmetric, without dendritic trichomes.....22

21. Calyx cupuliform with more than three patelliform glands in upper third ..... 15. *Fridericia cinnamomea*
21'. Calyx tubular with one or two patelliform glands in upper third..... 17. *Fridericia dispar*
22. Inflorescence a raceme; calyx cupuliform to tubular; patelliform glands present ..... 23
22'. Inflorescence a thyrse; calyx campanulate or spathaceous; patelliform glands absent..... 24
23. Leaflets orbicular, venation triplinerved at leaflet base.....18. *Fridericia platyphylla*
23'. Leaflets lanceolate, venation pinnate .....19. *Fridericia subverticillata*
24. Leaflets oblong, membranaceous, venation brochidodromous..... 26. *Tanaecium dichotomum*
24'. Leaflets ovate, chartaceous, venation eucamptodromous ..... 25
25. Leaflets vinaceous when dry; calyx campanulate, dentate; corolla lacking glands ..... 11. *Cuspidaria argentea*
25'. Leaflets green when dry; calyx spathaceous; corolla with glands ..... 12. *Cuspidaria pulchra*

**1. *Adenocalymma apparicianum*** J.C. Gomes, Arch. Jard. Bot. Rio de Janeiro 9: 223.1950. [1949]. Fig. 1a-c

Liana. Stem cylindrical non-fistulose, striate, puberulent, with lenticels. Prophylls 0.3–0.5 × 0.8–1.2 cm, straight, threadlike, puberulent, with patelliform glands. Leaves 3-foliolate; petiole 0.5–1.8 cm long, puberulent; petiolules 0.2–0.7 cm long, puberulent; tendrils simple, puberulent, lenticels present; leaflets 3.2–11.7 × 2.2–6 cm, coriaceous, discolorous, ovate to orbicular, apex retuse, base obtuse, margin entire, puberulent on adaxial and abaxial surfaces. Inflorescence a terminal thyrse, 8.8–15.5 cm long, bracts 0.4 cm long, puberulent; calyx 1–1.8 × 0.5–0.6 cm, cupuliform, puberulent, 5-toothed, light green, patelliform glands present; corolla 7.1–7.5 cm long, infundibuliform, not flattened, light yellow, puberulent, lobes 2.3–3.4 × 2.4–3.2 cm, puberulent; stamens 1.6–2.8 cm long, glabrous, staminode 0.3–1.7 cm long; ovary 2 × 1 mm, glabrous; nectariferous disk 1–3 mm long; style 3.5 cm, stigma 2 mm long. Fruit capsule cylindrical, roughened, 6.8–10 × 0.5–1.1 cm, puberulent, patelliform glands present. Seeds 4–4.8 × 1.2–1.5 cm, light brown, patelliform glands present.

**Examined material**: BRAZIL. PIAUÍ: Parnaíba, Carpina, 10.XI.2016, fr., *D.S. Aguiar 46* (HDELTA). Reis Velloso, 1.XI.2014, fl. and fr., *R.C.S. Costa & M.F.S. Silva 02* (HDELTA). Joaz Sousa, 19.XII.2014, fl. and fr., *R.C.S. Costa & M.F.S. Silva 07* (HDELTA).

*Adenocalymma apparicianum* is a very distinct species in the study area, similar only to *A. divaricatum* because of the yellow, puberulous corolla. It differs from the other species of *Adenocalymma*, among other differences, by its oblong, roughened fruit, and tubular calyx. The leaflets of *A. apparicianum* are coriaceous, the prophylls are short (0.3–0.5 cm) and steadfast, and the calyx has patelliform glands at the apex.

This species is endemic to Brazil, occurring in Northeast region (Ceará, Rio Grande do Norte) and in the Caatinga phytogeographic domain (BGF 2018). In the study area, it was collected as a ruderal in Caatinga vegetation. Flowering and fruiting were observed from November to December. This is a new record for the state of Piauí.

**2. *Adenocalymma divaricatum*** Miers, Ann. Mag. Nat. Hist. ser. 3, 7(41): 390. 1861. Fig. 1d-f

Liana. Stem cylindrical non-fistulose, striate, glabrous, with lenticels. Prophylls 0.2–0.9 cm long, filiform, puberulent, with patelliform glands. Leaves 2-foliolate; petiole 0.5–3.5 cm long, puberulent; petiolules 0.2–2.5 cm long, glabrous; tendrils simple, glabrous, lenticels absent; leaflets 2.5–12 × 0.9–5.7 cm, chartaceous, concolorous, lanceolate, apex acute, base obtuse, margin entire, glabrous on adaxial surface and puberulent on abaxial surface. Inflorescence an axillary raceme 8–11 cm long, bracts absent, axis glabrous; calyx 1.2–1.3 × 0.6–0.7 cm, campanulate, puberulent, 5-toothed, green, patelliform glands present; corolla 5.5–5.7 cm long, infundibuliform, yellow, puberulent, lobes 2 × 2.4–3.2 cm, puberulent; stamens 1.6–2.4 cm long, glabrous, staminode 2 mm long; ovary 1–2 × 3–4 mm, puberulent; nectariferous disk 1–2 × 2 mm; style 3.6 cm long, stigma 4 mm long. Fruit capsule tetragonal 12–18 × 3–5 cm, glabrous, patelliform glands present. Seeds 4–4.8 × 1.2–1.5 cm, brown, patelliform glands absent.

**Examined material**: BRAZIL. PIAUÍ: Parnaíba, Tabuleiros Litorâneos, 18.XII.2015, fl. and fr., *M.F.S. Silva* & *I.M. Andrade 783* (HDELTA); 18.XII.2015, fl. and fr., *M.F.S. Silva* & *I.M. Andrade 784* (HDELTA).

*Adenocalymma divaricatum* is similar to *A. apparicianum* in the shape and color of the corolla. The two species differ in that *A. divaricatum* has tetragonal fruits and glands in the intermediate part

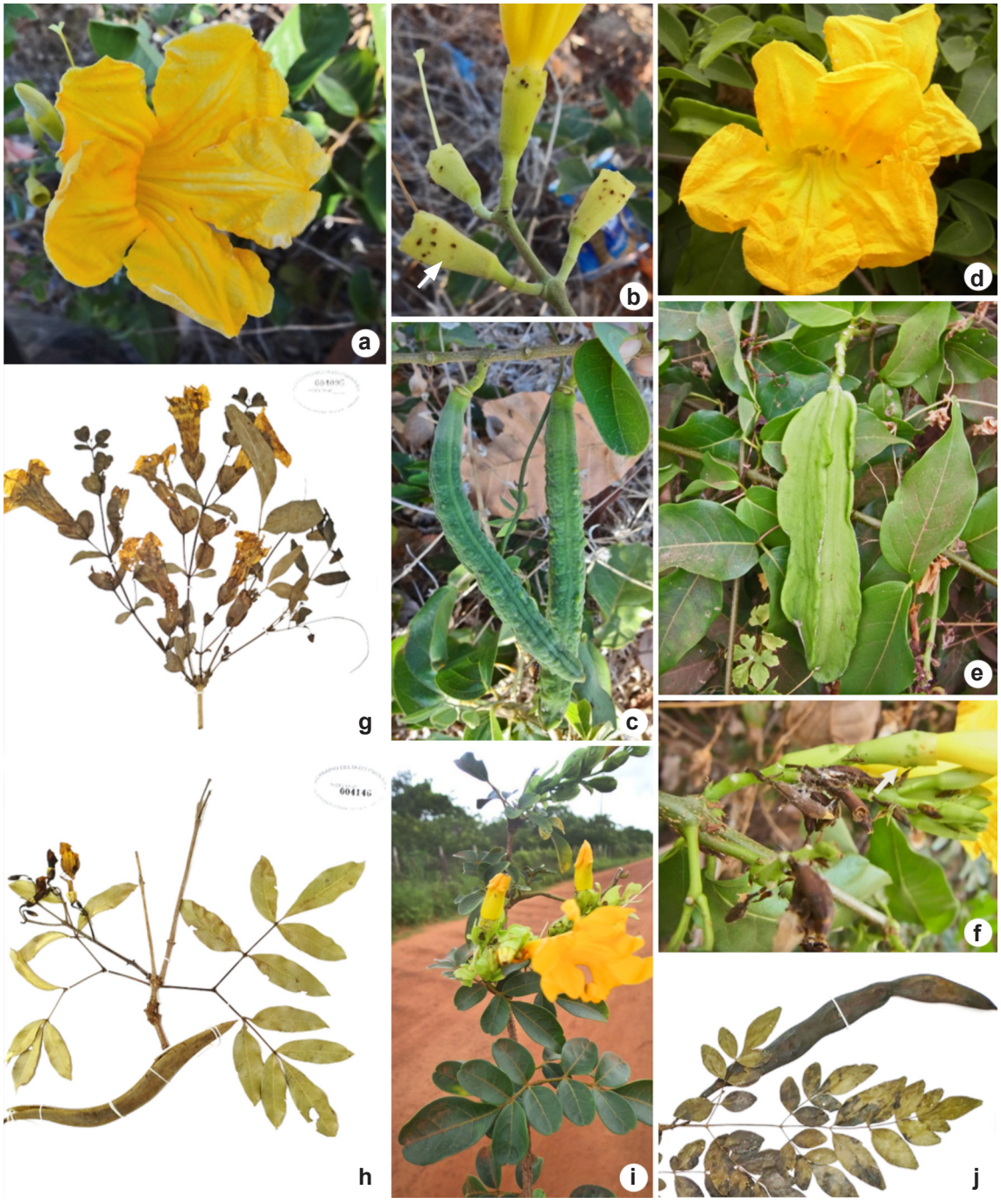


**Figure 1** – a-j. Diversity of Bignoniaceae in coastal Piauí, Brazil – a-c. *Adenocalymma apparicianum* – a. flower; b. calyx with patelliform glands (indicated by arrow); c. fruits; d-f. *A. divaricatum* – d. flower; e. fruit; f. patelliform glands (indicated by arrow); g. *A. involucratum*; h. *A. pedunculatum*; i-j. *A. pubescens* – i. branch with fruit; j. branch with flowers. (a. *Costa & Silva 02*; d-f. *Silva & Andrade 783*; g. *Lima 57*; h. *Santos 41*; i-j. *Santos 66*).

of the calyx while *A. appariciánum* has cylindrical fruits and glands at the apex of the calyx. The type of species was collected in Oeiras, Piauí by G. Gardner in 1839.

