

Flora of Paraíba, Brazil: Commelinaceae Mirb.

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Abstract: This study comprises the taxonomic survey of Commelinaceae in the State of Paraíba, northeastern Brazil, aiming present the richness and distribution of its species. Field expeditions were undertaken between March/2022 and June/2023 to obtain fertile specimens and identify natural populations. Morphological analyses were based mainly on the local herbarium collection (HACAM) and on collections maintained in local herbaria (CSTR, EAN, HCES, and JPB), as well as in herbaria from Pernambuco State (IPA and PEUFR) and digital platforms (Herbário Virtual Reflora and *SpeciesLink*). Taxonomic identifications were based on specialized literature, including consultations of the nomenclatural types and protologues. A total of 18 species belonging to nine genera were identified (12 species encountered in the Caatinga and 15 in the Atlantic Forest). The genera *Commelina* L. and *Tradescantia* L. emend. M.Pell. were the most taxonomically diversified, with four species each. *Dichorisandra perforans* and *D. thyrsiflora* represented new occurrences for the study area. The taxonomic treatments include morphological descriptions, identification key, geographic distribution data, preferred environments, flowering and/or fruiting data, images, and taxonomic notes based on the vegetative and reproductive characteristics of each species.

Keywords: Atlantic Forest; Caatinga; Commelinales; Diversity; Northeastern Brazil.

Flora da Paraíba, Brasil: Commelinaceae Mirb.

Resumo: Este estudo compreende o levantamento taxonômico de Commelinaceae no Estado da Paraíba, Nordeste brasileiro, objetivando conhecer a riqueza e distribuição das suas espécies. No período de março/2022 a junho/2023 foram feitas incursões para a obtenção de espécimes férteis e observações das populações naturais. As análises morfológicas foram baseadas na coleção do herbário local (HACAM), principalmente, e em coleções mantidas em herbários locais (CSTR, EAN, HCES e JPB), do Estado de Pernambuco (IPA e PEUFR) e plataformas digitais (Herbário Virtual Reflora e *SpeciesLink*). A identificação taxonômica baseou-se na literatura especializada, incluindo consultas dos tipos nomenclaturais e protólogos. Foram registradas 18 espécies em nove gêneros, 12 espécies encontradas na Caatinga e 15 na Floresta Atlântica. Os gêneros *Commelina* L. e *Tradescantia* L. emend. M.Pell. foram os mais diversificados taxonomicamente, com quatro espécies cada. *Dichorisandra perforans* e *D. thyrsiflora* constituem novas ocorrências para a área de estudo. O tratamento taxonômico inclui descrições morfológicas, chave de identificação, dados de distribuição geográfica, ambientes preferenciais, floração e ou frutificação, imagens e notas taxonômicas fundamentadas em caracteres vegetativos e reprodutivos para as espécies.

Palavras-chave: Caatinga; Commelinales; Diversidade; Floresta Atlântica; Nordeste brasileiro.

Introduction

Commelinaceae Mirb. is a monocot family of the order Commelinales. It comprises forty-two genera and approximately 720 species and has a cosmopolitan distribution (Pellegrini 2018; Govaerts & Faden 2011). According to Aona & Pellegrini (2012) and the Flora e Funga

do Brasil (continuously updated), the family is represented in Brazil by fifteen genera and 120 species encountered in all the phytogeographic domains of that country, predominantly in open fields, forests, and swampy areas.

The species are morphologically characterized by having an herbaceous habit, stem generally succulent and distinctly segmented

into nodes and internodes, with sheathing leaves, and flowers generally ephemeral and deliquescent (Faden 1998), notably lacking nectaries, with pollen as the only resource offered to pollinators (Faden 2000).

According to Faden (2012), the great morphological similarities observed between the floral structures of *Commelina* species result in difficulties in their identification. Within this context, the Brazilian Atlantic Forest harbors the greatest representativity of the family, principally in terms of the genus *Dichorisandra* J.C. Mikan., and constitutes one of the most important centers of taxonomic diversity of the genus, with 39 species (Aona & Amaral 2024).