This species is endemic to Brazil and occurs in Northeast (Bahia, Ceará, Piauí) and Southeast (Espírito Santo, Minas Gerais, Rio de Janeiro) regions and in the Caatinga and Atlantic Forest phytogeographic domains (BGF 2018). In the study area, flowering and fruiting were observed from December in Caatinga areas, according to field observations and HDELTA herbarium data.

**3. *Adenocalymma involucratum*** (Bureau & K. Schum.) L.G. Lohmann, Ann. Missouri Bot. Gard. 99(3): 392. 2014. Fig. 1g

Liana. Stem cylindrical non-fistulose, striate, glabrous, with lenticels. Prophylls 0.7–1.7 × 0.8–1.2 cm, lanceolate, puberulent, with patelliform glands. Leaves 2-pinnate; petiole 1–1.5 cm long, puberulent; petiolules 1.4–3 cm long, puberulent; tendrils simple, glabrous, lenticels present; leaflets 2.2–8.5 × 0.9–1.9 cm, coriaceous, concolorous, elliptic, apex retuse, base attenuate, margin entire, glabrous on adaxial and abaxial surface. Inflorescence a terminal thyrse, 12–15 cm long, bracts 1.8–2.7 cm long; calyx 2–3 × 0.9–1.4 cm, bilabiate, glabrous, light green, without patelliform glands; corolla 7–8 cm, infundibuliform, dark yellow, glabrous, lobes 1.9–2 × 2.7–2.8 cm, glabrous; stamens 1.9–2.8 cm long, glabrous, staminode 5–6 mm long; ovary 3 × 1 mm, glabrous; nectariferous disk 1–2 mm; style 4.1 cm long, stigma 2 mm long. Fruit and seeds not observed.
**Examined material**: BRAZIL. PIAUÍ: Parnaíba, Embrapa, 15.XII.2015, fl., *G.A. Lima 57* (HDELTA).

*Adenocalymma involucratum* is similar to *A. pubescens* in leaflet shape, but differs because of its pubescent stems and prophylls.

This species is endemic to Brazil and occurs in the North (Tocantins), Northeast (Bahia, Ceará, Maranhão, Piauí), Central-West (Distrito Federal, Goiás), and Southeast (Minas Gerais) regions, in the Caatinga and Cerrado phytogeographic domains (BGF 2018). In the study area, the species was found in a Caatinga transition area; only one sample was found in the coastal region, flowering in December.

**4. *Adenocalymma pedunculatum*** (Vell.) L.G. Lohmann, Ann. Missouri Bot. Gard. 99(3): 395. 2014. Fig. 1h

Liana. Stem cylindrical non-fistulose, striate, glabrous, with inconspicuous lenticels. Prophylls absent. Leaves 2–3-foliolate; petiole 3–3.5 cm long, puberulent; petiolules 3–3.5 cm long, glabrous; tendrils trifid, glabrous, lenticels absent; leaflets 5–7.4 × 1.6–3 cm, coriaceous, concolorous, lanceolate, apex acute, base cuneate, margin entire, glabrous on adaxial and abaxial surfaces. Inflorescence an axillary raceme, 6–26 cm long, bracts 0.2–0.3 cm long; calyx 0.7–0.8 × 0.5–0.6 cm, tubular, not laciniate, puberulent, dark green, patelliform glands present; corolla 2.8–3 cm long, tubular, not flattened, yellow, puberulent, lobes 1 × 1.3 cm, glabrous; stamens 1.8–2.9 cm long, glabrous, staminode 2 mm long; ovary 2 × 1 mm, glabrous; nectariferous disk 1–2 mm; style 3.5 cm long, stigma 2 mm long. Fruit capsule linear flattened 18–26 cm long, glabrous, patelliform glands present. Seeds 5.7 × 2.3 cm, brown, patelliform glands absent.
**Examined material**: BRAZIL. PIAUÍ: Parnaíba, Tabuleiros Litorâneos, 19.IX.2016, fl. and fr., *D.A. Santos 41* (HDELTA).

*Adenocalymma pedunculatum* resembles *A. validum* in the shape and color of the corolla, leaf distribution, trifid tendrils and linear flattened fruit, but differs in the tubular calyx and lanceolate leaflets, whereas in *A. validum* the calyx is campanulate and the leaflets ovate to orbicular.

The species is endemic to Brazil and occurs in the North (Pará, Tocantins), Northeast (Bahia, Maranhão), Central-West (Distrito Federal, Goiás, Mato Grosso) and Southeast (Espírito Santo, Minas Gerais, São Paulo) regions, in the Amazon, Cerrado, and Atlantic Forest phytogeographic domains (BGF 2018). In the study area, it was collected in Caatinga and observed in flower and fruit in September. This is a new record for the state of Piauí.

**5. *Adenocalymma pubescens*** (Spreng.) L.G. Lohmann, Ann. Missouri Bot. Gard. 99(3): 395. 2014. Fig. 1i-j

Liana. Stem cylindrical non-fistulose, striate, pubescent, with lenticels. Prophylls 0.5–0.9 cm long, lanceolate, pubescent, with patelliform glands, margin of prophylls ciliate. Leaves 2-pinnate; petiole 0.6–5 cm long, pubescent; petiolules 0.6–6.4 cm long, pubescent; tendrils simple, pubescent, lenticels present; leaflets 0.7–4.6 × 0.4–2.7 cm, coriaceous, discolorous, ovate to lanceolate, apex mucronate, base attenuate to obtuse, margin entire, pubescent adaxially and glabrous abaxially, patelliform glands absent. Inflorescence an axillary thyrse 5–12 cm long,

bracts 0.4 cm long, pubescent; calyx 1–1.8 × 0.5–0.6 cm, tubular, pubescent, 5-toothed, light green, patelliform glands present; Corolla 4–5 cm long, infundibuliform, dark yellow, pubescent, lobes 1 × 0.8 cm, pubescent; stamens 1.1–1.8 cm long, glabrous, staminode 3–4 mm long; ovary 5 × 1 mm long, glabrous; nectariferous disk 1–3 mm long; style 2.4 cm long, stigma 2 mm long. Fruit capsule flat, linear, 18–20 × 1.5–1.9 cm, glabrous, patelliform glands absent. Seeds 3.3 × 1.3 cm, dark brown, membranaceous.

**Examined material**: BRAZIL. PIAUÍ: Parnaíba, Tabuleiros Litorâneos, 9.III.2017, fl., *D.A. Santos 63* (HDELTA); 23.V.2017, fl. and fr., *D.A. Santos 66* (HDELTA).

*Adenocalymma pubescen*s is similar to *A. involucratum* in the leaflet arrangement, but differs in the pubescent tendrils and leaflets and ciliate margin of the prophylls.

This species is endemic to Brazil and occurs in the North (Tocantins), Northeast (Bahia, Maranhão, Piauí), Central-West (Distrito Federal, Goiás), and Southeast (Espírito Santo, Minas Gerais, Rio de Janeiro, São Paulo) regions and in the Caatinga, Cerrado, and Atlantic Forest phytogeographic domains (BGF 2018). In the study area, it was observed in flower in March and in fruit in June.

**6. *Adenocalymma validum*** (K. Schum.) L.G. Lohmann, Ann. Missouri Bot. Gard. 99(3): 398. 2014. Fig. 2a-b

Liana. Stem cylindrical non-fistulose, striate, glabrous, lenticels present. Prophylls absent. Leaves 2–3-foliolate; petiole 2.7–5.3 cm long, glabrous; petiolules 1.5–4.2 cm long, glabrous; tendrils trifid, glabrous, lenticels absent; leaflets 5.4–11 × 2.2–3.5 cm, coriaceous, concolorous, ovate to orbicular , apex acute, base cuneate, margin entire, glabrous on adaxial and abaxial surfaces. Inflorescence a terminal pleiothyrse, 20–22 cm long, bracts absent; calyx 1.2 × 0.7 cm, campanulate, glabrous, green, patelliform glands present in the apex; corolla 4.9–6.7 cm, infundibuliform, dark orange, patelliform glands present, lobes 1.1 × 1 cm long, glabrous, patelliform glands present; stamens 1.8–2.8 cm long; glabrous, staminode 4 cm long; ovary 4 × 1 mm, glabrous; nectariferous disk 1 × 2 mm; style 3.5 cm long, stigma 3 mm long. Fruit capsule flat, 16–20 × 1 cm, glabrous, patelliform glands present. Seeds 5.2–6 × 1.1–1.7 cm, light brown, patelliform glands absent.

**Examined material**: BRAZIL. PIAUÍ: Parnaíba, Bairro Reis Velloso, 1.XI.2014, fl. and fr., *R.C.S. Costa* & *M.F.S. Silva 03* (HDELTA). Joaz Sousa, 19.XII.2014, fl., *R.C.S. Costa* & *M.F.S. Silva 08* (HDELTA). Tabuleiros Litorâneos, 08.I.2015, fl., *R.C.S. Costa* & *M.F.S. Silva 11* (HDELTA).

*Adenocalymma validum* is distinguished especially by the patelliform glands at the calyx apex.

This species is native but non-endemic to Brazil and has been recorded in the North (Amazonas, Amapá, Pará, Rondônia, Roraima, Tocantins), Northeast (Bahia, Ceará, Maranhão, Pernambuco, Piauí), and Southeast (Espírito Santo, Minas Gerais, Rio de Janeiro, São Paulo) regions (BGF 2018). In the study area, this species occurs as a ruderal plant. Flowering and fruiting plants were observed between November and January.

**7. *Anemopaegma heringeri*** J.C. Gomes, Arch. Jard. Bot. Rio de Janeiro, 12: 147, 1953. Fig. 2c-d

Liana. Stem cylindrical, non-fistulose, striate, glabrous, with lenticels. Prophylls 0.5–1 × 0.6–1 cm, obovate, puberulent, with patelliform glands. Leaves 2-foliolate; petiole 0.7–1.8 cm long, pubescent; petiolules 0.3–0.6 cm long, pubescent; tendrils simple, pubescent, lenticels absent; leaflets 3.8–7.5 × 1.2–2.7 cm, chartaceous, discolorous, lanceolate, apex acuminate, base obtuse, margin entire, glabrous on adaxial and abaxial surfaces. Inflorescence an axillary raceme, 5.8–12 cm long, bracts 0.3–0.5 cm long, pubescent; calyx 0.8–0.9 × 0.7–0.8 cm, tubular to campanulate, non-toothed, puberulent, ciliate at margins, dark green, patelliform glands present; corolla 3.8–4.5 cm long, infundibuliform, yellowish cream, lobes 0.5 × 0.6 cm, pubescent; stamens 1.5–1.8 cm long, glabrous, staminode 2–3 cm long; ovary 3 × 1 mm, pubescent; nectariferous disk 18–20 mm long; style 2 cm long, stigma 2 mm long. Fruit and seeds not observed.

**Examined material**: BRAZIL. PIAUÍ: Parnaíba, Estrada do Céu, 9.I.2017, fl., *D.A. Santos 54* (HDELTA); 10.I.2017, fl., *D.A. Santos 55* (HDELTA).

*Anemopaegma heringeri* can be recognized by its pubescent foliate prophylls, and the bracts arranged at the base of the flower and in the middle of the pedicel. It is popularly known as “liana”.

This species is endemic to Brazil and occurs in Southeast region (Minas Gerais) and in the Cerrado phytogeographic domain (BGF 2018). In the study area it was collected in flower in January in an ecotone between Caatinga and Cerrado, in sandy soil near the river Igaraçu.

**8.** ***Anemopaegma laeve*** DC., Prodr. [A.P. de Candolle] 9: 189. 1845. Fig. 2e-f

Liana. Stem cylindrical non-fistulose, striate, glabrous, lenticels absent. Prophylls foliate 0.5–1.7 × 1–2 cm, orbicular, glabrous, with patelliform glands. Leaves 2–3-foliolate; petiole 1.2–3.3 cm long, glabrous; petiolules 0.2–0.9 cm long, glabrous; tendrils trifid, glabrous, lenticels absent; leaflets 3.2–1.7 × 2.2–6 cm, chartaceous, concolorous, ovate, apex acute to retuse, base rounded, margin entire revolute, glabrous on adaxial and abaxial surfaces, patelliform glands absent. Inflorescence an axillary raceme, 5.4–8 cm long, bracts absent; calyx 0.9 × 0.8 cm long, campanulate, puberulent lepidote, non-toothed, yellowish green, patelliform and glands present; corolla 4.5 cm long, infundibuliform, light yellow, lepidote, lobes 1 × 1 cm long, whitish, glabrous, patelliform glands present; stamens 1.1–2.4 cm long, glabrous, staminode 4 mm long; ovary

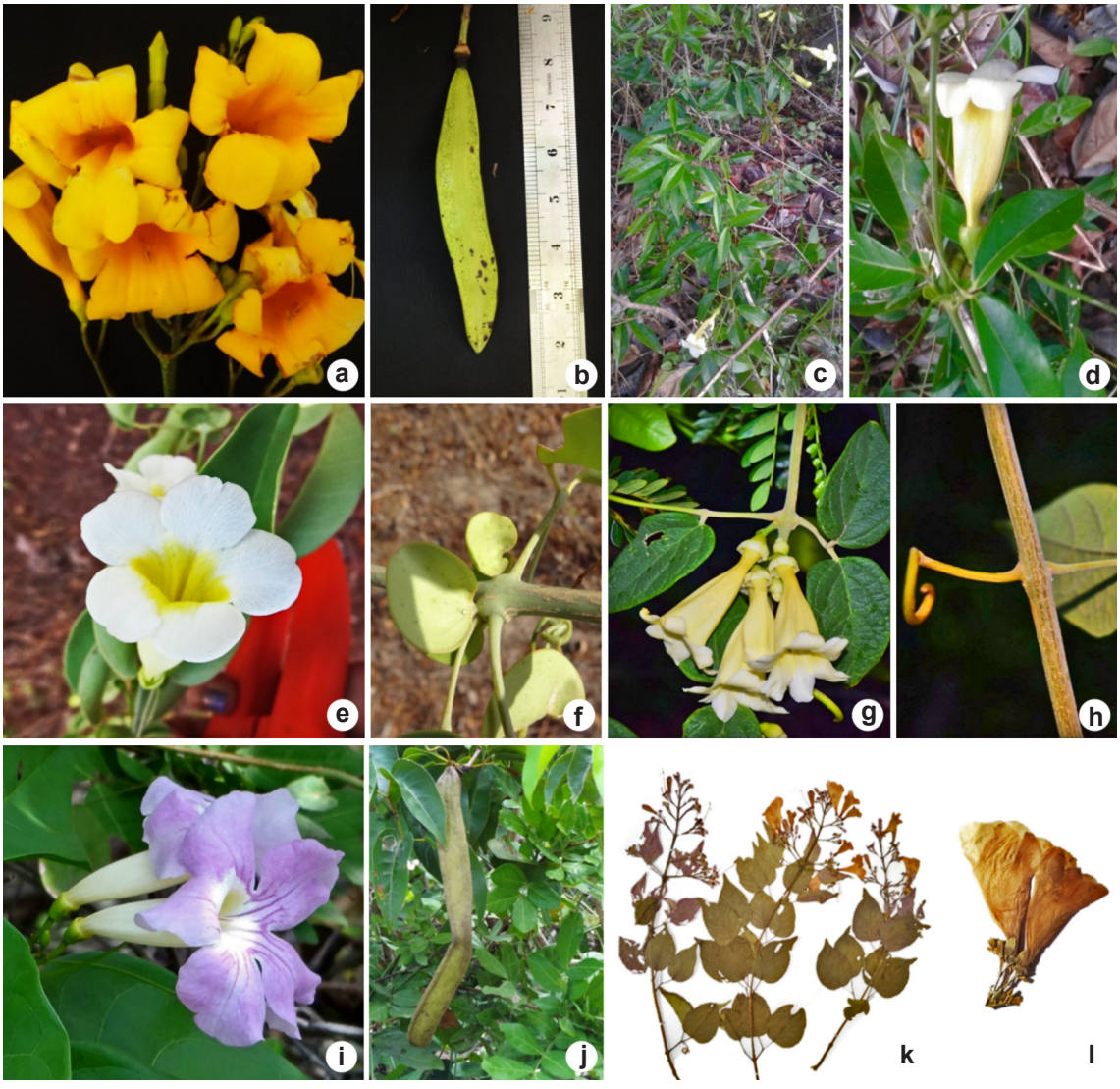


**Figure 2** – a-l. Diversity of Bignoniaceae in coastal Piauí, Brazil – a-b. *Adenocalymma validum* – a. inflorescence; b. fruit; c-d. *Anemopaegma heringeri* – c. habit; d. flower; e-f. *A. laeve* – e. flower; f. prophylls; g-h. *A. prostratum* – g. inflorescence; h. tendril; i-j. *Bignonia corymbosa* – i. inflorescence; j. fruit; k-l. *Cuspidaria argentea* – k. branch; l. inflorescence detail. (a-b. *Costa & Silva 03*; c-d. *Santos 54*; e-f. *Costa 04*; g-h. *Andrade 4875*; i-j. *Santos 45*; k-l. *Santos 60*).

2 × 1 mm, glabrous; nectariferous disk 1 × 3 mm; style 3.7 cm long, stigma 2 mm long. Fruit capsule septifragal, flat, orbicular, 5.6–8 × 4–4.5 cm, glabrous, patelliform glands absent, calyx persistent in fruit. Seeds 0.9–1 × 0.5–0.7 cm, glabrous, brown, patelliform glands present.

**Examined material**: BRAZIL. PIAUÍ: Ilha Grande, Tatus, 6.XII.2014, fl., *R.C.S. Costa 04* (HDELTA). Parnaíba, Carpina, 12.I.2016, fr., *D.A. Santos 47* (HDELTA); Embrapa, 16.XII.2014, fl., *E.G. Amorim 29* (HDELTA); Floriópolis, 15.XII.2014, fl. and fr., *S.P. Nunes 02* (HDELTA); 31.IV.2015, fr., *C.A. Pereira 03* (HDELTA); Lagoa Portinho, 23.X.2012, fl., *D.M. Rodrigues 02* (HDELTA); Sabiazal, 18.XII.2014, fl., *J. Araújo 04* (HDELTA); Tabuleiros Litorâneos, 8.V.2015, fl. and fr., *R.C.S. Costa 14* (HDELTA); 18.XII.2015, fl., *M.F.S. Silva* & *I.M. Andrade 780* (HDELTA).

*Anemopaegma laeve* is characterized by the presence of orbicular foliate prophylls and can be distinguished from *A. citrinum* Mart. *ex* DC by its chartaceous leaflets with revolute, corolla with yellow tube and whitish lobes, and flattened orbicular fruit capsule.