The taxonomic complexity of Commelinaceae and its large number of species endows the family with significant ecological and economic importance (ornamental, ecotoxicological, pharmaceutical, medicinal, and industrial) (Li 2006; Mensah et al. 2014). Taxonomic studies focusing on the family, however, are still incipient, which is related, at least in part, to difficulties associated with studying collections held only in regional herbaria.

The present study presents a floristic-taxonomic survey of the Commelinaceae found in Paraíba State, Brazil, which was designed to amplify knowledge concerning this family in the state and in the northeastern region of that country, gathering information concerning the morphology, taxonomic diversity, and geographic distributions of its species.

Material and Methods

1. Study area

Paraíba State (07°09'S-36°49'W) is located in northeastern Brazil and covers approximately 56,469 km² (Figure 1). The state is divided

into four intermediate regions: João Pessoa, Campina Grande, Patos, and Sousa – Cajazeiras, and includes 223 municipalities (IBGE 2015). Although it is one of the smallest Brazilian states, it comprises a wide variation of natural landscapes (Governo da Paraíba 2022).

The vegetation of Paraíba encompasses the Atlantic Forest domain, with Mangrove areas (along the coast) and a small strip of tropical forest, although the Caatinga domain predominates (covering approximately 80% of the state), with a tropical climate along the coast and a semiarid climate inland (Portal Brasil 2022).

The Caatinga domain is considered the fourth largest vegetation formation in Brazil (Albuquerque 2010) and the only one exclusive to that country. Caatinga vegetation is dominant in northeastern Brazil and is rich in biodiversity and endemism of both plants and animals (Araújo & Falcão-Sobrinho 2009), although it still requires in-depth taxonomic, floristic, and phytosociological studies that could permit a better understanding of its structure and conservation. The Atlantic Forest covers 17 Brazilian states and is the holder of the greatest biodiversity of known tropical forests, although anthropogenic impacts increased by approximately 30% between 2018 and 2019, causing a considerable reduction in the extent of its original coverage (SOS Mata Atlântica Report 2021). According to Tabarelli & Santos (2004), the Atlantic Forest domain of Paraíba is now restricted to just two large areas (covering a total of 6743 km²) in 63 municipalities.

2. Data collection and morpho-taxonomic analyses

Field expeditions, employing the random walk methodology, were undertaken between March/2022 and June/2023 to collect fertile specimens and observe natural populations. Localities for those expeditions were based on records of species occurrences available on the *SpeciesLink* (<https://specieslink.net>), GBIF - Global Biodiversity