This species is endemic to Brazil and occurs in the Northeast (Bahia, Ceará, Maranhão, Paraiba, Pernambuco, Piauí) and Southeast (Minas Gerais) regions, and in the Caatinga and Cerrado phytogeographic domains (BGF 2018). In the study area it is common in the municipality of Parnaíba, having been collected at five localities, in disturbed areas of Cerrado-Caatinga transition habitat, wasteland and highway margins. Flowering was observed from October to December and fruiting from December to May.

**9.** ***Anemopaegma prostratum*** DC., Prodr. [A.P. de Candolle] 9: 189. 1845. Fig. 2g-h

Liana. Stem cylindrical non-fistulose, striate, puberulent, lenticels absent. Prophylls absent. Leaves 2–3-foliolate; petiole 1.4–4 cm long, puberulent; petiolules 0.4–1.8 cm long, puberulent; tendrils woody simple, puberulent, lenticels absent; leaflets 3.2–1.7 × 2.2–6 cm, chartaceous, discolorous, ovate or orbicular, apex acute, base obtuse, margin entire, puberulent on adaxial and abaxial surfaces. Inflorescence an axillary raceme 9.5–11 cm long, bracts absent; calyx 1–1.1 × 1.2–1.4 cm, campanulate, puberulent, 5-toothed, light green, patelliform glands present; corolla 3.5–5 cm long, infundibuliform, yellowish cream, lepidote, puberulent, lobes 1 × 1 cm, glabrous; stamens 1.6–2.9 cm long, glabrous, staminode 9 mm long; ovary 4 × 2 mm, glabrous; nectariferous disk 2 × 3 mm; style 3 cm long, stigma 2 mm long. Fruit capsule septifragal, flattened, elliptic, 3.5–6 × 3.5–5.1 cm, glabrous, patelliform glands present. Seeds 2.7 × 2.1 cm, cream, patelliform glands present.

**Examined material**: BRAZIL. PIAUÍ: Parnaíba, Tabuleiros Litorâneos, 18.XII.2015, fr., *M.F.S. Silva* & *I.M. Andrade 785* (HDELTA); 3.I.2017, fl., *I.M. Andrade 4875* (HDELTA).

*Anemopaegma prostratum* is similar to *A. nebulosum* Firetti-Leggeri & L.G. Lohmann which occurs in the South region (Paraná, Santa Catarina), but differs in its ovate to orbicular chartaceous leaflets, lack of prophylls, and infundibuliform corolla (Leggieri *et al.* 2015). It differs from the others of its genus presented here by its simple woody tendrils, and the whitish appearance of the adaxial surface of the leaves due to their pubescence.

This species is not endemic to Brazil. It occurs in the Northeast (Bahia), Southeast (Espírito Santo, Minas Gerais, Rio de Janeiro, São Paulo), and South (Paraná, Rio Grande do Sul, Santa Catarina) regions and in the Atlantic Forest phytogeographic domain (BGF 2018). In the study area, this species was collected in a Caatinga area and was observed in flower and fruit from December to January.

**10.** ***Bignonia corymbosa*** (Vent.) L.G. Lohmann, Jard. Malmaison 1(8): 43, 5. 1804. Fig. 2i-j

Liana. Stem quadrangular, non-fistulose, striate, pubescent, with lenticels. Prophylls bromeliad-like. Leaves 2–3-foliolate; petiole 0.8–4.3 cm long, glabrous; petiolules 0.2–2.1 cm long, glabrous; tendrils simple, glabrous, lenticels absent; leaflets 6–14 × 3.2–5.9 cm, chartaceous, discolorous, elliptic to ovate, apex acuminate, base obtuse, margin entire, glabrous on adaxial and abaxial surfaces. Inflorescence an axillary thyrse, 6–11 cm long, bracts 0.3–0.4 cm long; calyx 0.6–0.8 × 0.5–0.8 cm, campanulate, glabrous, green, patelliform glands present; corolla 4.1–6.1 cm long, infundibuliform, purple, patelliform glands present, lobes 1.8–2.5 × 1–1.7 cm, glabrous; stamens 1.5–2.4 cm long, glabrous, staminode 3–4 cm long; ovary 4–5 × 1–2 mm, glabrous; nectariferous disk absent; style 3.2 cm long, stigma 2 mm long. Fruit capsule septifragal, flattened, linear, 22.5–47 × 1.8–2.2 cm, glabrous, patelliform glands absent. Seeds 2.9–3.5 × 1.5–1.6 cm, brown, patelliform glands absent.

**Examined material**: BRAZIL. PIAUÍ: Ilha Grande, 15.IX.2011, fl., *R.N. Freitas 34* (HDELTA); Tatus, 26.X.2016, fl., *D.A. Santos 45* (HDELTA). Parnaíba: Estrada do Céu, 29.IX.2014, fl. and fr., *R.C.S. Costa*

*01* (HDELTA); 10.I.2017, fl. and fr., *D.A. Santos 55* (HDELTA).

*Bignonia corymbosa* is distinguished by its bromeliad-like prophylls, flattened linear septifragal fruit capsule 22.5–47 cm long, and purple corolla.

This species is a Neotropical liana widely distributed in the tropics (Gentry 1974). It is not endemic to Brazil where it occurs in the North (Acre, Amazonas, Pará, Rondônia, Tocantins), Northeast (Alagoas, Bahia, Ceará, Maranhão, Pernambuco, Piauí, Sergipe), Central-West (Goiás, Mato Grosso do Sul, Mato Grosso), and Southeast (Espírito Santo, Minas Gerais, Rio de Janeiro, São Paulo) regions and in the Amazon, Cerrado, and Atlantic Forest phytogeographic domains (BGF 2018). In the study area, it is popularly known as "liana" and was collected on sand banks associated with river banks and stream sides, characterized as an amphibious or semi-aquatic macrophyte. In coastal Piauí it was observed in flower and fruit during all months of the year.

**11. *Cuspidaria argentea*** (Wawra) Sandwith, Kew Bull. 9(4): 606. 1955. Fig. 2k-l

Liana. Stem cylindrical, non-fistulose, striate, pubescent, with lenticels. Prophylls absent. Leaves 2–3-foliolate; petiole 0.7–1.6 cm long, pubescent; petiolules 0.3–1 cm long, pubescent; tendrils simple, pubescent, lenticels absent; leaflets 3.5–6.7 × 1.6–3.1 cm, chartaceous, discolorous, ovate, apex acute to cuspidate, base cuneate, margin entire, pubescent on adaxial and abaxial surfaces, patelliform glands absent. Inflorescence a terminal thyrse, 8–17 cm long, pubescent, bracts absent; calyx 0.1–0.2 × 0.3 cm, campanulate, puberulent, 5-toothed, light pink, patelliform glands absent; corolla 2.1–3.5 cm long, infundibuliform, lilac, pubescent, lobes 0.7 × 0.8 cm, pubescent; stamens 0.8–1.3 cm long glabrous, staminode 2–3 cm long; ovary 1 × 1 mm, glabrous; nectariferous disk 1 × 1 mm; style 1.4 cm long, pubescent, stigma 1 mm long. Fruit and seeds not observed.

**Examined material**: BRAZIL. PIAUÍ: Parnaíba, Av. São Sebastião, 9.III.2017, fl., *D.A. Santos 60* (HDELTA); Bairro Reis Velloso, 26.II.2014, fl., *A.A. Tavares* (HDELTA 4154). Luís Correia, Pontal do Anel, 24.I.2016, fl., *R.N. Silva 03* (HDELTA); 24.I.2016, fl., *T.S. Silva 01* (HDELTA); 20.II.2016, *R.S. Souza 01* (HDELTA); 24.I.2016, fl., *B.M.A. Fortes 01* (HDELTA).

*Cuspidaria argentea* is characterized by calyx usually with split teeth. According to Lohmann & Pirani (2003) the fruit capsules have raised margins and median ribs. The dry leaflets of *C. argentea* have a lilac color that differentiates them from those of other species studied; the 0.1–0.2 cm long is also distinctive.

This species is endemic to Brazil, occurring in Northeast region (Bahia, Ceará, Maranhão, Pernambuco, Piauí) and in the Caatinga phytogeographic domain (BGF 2018). In coastal Piauí it was found growing in ruderal areas, flowering from January to March.

**12. *Cuspidaria pulchra*** (Cham.) L.G. Lohmann, Ann. Missouri Bot. Gard. 99(3): 428. 2014. Fig. 3a-b

Liana. Stem cylindrical, non-fistulose, striate, pubescent, with lenticels and glands. Prophylls absent. Leaves 3-foliolate; petiole 1.1–3.1 cm long, pubescent; petiolules 0.4–2 cm long, pubescent; tendrils simple, pubescent, lenticels absent; leaflets 3.4–7.5 × 2.5–4.9 cm, chartaceous, discolorous, ovate to elliptic, apex acute to cuspidate, base cordate, margin entire, tomentose on adaxial surface and pubescent on abaxial surface. Inflorescence a terminal thyrse, 15–22.5 cm long, bracts absent; calyx 0.8 × 0.4 cm, spathaceous and bilobate, pubescent, purple, patelliform glands present; corolla 2–3.5 cm long, infundibuliform, purple, pubescent, lobes 0.5 × 0.5 cm; stamens 1.1–1.3 cm, glabrous, staminode 2 mm long; ovary 2 × 1 mm, glabrous; nectariferous disk 1 × 3 mm; style 1.5 cm long, stigma 1 mm long. Fruit capsule septifragal, flattened, linear, 21–23 × 0.8 cm, viscous patelliform glands present, lepidote present. Seeds 2.2–2.9 × 0.9–1 cm, glabrous, light brown, patelliform glands absent.

**Examined material**: BRAZIL. PIAUÍ: Parnaíba, Tabuleiros Litorâneos, 19.IX.2016, fl. and fr., *D.A. Santos 43* (HDELTA); Embrapa, 22.IX.2014, fl. and fr., *E.G. Amorim 21* (HDELTA).

*Cuspidaria pulchra* can be identified by the densely pubescent leaf blade and thin, inflated calyx.

This species occurs in Bolivia and Brazil. In Brazil it occurs in the Northeast (Bahia, Ceará, Maranhão, Piauí) Central-West (Distrito Federal, Goiás, Mato Grosso), and Southeast (Espírito Santo, Minas Gerais, Rio de Janeiro, São Paulo) regions (BGF 2018). Scudeller (1997, 2004) recorded this species in flower from March to September, and in May. In the study area, flowering and fruiting were observed in September and October in a Caatinga area.

**13. *Dolichandra hispida*** (DC.) L.H. Fonseca & L.G. Lohmann, PhytoKeys 46: 37. 2015. Fig. 3c

Liana. Stem cylindrical non-fistulose, striate, glabrous, with lenticels. Prophylls 0.6–0.8 cm long, acute, glabrous, patelliform glands absent. Leaves 2-foliolate; petiole 0.5–1.9 cm long, puberulent; petiolules 0.9–1 cm long, puberulent; tendrils trifid, uncinate, pubescent, lenticels absent; leaflets 7.9–12 × 2.5–4.5 cm, chartaceous, discolorous, oblong to elliptic, apex acute, base obtuse, margin entire, glabrous on adaxial and abaxial surfaces, patelliform glands absent. Inflorescence an axillary thyrse, 3–5 cm long, hispid, bracts 0.3–0.4 cm; calyx 2 × 1.2 cm, spathaceous,

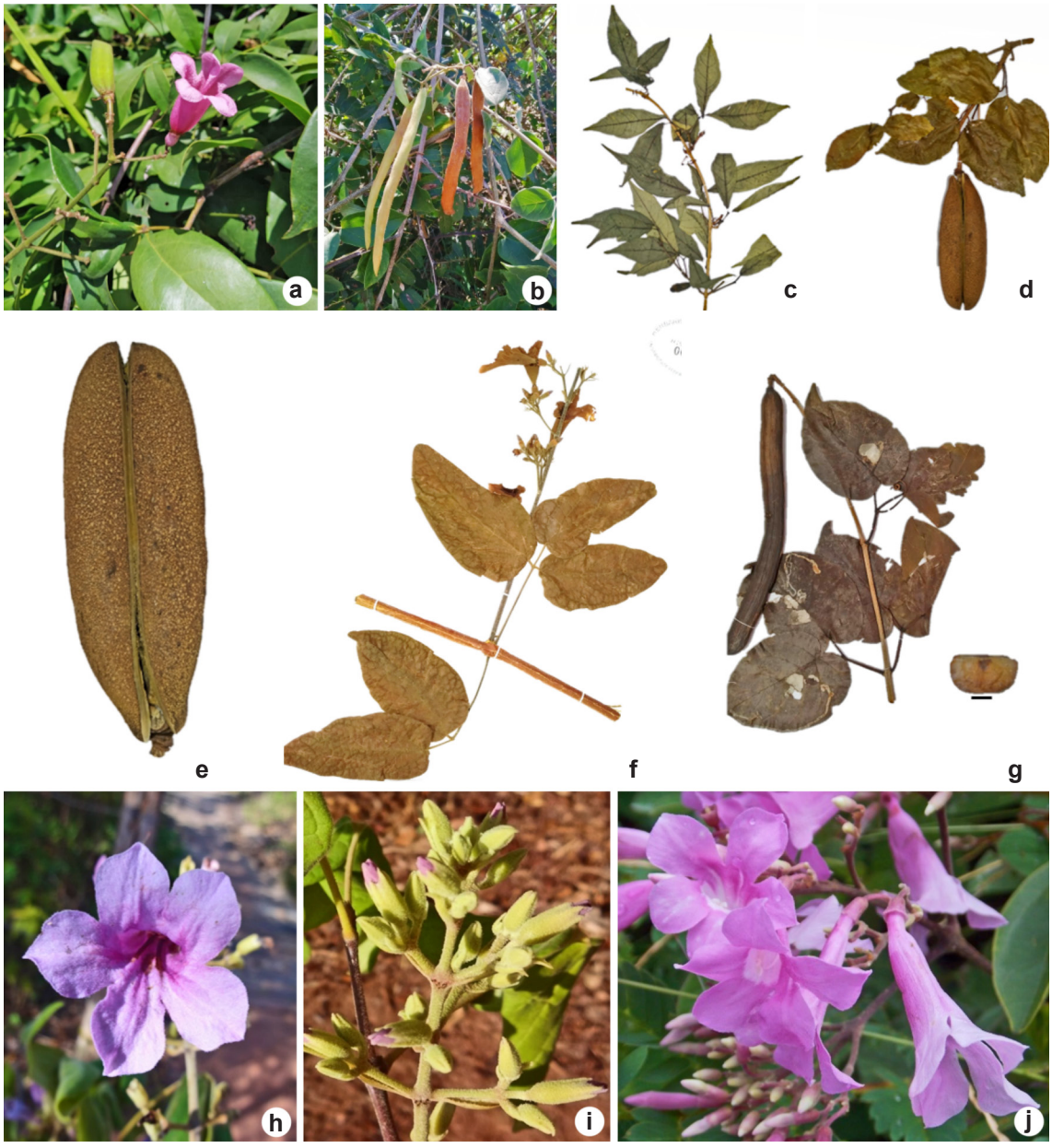


**Figure 3** – a-j. Diversity of Bignoniaceae in coastal Piauí, Brazil – a-b. *Cuspidaria pulchra* – a. flower; b. fruits; c. *Dolichandra hispida*; d-e. *Dolichandra quadrivalvis* – d. branch; e. fruit; f. *Fridericia cinnamomea*; g. *F. crassa*; h-i. *F. dispar* – h. flower; i. flowers in bud showing calyces; j. *F. platyphylla*. (a-b. *Santos 43*; c. *Nascimento 76*; d-e. *Santos 62*; f. *Lima 60*; g. *Reis 51*; h-i. *Andrade 4577*; j. *Santos 57*).

membranaceous, glabrous, non-toothed, green, patelliform glands absent; corolla 3 cm long, infundibuliform, dark yellow, glabrous; stamens 1.3–1.9 cm long, glabrous, staminode 7 mm long; ovary 3 × 1 mm, glabrous; nectariferous disk 1–3 mm; style 2.5 cm, stigma 2 mm long. Fruit and seeds not observed.

**Examined material**: BRAZIL. PIAUÍ: Ilha Grande, 12.I.2010, fl., *M.G.P. Nascimento 76* (HDELTA).

*Dolichandra hispida* is characterized by its spathaceous calyx, trifid tendrils and hispid indumentum and differs from *D. quadrivalvis* in its chartaceous, oblong to elliptic leaflets.

This species is not endemic to Brazil, where it occurs in the Central-West (Mato Grosso do Sul, Mato Grosso), Southeast (Minas Gerais, São Paulo), and South (Paraná, Rio Grande do Sul, Santa Catarina) regions and in Atlantic Forest vegetation (Fonseca & Lohmann 2019), near wetlands. In the study area the species was collected in flower in January in Caatinga. This is a new record for the state of Piauí.

**14. *Dolichandra quadrivalvis*** (Jacq.) L.G. Lohmann, Nuevo Cat. Fl. Vasc. Venezuela 273. 2008. Fig. 3d-e

Liana. Stem cylindrical, non-fistulose, striate, glabrous, with lenticels. Prophylls absent. Leaves 2-foliolate; petiole 1.8–2.3 cm long, glabrous; petiolules 0.8–1.3 cm long, glabrous; tendrils uncinate, glabrous, lenticels absent; leaflets 3.5–9 × 2.7–7 cm, chartaceous, discolorous, ovate to obovate, apex acuminate, base truncate, margin entire, glabrous on adaxial and abaxial surfaces, patelliform glands absent. Inflorescence not observed. Fruit capsule elliptic to oblong or oval, 6.5–13 × 2–4.5 cm, rigid, glabrous, brown, patelliform glands present, with persistent calyx. Seeds 3.9–4.1 × 0.9–1.3 cm, light brown, patelliform glands absent.

**Examined material**: BRAZIL. PIAUÍ: Parnaíba, Tabuleiros Litorâneos, 9.III.2017, fr., *D.A. Santos 62* (HDELTA).

*Dolichandra quadrivalvis* can be identified by the presence of uncinate tendrils and a long, rigid, oval fruit capsule.

This species is not endemic to Brazil where it occurs in the North (Acre, Amazonas, Amapá, Pará, Rondônia, Roraima, Tocantins), Northeast (Alagoas, Bahia, Ceará, Maranhão, Paraíba, Pernambuco, Piauí, Rio Grande do Norte, Sergipe), Central-West (Distrito Federal, Goiás, Mato Grosso do Sul, Mato Grosso), Southeast (Espírito Santo, Minas Gerais, Rio de Janeiro, São Paulo), and South (Paraná, Rio Grande do Sul, Santa Catarina) regions and in the Amazon, Caatinga, Atlantic Forest, and Pantanal phytogeographic domains (Fonseca & Lohmann 2019). In the study area it was collected in fruit in March in a Caatinga area.