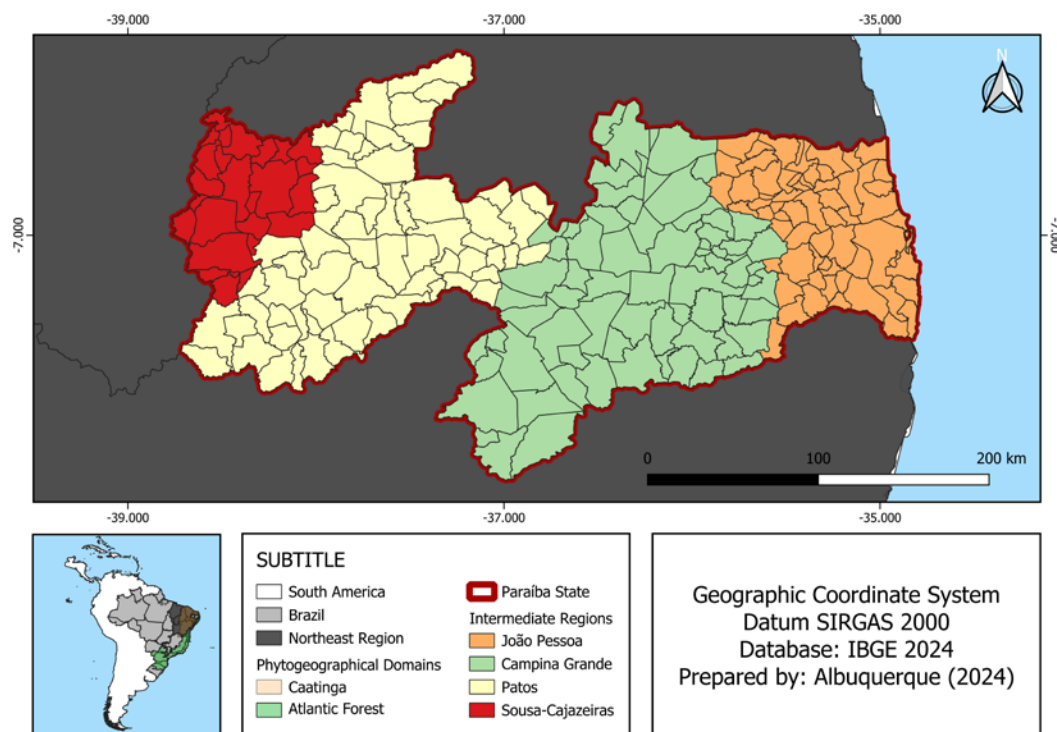


Figure 1. Localization of the study area, Paraíba state, Brazil.

Information Facility (<https://www.gbif.org>), and Herbário Virtual da Flora e dos Fungos (Reflora) online repositories, and collections in local herbaria. The field collection of botanical materials and their herborization were based on Peixoto & Maia (2013).

The specimens collected in the field were incorporated into the Manuel of Arruda Câmara Herbarium (HACAM), Campus I, Universidade Estadual de Paraíba (UEPB), Campina Grande, Paraíba state, Brazil (not indexed).

The comparative morphological analyses were based on our collections and on specimens held in the principal herbaria in Paraíba (CSTR, EAN, HACAM, HCES, and JPB) and Pernambuco state (HST, IPA, and PEUFR), northeastern Brazil, as well as in the repositories mentioned above. The nomenclatural types were consulted on the JSTOR-Global Plants platform (<https://plants.jstor.org>).

The taxonomic descriptions were elaborated based on Radford et al. (1974) and Harris & Harris (2001) in terms of shapes and types of indument, Weberling (1965, 1989) and Panigo et al. (2011) for inflorescence morphology, Aona (2008), Aona et al. (2016), and Spjut (1994) for fruits, and Faden (1991) for seed characterizations.

The geographical distributions of the species were based on information provided on the herbarium labels of the specimens consulted.

Results and Discussion

Eighteen species belonging to twelve genera were identified. Of those eighteen species, two were encountered only in the Caatinga domain, while five were exclusive to the Atlantic Forest; eleven were encountered in both phytogeographic domains in Paraíba State (Figure 2). The species recorded were: *Aneilema brasiliense* C.B. Clarke, *Callisia*

filiformis (M. Martens & Galeotti) D.R. Hunt, *Callisia repens* (Jacq.) L., *Commelina benghalensis* L., *Commelina diffusa* Burm.f., *Commelina erecta* L., *Commelina obliqua* Vahl, *Dichorisandra hexandra* (Aubl.) C.B. Clarke, *Floscopa glabrata* (Kunth) Hassk., *Gibasis geniculata* (Jacq.) Rohweder, *Murdannia nudiflora* (L.) Brenan, *Tinantia sprucei* C.B. Clarke, *Tradescantia ambigua* Mart. ex Schult. & Schult.f., *Tradescantia pallida* (Rose) D.R. Hunt, *Tradescantia spathacea* Sw., *Tradescantia zebrina* Heynh. ex Bosse, and *Tripogandra diuretica* (Mart.) Handlos. *Dichorisandra perforans* C.B. Clarke and *D. thyrsiflora* J.C. Mikan were recorded here for the first time for Paraíba State (with few specimens): *D. perforans* was encountered in the municipalities of Itapororoca, São José da Mata, and Sapé and *D. thyrsiflora* in the municipalities of Caaporã, João Pessoa, and Sapé.