**15. *Fridericia cinnamomea*** (DC.) L.G. Lohmann, Ann. Missouri Bot. Gard. 99(3): 435. 2014. Fig. 3f

Liana. Stem cylindrical, non-fistulose, striate, puberulent, with lenticels. Prophylls absent. Leaves 3-foliolate; petiole 4.8–5.8 cm long, puberulent; petiolules 0.4–2 cm long, puberulent; tendrils simple, puberulent, lenticels absent; leaflets 9.1–11.1 × 4.1–5.3 cm, chartaceous, strongly asymmetrical lateral, discolorous, ovate, apex retuse, base oblique, margin entire, puberulent on adaxial and abaxial surfaces, patelliform glands present. Inflorescence a terminal raceme, 11.5–18 cm long, bracts 0.2 cm long; calyx 0.5–0.7 × 0.4–0.5 cm, cupuliform, puberulent, 5-toothed, light green, more of three patelliform glands present; corolla 2–3 cm long, infundibuliform, lilac, puberulent, lobes 1–1.2 × 0.8–1.3 cm, puberulent; stamens 1.0–1.5 cm long, glabrous, staminode not observed; ovary 3 × 1 mm, glabrous; nectariferous disk 1–2 mm long; style 1.1 cm long, stigma 2 mm long. Fruit and seeds not observed.

**Examined material**: BRAZIL. PIAUÍ: Parnaíba, 7.X.2011, fl., *M.J.A. Rodrigues 09* (HDELTA); Embrapa, 14.II.2016, fl., *G.A. Lima 60* (HDELTA).

*Fridericia cinnamomea* is distinguished by its lilac flowers, chartaceous puberulent leaflets, with a retuse apex and strongly asymmetrical lateral leaflets.

This species is not endemic to Brazil where it occurs in the North (Acre, Amazonas, Amapá, Pará, Rondônia, Roraima, Tocantins), Northeast (Maranhão), and Central-West (Goiás, Mato Grosso do Sul, Mato Grosso) regions and in the Amazon and Cerrado phytogeographic domains (BFG 2018). In coastal Piauí it was collected as a ruderal in disturbed areas and in Caatinga vegetation. Flowering was observed in February and October.

**16. *Fridericia crassa*** (Bureau & K. Schum.) L.G. Lohmann, Ann. Missouri Bot. Gard. 99(3): 436. 2014. Fig. 3g

Liana. Stem quadrangular, non-fistulose, striate, glabrous, with lenticels absent. Prophylls absent. Leaves 2-foliolate; petiole 1.7–4.1 cm long,

puberulent; petiolules 1.8–3 cm long, glabrous; tendrils simple, glabrous, lenticels present; leaflets 9–12 × 7.1–9.9 cm, coriaceous, concolorous, cordiform, apex acute, base cordate, margin entire, adaxial and abaxial surfaces glabrous. Inflorescence not observed. Fruit capsule septifragal, flattened, 27.7 × 2.1 cm, glabrous, patelliform glands present. Seeds 3 × 1.2 cm, glabrous, light brown, patelliform glands absent.

**Examined material**: BRAZIL. PIAUÍ: Cajueiro da Praia, Lagoa Seca, 26.I.2010, fr., *R.B. Reis 51* (HDELTA).

*Fridericia crassa* is characterized by its glabrous, cordiform, coriaceous leaflets and elongated fruit which resembles that of *Bignonia corymbosa*.

This species is endemic to Brazil and occurs only in the Northeast (Maranhão, Piauí) region and in the Caatinga and Cerrado phytogeographic domains (BFG 2018). In the study area it was collected in fruit in January in an area of Caatinga.

**17. *Fridericia dispar*** (Bureau *ex* K. Schum.) L.G. Lohmann, Ann. Missouri Bot. Gard. 99(3): 437 (2014). Fig. 3h-i

Liana. Stem cylindrical, non-fistulose, striate, pubescent, with lenticels. Prophylls 0.2–0.3 cm long, straight, filiform, pubescent, patelliform glands absent. Leaves 3-foliolate; petiole 2.7–5.5 cm long, pubescent; petiolules 0.2–0.5 cm long, pubescent; tendrils simple, pubescent, lenticels present; leaflets 6–9 × 2.7–4.1 cm, chartaceous, discolorous, ovate to elliptic, apex cuspidate to retuse, base obtuse, margin entire, adaxial and abaxial surfaces pubescent, patelliform glands present. Inflorescence a terminal thyrse, 5.5–8.8 cm long, bracts 0.2–0.4 cm; calyx 0.4–0.5 × 0.3–0.4 cm, tubular, pubescent, 5-toothed, light green, one or two blackened patelliform glands present; corolla 1.9–2 cm long, infundibuliform, purple, pubescent, lobes 8 × 8 cm, puberulent; stamens 0.9–1.2 cm long, glabrous, staminode 5 mm long; ovary 2 × 1 mm, glabrous; nectariferous disk 1 × 1 mm; style 1.4 cm long, stigma 1 mm long. Fruit and seeds not observed.

**Examined material**: BRAZIL. PIAUÍ: Parnaíba, Tabuleiros Litorâneos, 8.I.2015, fl., *R.C.S. Costa & M.F.S. Silva 12* (HDELTA); 18.XII.2015, fl., *I.M. Andrade 4577* (HDELTA).

*Fridericia dispar* is characterized by its densely pubescent stem and pubescent calyx and 5-toothed. It is similar to *Fridericia cinnamomea* in pubescence but differs in the ovate to elliptic leaflets and tubular calyx (cupuliform in *F. cinnamomea*).

This species is endemic to Brazil and occurs in the Northeast (Alagoas, Bahia, Ceará, Paraiba, Pernambuco, Piauí, Rio Grande do Norte, Sergipe) and Southeast (Minas Gerais) regions and in the Caatinga and Cerrado phytogeographic domains (BFG 2018). In the study area it plant was recorded in Caatinga vegetation and as a ruderal in disturbed areas. Flowering was observed from December to January.

**18. *Fridericia platyphylla*** (Cham.) L.G. Lohmann, Ann. Missouri Bot. Gard. 99(3): 442. 2014. Fig. 3j

Liana. Stem cylindrical, non-fistulose, striate, puberulent, with lenticels. Prophylls absent. Leaves 2-foliolate; petiole 0.6–0.8 cm long, pubescent; petiolules 1–1.5 cm long, pubescent; tendrils not observed; leaflets 4.4–9.3 × 2.5–6.7 cm, chartaceous, discolorous, obovate or orbicular, apex cuspidate to retuse, base cuneate, margin entire, pubescent on adaxial and abaxial surfaces, venation brochidodromous, triplinerved at base. Inflorescence a terminal thyrse, 8.5–10 cm long, bracts absent; calyx 0.3–0.4 × 0.2–0.3 cm, tubular, puberulent, 5-toothed, green, patelliform glands absent; corolla 2.5–3 cm long, infundibuliform, purple, puberulent, lobes 0.9 × 0.7 cm, puberulent; stamens 0.8–1.2 cm long, glabrous, staminode 3 mm long; ovary 3 × 1 mm, glabrous; nectariferous disk 1 × 2 mm; style 1.4 cm long, stigma 1 mm long. Fruit flattened, 17.7 × 0.9 cm, patelliform glands present, lepidote scales present. Seeds 2.8–3 × 0.9–1 cm, light brown, patelliform glands absent.

**Material examined**: BRAZIL. PIAUÍ: Cajueiro da Praia, 5.VI.2017, fl., *D.A. Santos 76* (HDELTA). Luís Correia, Pontal do Anel, 14.VI.2015, fl., *V.S. Pereira 54* (HDELTA). Parnaíba, Cachoeirinha, 18.VIII.2011, fl. and fr., *M.S.L. Cardoso 02* (HDELTA); Conrado, 19.VII.2014, fl. and fr., *M.S. Carvalho & J.C.V. Santos 02* (HDELTA); BR-422, 2.VIII.2014, fl., *V.S. Pereira 02* (HDELTA); Embrapa, 9.VII.2015, fl. and fr., *E.G. Amorim 41* (HDELTA); Reis Velloso, 10.I.2017, fl., *D.A. Santos 57* (HDELTA); Joaz Souza, 19.XII.2014, fl., *R.C.S. Costa 09* (HDELTA).

*Fridericia platyphylla* is characterized by its obovate or orbicular, basally triplinerved leaflets with brochidodromous venation, and its shrubby to lianescent habit.

This species is endemic to Brazil, occurring in the North (Acre, Amazonas, Pará, Rondônia, Roraima, Tocantins), Northeast (Alagoas, Bahia, Ceará, Maranhão, Paraíba, Pernambuco, Piauí,

Sergipe), Central-West (Distrito Federal, Goiás, Mato Grosso do Sul, Mato Grosso), Southeast (Espírito Santo, Minas Gerais, Rio de Janeiro, São Paulo), and South (Paraná) regions and in the Amazon, Caatinga, Cerrado, Atlantic Forest, and Pantanal phytogeographic domains (BFG 2018). In the study area it was observed in Caatinga vegetation, along highway margins and as a ruderal in disturbed areas. It is considered a common species in several vegetation types. Flowering was observed from December to August and fruiting between July and August.

Silva-Castro & Queiroz (2003) recorded this species in Caatinga and Campos Gerais (a form of Cerrado) in Catolés, Bahia. Araujo (2008) recorded it in Campo Rupestre areas (low-growing montane vegetation on rocks and associated thin soils) and seasonal forest in Itacolomi State Park, Minas Gerais.

**19. *Fridericia subverticillata*** (Bureau & K. Schum.) L.G. Lohmann, Ann. Missouri Bot. Gard. 99(3): 445. 2014. Fig. 4a

Liana. Stem cylindrical, non-fistulose, striate, glabrous, with blackened lenticels. Prophylls absent. Leaves 2-foliolate; petiole 0.2–0.7 cm long, puberulent; petiolules 0.5–0.6 cm long, puberulent; tendrils simple, puberulent, lenticels present; leaflets 2.6–12.5 × 1.2–5.2 cm, coriaceous, discolorous, lanceolate, apex acute, retuse, base attenuate, margin entire, glabrous on adaxial and abaxial surfaces. Inflorescence an axillary thyrse, 5–8.5 cm long, bracts absent; calyx 0.4–0.6 × 0.6–0.8 cm, campanulate, puberulent, light green, patelliform glands present; corolla 2.7–3 cm long, infundibuliform, whitish, puberulent, lobes 1.2 × 1.3 cm, puberulent; stamens 1.3–1.8 cm long, glabrous, staminode 7–8 mm long; ovary 1 × 1 mm, glabrous; nectariferous disk 1 × 3 mm; style 3 cm long, stigma 2 mm long. Fruit linear, flattened, 8.1–13.2 × 1.2–1.6 cm, glabrous, patelliform glands absent, calyx persistent. Seeds 2.4 × 1.1cm, light brown, patelliform glands absent.

**Examined material**: BRAZIL. PIAUÍ: Cajueiro da Praia, 5.VI.2007, fl. and fr., *D.A. Santos 75* (HDELTA). Ilha Grande, Tatus, 26.IV.2010, fl., *L. Araújo 05* (HDELTA). Luís Correia, Pontal do Anel, 7.VI.2016, fl., *V.S. Pereira 42* (HDELTA). Parnaíba, Tabuleiros Litorâneos, 23.V.2017, fl., *D.A. Santos 67* (HDELTA).

*Fridericia subverticillata* differs in its white corolla from the other species of *Fridericia* included in this study.

This species is endemic to Brazil, occurring in the Northeast region (Ceará, Piauí and Rio Grande do Norte) and in the Caatinga phytogeographic domain (BFG 2018). In the study area it was found as ruderal in disturbed areas and observed flowering from April to June, fruiting in June.

**20. *Handroanthus impetiginosus*** (Mart. *ex* DC.) Mattos, Loefgrenia 50: 2. 1970. Fig. 4b-c

Tree 2.5 m. Stem cylindrical, non-fistulose, striate, glabrous, with lenticels. Prophylls absent. Leaves 5-foliolate; petiole 10–11 cm long, lepidote; petiolules 0.9–6 cm long, lepidote; tendrils absent; leaflets 5.5–15 × 3.2–8.2 cm, chartaceous, discolorous, ovate, apex acute, base rounded, margin entire, puberulent on adaxial and abaxial surface. Inflorescence a terminal thyrse, 10–12 cm long, axis puberulent, bracts 0.1–0.2 cm long; calyx 1.7 × 0.9 cm, campanulate, puberulent, green, patelliform glands present; corolla 5–8.5 cm, infundibuliform, light pink, puberulent, lobes 2.2 × 2.5 cm, puberulent; stamens 1.8–2 cm long, glabrous, staminode 4–5 mm long; ovary 2–3 × 1–2 mm, glabrous; nectariferous disk 2 × 2 mm; style 3 cm long, stigma 2 mm long. Fruit capsule flattened 17 × 1.1 cm, puberulent, patelliform glands absent. Seeds 2–2.2 × 0.5–0.7 cm, dark brown, patelliform glands absent.

**Examined material**: BRAZIL. PIAUÍ: Parnaíba, Av. São Sebastião, 22.VIII.2008, fl., *L.S. Santos 02* (HDELTA); 10.VI.2014, fl., *I. Lima 59* (HDELTA); Floriopólis, 23.XII.2014, fl. and fr., *G.A. Lima 13* (HDELTA); Tabuleiros Litorâneos, 19.IX.2016, fl., *D.A. Santos 42* (HDELTA).

*Handroanthus impetiginosus* is characterized by its digitate, usually 5–7-foliolate leaves, the leaflets pubescent on both faces and with conspicuous central and secondary veins (Rodrigues 2012). According to Espírito Santo *et al*. (2013), the species exhibits wide morphological variation.

This species is not endemic to Brazil, ranging from northwestern Mexico to northwestern Argentina. In Brazil it occurs in the North (Acre, Pará, Rondônia, Tocantins), Northeast (Alagoas, Bahia, Ceará, Maranhão, Paraíba, Pernambuco, Piauí, Rio Grande do Norte, Sergipe), Central-West (Distrito Federal, Goiás, Mato Grosso do Sul, Mato Grosso), and Southeast (Espírito Santo, Minas Gerais, Rio de Janeiro, São Paulo) regions and in the Amazon, Caatinga, Cerrado, Atlantic Forest, and Pantanal phytogeographic domains (BFG 2018). In the study area flowering was observed between August and December, and it was found as a ruderal in disturbed areas and in caatinga vegetation.


**Figure 4** – a-p. Diversity of Bignoniaceae in coastal Piauí, Brazil – a. *Fridericia subverticillata*; b-c. *Handroanthus impetiginosus* – b. habit; c. flower; d-e. *Lundia helicocalyx* – d. inflorescence; e. tendril; f-h. *Neojobertia candolleana* – f. flower; g. calyx; h. tendril; i-j. *N. mirabilis* – i. inflorescence; j. calyx; k-l. *Pleonotoma castelnaei* – k. flower; l. fruit; m-o. *Stizophyllum perforatum* – m. flower; n. fruit; o.calyx; p. *Tanaecium dichotomum.* (a. *Santos 75*; b-c. *Santos 42*; d-e. *Costa & Silva 13*; f-h. *Costa 10*; i-j. *Costa & Silva 05*; k-l. *Silva & Andrade 781*; m-o. *Silva & Andrade 782*; p. *Pereira 109*).

**21. *Lundia helicocalyx*** A.H. Gentry, *Phytologia* 46(4): 210(-211) 1980. Fig. 4d-e

Liana. Stem cylindrical non-fistulose, striate, pubescent, with lenticels. Prophylls absent. Leaves 2–3-foliolate; petiole 1.5–2.7 cm long, pubescent; petiolules 1–2.5 cm long, pubescent; tendrils simple, pubescent, lenticels present; leaflets 5.8–10.7 × 3.4–6.5 cm, chartaceous, discolorous, ovate, apex cuspidate, base cordate, margin entire, pubescent on adaxial and abaxial surfaces, patelliform glands absent. Inflorescence an axillary raceme, 7–9 cm long, bracts absent; calyx 0.4–0.5 × 0.3–0.4 cm, cupuliform to campanulate, pubescent, 5-toothed, light green, patelliform glands present; corolla 4–4.3 cm long, infundibuliform, cream, pubescent, patelliform glands present, lobes 1.7–1.5 cm, pubescent; stamens 1–1.8 cm long, pubescent, staminode 2 mm long; ovary 4 × 2 mm, pubescent; nectariferous disk not observed; style 3.1 cm long, stigma 4 mm long. Fruit and seeds not observed.

**Examined material**: BRAZIL. PIAUÍ: Parnaíba, Carpina, 8.V.2015, fl., *D.A. Santos 15* (HDELTA); Tabuleiros Litorâneos, 8.I.2015, fl., *R.C.S. Costa* & *M.F.S. Silva 13* (HDELTA); Tabuleiros Litorâneos, 8.II.2017, fl., *D.A. Santos 58* (HDELTA).

*Lundia helicocalyx* is easily recognized by its very dense pubescence, and its calyx that is long, with long lobes; the flowers are similar to those of *Lundia densiflora* DC., an Amazonian species. The type of *L. helicocalyx* was collected in Piauí in 1972 by D. Sucre & J. Silva in the municipality of Buriti dos Lopes.

This species is endemic to Brazil, occurring in the Northeast region (Maranhão, Piauí) and in the Caatinga and Cerrado phytogeographic domains (BFG 2018). In the study area this species was collected in Caatinga vegetation and flowering was observed in January and February.

**22. *Neojobertia candolleana*** (Mart. *ex* DC.) Bureau & K. Schum., *Fl. bras*., 8(2): 396. 1897. Fig. 4f-h

Liana. Stem quadrangular, non-fistulose, striate, glabrous, lenticels absent. Prophylls 0.2–0.3 cm, straight, small, filiform, bifurcated at the apex, patelliform glands absent. Leaves triternate; petiole 1.7–3 cm long, glabrous; petiolules 1–3.2 cm long, glabrous; tendrils trifid, glabrous, lenticels absent; leaflets 1.7–3.1 × 0.9–2.1 cm, chartaceous, discolorous, ovate, apex cuspidate, base oblique, margin undulate, glabrous on adaxial and abaxial surfaces. Inflorescence a terminal or axillary thyrse, 5–6.5 cm long, axis glabrous, bracts absent; calyx 4–4.2 × 0.8–0.9 cm, spathaceous, glabrous, 5-toothed, green, patelliform glands present throughout the calyx; corolla 6–7.5 cm long, infundibuliform, yellow, glabrous, lobes 1.9–2 × 2.2–2.4 cm, patelliform glands present; stamens 2–2.3 cm long, glabrous, staminode 4–5 mm long; ovary 3 × 1 mm, glabrous; nectariferous disk 1 × 3 mm; style 4.4 cm, stigma 4 mm long. Fruit long, flattened, 19 × 2.9 cm, glabrous, patelliform glands present, calyx persistent. Seeds 4–5 × 1.2–1.4 cm, beige, patelliform glands absent.

**Examined material**: BRAZIL. PIAUÍ: Luís Correia, Pontal do Anel, 21.II.2016, fl., *V.S. Pereira 115* (HDELTA). Parnaíba, Av. São Sebastião, 29.V.2017, fl., *D.A. Santos 69* (HDELTA); Rosápolis, 19.XII.2014, fl. and fr., *R.C.S. Costa 10* (HDELTA); Tabuleiros Litorâneos, 1.XII.2016, fl., *D.A. Santos 53* (HDELTA); Tabuleiros Litorâneos-Agrícola Formosa, 23.V.2017, fl. and fr., *D.A. Santos 65* (HDELTA).