The species *Callisia filiformis*, *C. repens*, *Commelina benghalensis* L., *C. diffusa*, *C. erecta*, *C. obliqua*, *Tradescantia pallida* and *T. spathacea* were the most common and generally found in anthropized areas (ruderal or not), while *Aneilema brasiliense*, *Dichorisandra perforans*, *D. thyrsiflora*, *Floscopa glabrata*, *Gibasis geniculata*, *Murdannia nudiflora*, *Tinantia sprucei*, *Tradescantia ambigua* and *T. zebrina* were found in both anthropized and preserved areas; *Dichorisandra hexandra* was predominantly associated to the preserved areas. The maps of the density (Figure 3) and richness (Figure 4) of the species of Commelinaceae indicated various areas of high species richness and call attention to the fact that those areas of high density and richness correspond to conservation areas within Paraíba State; the other areas of richness correspond to disturbed areas or ecotone zones.

Additionally, we identified various areas without previous records of any Commelinaceae species; four of those areas were conservation areas (two located in the intermediate region of João Pessoa and two in the

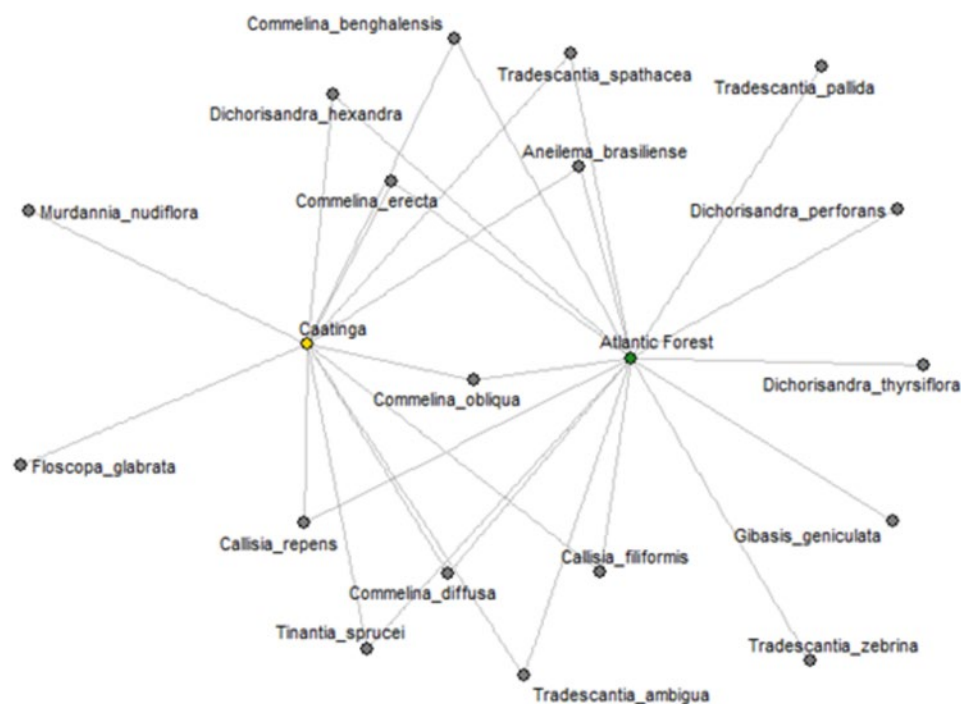


Figure 2. Analysis of the distribution of the species of Commelinaceae among the phytogeographic domains (Caatinga and Atlantic Forest) in Paraíba state, Brazil. (Prepared by: Pinto, A.S.).