In Brazil there are three species of *Neojobertia*, all of which occur in Piauí state. *N. candolleana* is characterized by the presence of filiform prophylls without patelliform glands, chartaceous leaflets, and a spathaceous calyx.

This species is endemic to Brazil occurring in the Northeast (Alagoas, Bahia, Ceará, Paraiba, Pernambuco, Piauí, Rio Grande do Norte, Sergipe) and Southeast (Minas Gerais) regions and in the Caatinga and Cerrado phytogeographic domains (BFG 2018). In coastal Piauí this species was collected as a ruderal in disturbed areas and in Caatinga vegetation. Flowering and fruiting was observed in May, June and December.

**23. *Neojobertia mirabilis*** (Sandwith) L.G. Lohmann, Ann. Missouri Bot. Gard. 99(3): 455. 2014. Fig. 4i-j

Liana. Stem cylindrical, non-fistulose, striate, glabrous, lenticels absent. Prophylls absent. Leaves triternate; petiole 2–3.5 cm long, glabrous; petiolules 0.8–2.5 cm long, glabrous; tendrils trifid, glabrous, lenticels absent; leaflets 4.8–7.2 × 2.2–6 cm, coriaceous, discolorous, ovate, apex acuminate, base rounded, margin entire, adaxial and abaxial surfaces glabrous. Inflorescence a terminal thyrse, 10–15 cm long, bracts 0.4–0.5 cm; calyx 1.5–1.8 × 1.4–1.5 cm, urceolate or spathulate, membranaceous, puberulent, white, patelliform glands absent; corolla 4–4.5 cm long, infundibuliform, dark yellow when fully expanded, white when senescent, puberulent, lobes 1.9–2 × 2.2–2.4 cm, puberulent; stamens 1.3–2 cm long,

glabrous, staminode 6 mm long; ovary 0.8–1 × 0.9–1 mm, glabrous; nectariferous disk 0.9–1 × 2 mm; style 3 cm long, stigma 3 mm long. Fruit and seeds not observed.

**Examined material**: BRAZIL. PIAUÍ: Parnaíba, Catanduvas, 10.XI.2014, fl., *R.C.S. Costa* & *M.F.S. Silva 05* (HDELTA).

*Neojobertia mirabilis* is characterized by triternate leaves, spathulate or urceolate calyx and glabrous bifid tendrils. When mature, the flower changes in color from dark yellow to light yellow.

This species is endemic to Brazil occurring in the Northeast region (Maranhão, Piauí) and in the Caatinga phytogeographic domain (BFG 2018). It was collected as a ruderal in a disturbed area, in flower in November.

**24. *Pleonotoma castelnaei*** (Bureau) Sandwith, Kew Bull. 13(3): 438. 1959. Fig. 4k-l

Liana. Stem quadrangular, non-fistulose, striate, glabrous, with lenticels. Prophylls foliaceous 1.5–1.7 cm, orbicular, glabrous, patelliform glands present at base. Leaves triternate; petiole 5–6 cm long, glabrous; petiolules 2–2.5 cm long, glabrous; tendrils bifid to trifid, glabrous, lenticels absent; leaflets 3.2–5.5 × 2.2–2.9 cm, chartaceous, discolorous, elliptic, apex acute, base oblique, margin entire, glabrous on adaxial and abaxial surfaces, patelliform glands present. Inflorescence an axillary raceme, 5–5.5 cm long, bracts absent; calyx 0.8 × 0.4 cm, tubular, glabrous, green, 5-toothed, patelliform glands present; corolla 7–8 cm long, hypocrateriform, light yellow lobes cream, glabrous, lobes 1.3 × 0.5 cm, patelliform glands present; stamens 1.8–2 cm long, glabrous, staminode not observed; ovary 3 × 1 mm, glabrous; nectariferous disk 1 × 3 mm; style 4.8 cm long, stigma 2 mm long. Fruit capsule flattened, linear, 1.9 × 1.6 cm, glabrous, patelliform glands present. Seeds 3.5 ×1 cm, glabrous, light brown.

**Examined material**: BRAZIL. PIAUÍ: Parnaíba, Catanduvas, 10.XI.2014, fl. and fr., *R.C.S. Costa 06* (HDELTA); Floriópolis, 29.XI.2016, fl., *D.A. Santos 50* (HDELTA); Tabuleiros Litorâneos, 18.XII.2015, fl. and fr., *M.F.S. Silva* & *I.M. Andrade 781* (HDELTA); 19.VII.2016, fl., *D.A. Santos 44* (HDELTA).

The species is characterized by its axillary foliaceous prophylls and hypocrateriform flowers. It is similar to the Amazonian species *Pleonotoma jasminifolia* (Kunth) Miers, differing only in its longer corolla tube (Silva-Castro & Queiroz 2003).

*Pleonotoma castelnaei* is endemic to Brazil, occurring in Northeast (Bahia, Maranhão, Piauí) and Southeast (Minas Gerais) regions and in the Caatinga and Cerrado phytogeographic domains (Gomes 2019). In the study area it was collected in Caatinga with flowering was observed from September to December and fruiting between November and December.

**25. *Stizophyllum perforatum*** (Cham.) Miers, Proc. Roy. Hort. Soc. London 3: 198. 1863. Fig. 4m-o

Liana. Stem cylindrical, fistulose, striate, pubescent, lenticels absent. Prophylls absent or deciduous. Leaves 2–3-foliolate; petiole 1–3 cm long, pubescent; petiolules 0.1–1.8 cm long, pubescent; tendrils simple, pubescent, lenticels absent; leaflets 2.9–7.7 × 1.5–4 cm, chartaceous, discolorous, elliptic to lanceolate, apex acute, base cordate, margin dentate, glabrous on adaxial surface and pubescent on abaxial surface, yellow glands on the abaxial surface. Inflorescence an axillary raceme, 4–6 cm long, pubescent, bracts absent; calyx 0.9–1 × 0.8–0.9 cm, urceolate, inflated, pubescent, purple, patelliform glands present; corolla 2.5–3 cm, infundibuliform, rosy, pubescent, lepidote, lobes 0.5 × 0.4 cm, pubescent; stamens 1.1–1.9 cm long, glabrous, staminode 2 cm long; ovary 4 × 1 mm, glabrous; nectariferous disk 1 × 2 mm; style 0.8 cm long, stigma 2 mm long. Fruit capsule septifragal, 34–42 × 0.6–0.7 cm, pubescent, striate, calyx persistent. Seeds 1.4–1.7 × 0.4–0.5 cm, grayish brown, patelliform glands absent.

**Examined material**: BRAZIL. PIAUÍ: Parnaíba, Tabuleiros Litorâneos, 18.XII.2015, fl. and fr., *M.F.S. Silva* & *I.M. Andrade 782* (HDELTA); 3.I.2017, fr., *I.M. Andrade 4878* (HDELTA).

*Stizophyllum perforatum* can be identified easily from its hollow stem, densely pubescent branches and leaflets, simple tendrils, and yellow glands on the abaxial face of the leaflets. In addition, the young branches have a rusty appearance (Rodrigues 2012) and the fruit is narrowly linear (Lohmann & Taylor 2014), characteristic also observed in the material collected on the coast of Piauí.

This species is not endemic to Brazil, where it occurs in the Northeast (Bahia, Ceará, Maranhão, Piauí), Central-West (Distrito Federal, Goiás, Mato Grosso), Southeast (Espírito Santo, Minas Gerais, Rio de Janeiro, São Paulo), and South (Paraná) regions and in the Cerrado (in campos cerrado) and Atlantic Forest phytogeographic domains (Beyer 2019). It was collected in a Caatinga area in flower and fruit during December and January.

**26. *Tanaecium dichotomum*** (Jacq.) Kaehler & L.G. Lohmann, PhytoKeys 132: 41. 2019. Fig. 4p

Liana. Stem cylindrical, non-fistulose, striate, puberulent, with lenticels. Prophylls absent. Leaves 3-foliolate; petiole 4.3–7 cm long, puberulent; petiolules 0.2–1 cm long, puberulent; tendrils not observed; leaflets 6.9–10.3 × 3.2–4.2 cm, chartaceous, discolorous, ovate, apex cuspidate, base obtuse, margin entire, puberulent on adaxial and abaxial surfaces. Inflorescence a terminal thyrse, 4.5–11 cm long, bracts 0.2–0.4 cm long; calyx 0.7–0.8 × 0.3–0.4 cm, tubular, truncate, pubescent, 5-toothed, green, patelliform glands present; corolla 3.4–4.8 cm, infundibuliform, vinaceous, puberulent, lobes 1.2–13 × 1.3–1.4 cm, patelliform glands present; stamens 0.8–1.4 cm long, puberulent, staminode 5 mm long; ovary 2–3 × 1 mm, glabrous; nectariferous disk 1 × 2 mm; style 1.9 cm long, stigma 1 mm long. Fruit and seeds not observed.
**Examined material**: BRASIL. PIAUÍ: Luís Correia, Pontal do Anel, 14.II.2016, fl., *V.S. Pereira 109* (HDELTA).

*Tanaecium dichotomum* is distinguished by its truncate pubescent calyx with dark patelliform glands and a multi-flowered thyrsoid inflorescence.

This species is not endemic to Brazil, where it occurs in the Northern (Acre, Amazonas, Amapá, Pará, Rondônia, Roraima, Tocantins), Northeast (Alagoas, Bahia, Ceará, Maranhão, Paraíba, Pernambuco, Piauí, Rio Grande do Norte, Sergipe), Central-West (Distrito Federal, Goiás, Mato Grosso do Sul, Mato Grosso) and Southeast (Espirito Santo, Minas Gerais, Rio de Janeiro, São Paulo) regions (BFG 2018), in the Amazon, Caatinga, Cerrado, Atlantic Forest, and Pantanal phytogeographic domains. It was observed in flower in February in a caatinga area.

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