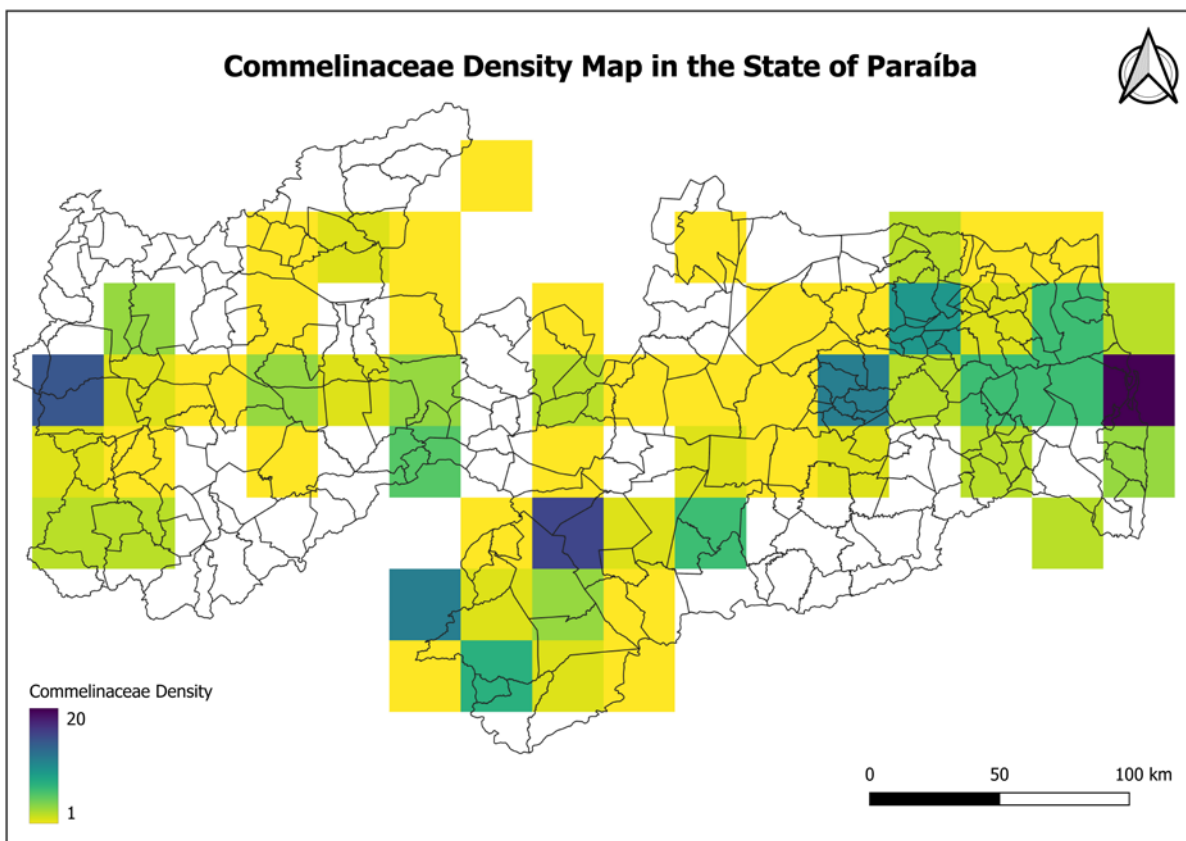


Figure 3. Density of the Commelinaceae species recorded in Paraíba state, Brazil. (Prepared by: Albuquerque, I.M.C.).

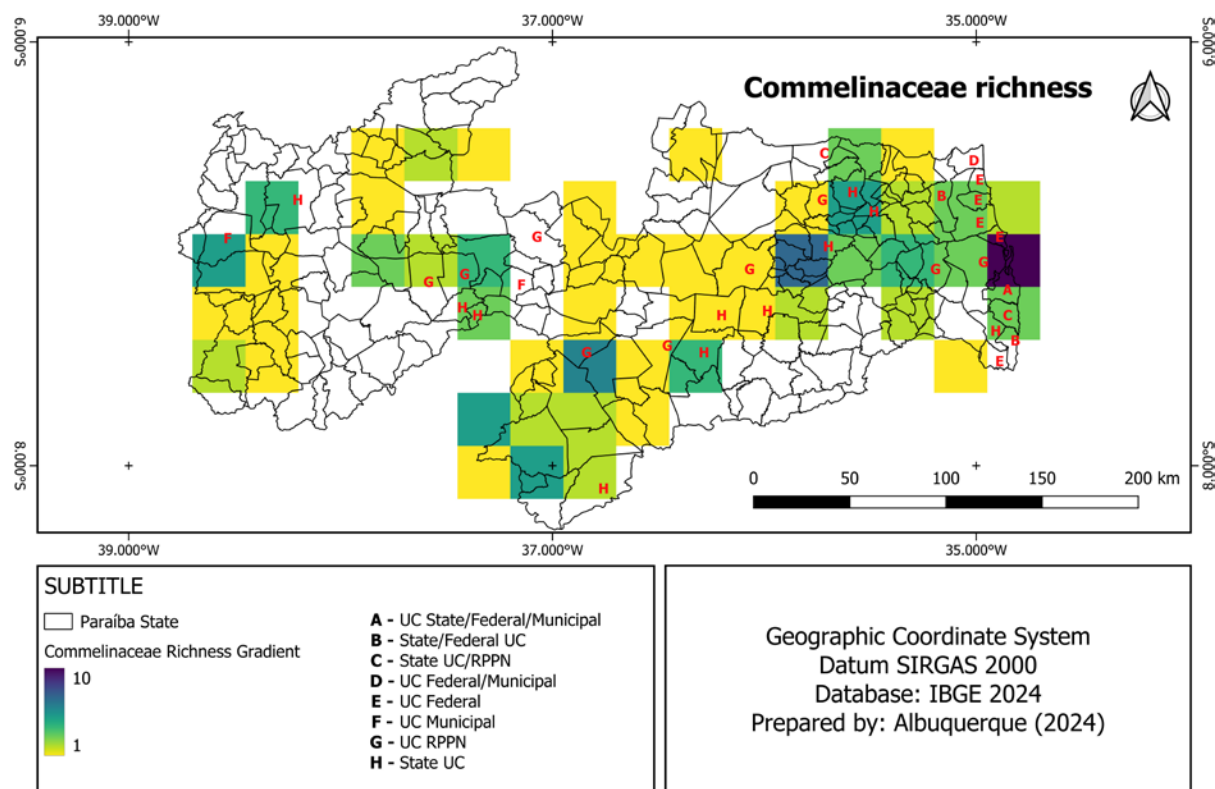


Figure 4. Richness of the species of Commelinaceae recorded in Paraíba state, Brazil. (Prepared by: Albuquerque, I.M.C.).

intermediate region of Patos), which draws attention to the importance of taxonomic field studies.

1. Commelinaceae Mirb., Hist. Nat. Pl. 8: 177. 1804.

Herbs, annual or perennial, erect to decumbent, generally succulent, terrestrial, rupicolous, aquatic, rarely epiphytic, rhizomatous or stoloniferous when perennial. Roots fibrous or tuberose. Stems ascendent, erect, or prostrate, sometimes decumbent, clearly segmented nodes and internodes, simple or branched, occasionally radicans. Leaves simple, alternate, distichous or spiral, sessile, or pseudopetiolate, margins ciliated or rarely glabrous, nerves parallel; bracts closed. Inflorescences thyrsoid, sessile, or pedunculate; basal bract tubular, foliar, or spatheaceous; principal axis developed or not; cincinnus 1-many, aggregated into a thyrus, free, or fused, with the costae alternate, subopposite, verticillate, or fasciculate; subtended by foliaceous bracts or enveloped by spatheaceous bracts, foliaceous or not. Flowers trimerous, actinomorphic or zygomorphic, generally deliquescent, bisexual or only staminate, rarely pistillate; sepals-3, imbricate; petals-3, corolla generally polypetalous; stamens 3-6, filaments glabrous or barbate, staminodes 1-3 when present; ovary superior, 2-3 locules. Capsule loculicidal, rarely with valves partially dehiscent or indehiscent. Seeds 1-many per locule, triangular or reniform to quadrangular; forehead smooth to ornamented.

Key to the species of Commelinaceae recorded in Paraíba State - Brazil

1. Cincinnus with spatheaceous bracts.....2
 2. Stems creeping, violaceous; ovary elliptic.....
..... *Commelina benghalensis*
 - 2'. Stems erect to decumbent, green; globose to oblong ovary..... 3
 3. Cincinnus axillary; bracts pubescent; fruit oblong.....
..... *Commelina diffusa*
 - 3'. Cincinnus terminal; bracts glabrous; fruit obovate or elliptic.....4
 4. Sheath of margin serrated; cilia green; stigma capitate; fruit obovate; seeds brown..... *Commelina erecta*
 - 4'. Sheath of margin ciliate, cilia reddish; stigma truncate; fruit elliptic; seeds orange..... *Commelina obliqua*
- 1'. Bracts of the cincinnus foliaceous.....5
 5. Leaves rosulate; base of blade cordate..... *Callisia repens*
 - 5'. Leaves spiraling or distichous; base of blade rounded.....6
 6. Perennial herbs, glabrous; actinomorphic flowers.....7
 7. Corolla zygomorphic; styles curved; stigma truncate; fruit discoid; seeds black.....*Floscopa glabrata*
 - 7'. Corolla actinomorphic; styles erect; stigma capitate; fruit globose; seeds gray or brown.....8
 8. Pedicel with hyaline trichomes; sepals oval; ovary glabrous; fruit green.....*Tradescantia ambigua*

- 8'. Pedicel glabrous; sepals lanceolate; ovary pilose; fruit brown
..... *Tradescantia zebrina*
- 6'. Annual herbs, pubescent; actinomorphic or zygomorphic flowers.....9
 9. Bracts pubescent.....10
 10. Stems not branched, glabrous; petals blue.....
..... *Dichorisandra perforans*
 - 10'. Stems branched, pubescent; petals white, pink, or purple...11
 11. Stems erect; petals pink or lilac; fruit elliptic-obovate, purple..... *Aneilema brasiliense*
 11. Stems prostrate; petals white; fruit globose, green.....
..... *Gibasis geniculata*
 - 9'. Bracts glabrous.....12
 12. Cincinnatus bracts with cuneate to obtuse apex.....13
 13. Stamens barbelate at the base; ovary obovate to oblong; fruits brownish..... *Murdannia nudiflora*
 - 13'. Stamens glabrous; ovary globose; fruits purple-blue, green or yellow.....14
 14. Sepals oval; styles curved.. *Dichorisandra hexandra*
 - 14'. Sepals elliptic to obovate; styles erect.....
..... *Dichorisandra thyrsoiflora*
 - 12'. Cincinnatus bracts with acuminate apex15
 15. Stems glabrous; sepals green.....16
 16. Petals white to light green; stamens glabrous; styles curved; stigma capitate; fruit brown.....
.....*Callisia filiformis*
 - 16'. Petals purple; stamens barbate; styles erect; stigma truncate; fruit green..... *Tinantia sprucei*
 - 15'. Stem pubescent; sepals white to pink.....17
 17. Sheath foliar with margin ciliate; cincinnus terminal, sessile; petals pink to purple; fruit green.....
..... *Tradescantia pallida*
 - 17'. Sheath foliar with margin glabrous; cincinnus axillary, pedunculate; petals white; fruit brown.....
..... *Tradescantia spathacea*

1. Aneilema brasiliense C. B. Clarke, Monogr. Phan. 3: 225. 1881. TYPE: Warming 1006; 1865; Brasil (C). (Figure 5, Figure 6a-b)

Herbs, 30–40 cm tall, terrestrial. Stems erect, branched, monomorphic when flowering, with trichomes hyaline, green. Leaves alternate, spiraled; bracts 0.4–1.5 cm long, puberulous, margins serrate; petiole 0.5–1.2 cm long, trichomes hyaline; blade 6–15 × 2–5 cm, oval to elliptic-lanceolate, green, apex acute to acuminate, base asymmetrical, cuneiform to rounded. Inflorescence terminal, pedunculate, erect; cincinnus 2–4, alternate, free, pedunculate, 3–10 flowers; peduncle of the cincinnus 1–4 cm long; bract of the cincinnus 0.5–2 × 0.2–0.6 cm, membranaceous, lanceolate to elliptic, green to brown, pubescent; bracteoles 3–10, 0.1–0.4 mm long, elliptic to lanceolate, pilose, green. Flowers zygomorphic, bisexual; sepals 2–6 × 2–4 mm, free, elliptic to oblong, puberulent, green; petals 3–7 × 3–4 mm, unequal, median

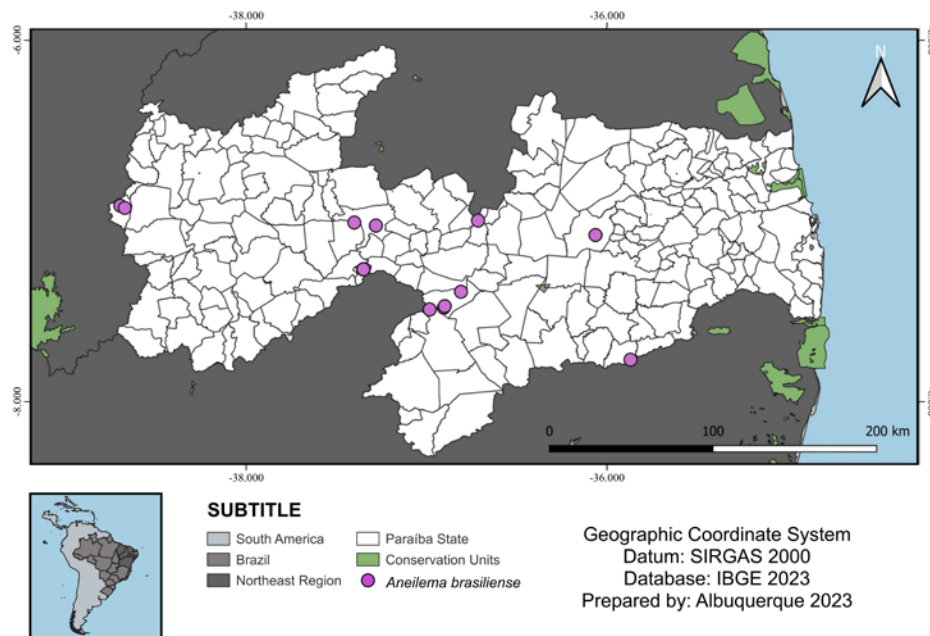


Figure 5. Geographic distribution of *Aneilema brasiliense* in Paraíba state, Brazil. (Prepared by: Albuquerque, I.M.C.).

petals oblong, lateral petals with longer claws, white, pink, or lilac, sessile; stamens 3, curved upwards, ca. 2 mm long, glabrous; filaments 2–7 mm long, glabrous, curved; anthers 0.3–1 × 0.6–0.8 mm, rimose, yellow; stamens 3, anthers 2–3 × 2–4 mm, bilobate, purple; ovary 1 × 1 mm, sessile, obovate to elliptic, glabrous; styles 3–5 mm long, curved; stigma capitate. capsules 5–8 mm long, sessile, elliptic-obovate, dehiscent, trilocular, bivalve, bilobate, purple. Seeds 1–2 × 1–4 mm, brown, coat, hilum linear.

Material examined selected: Brazil. PARAÍBA: Alagoa Grande, 10.VII.1953, fl., J. C. Moraes 952 (US); Bananeiras, 25.II.2022, fl., I. M. C. Albuquerque 67 (HACAM); Cachoeira dos Índios, 14.V.2014, fl., J. L. Costa-Lima 275 (HRSN); Campina Grande, 25.VI.2006, fl., M. F. Agra 3720 (JPB 21711); Cuité, 02.VIII.2012, V. F. Sousa et al. s.n. (HCES 617); Ibidem, 12.VII.2017, fl., V. F. Sousa s.n. (HCES 1120); Ibidem, 17.IV.2019, fl., V. F. Sousa et al. 851 (HCES); Junco do Seridó, 10.VII.1994, fl. fr., A. M. Miranda 55237 (US); Maturéia, 27.IV.2017, F. Gomes-Silva 313 (IPA); Patos, 04.III.1994, fl., S. I. Silva s.n. (PEUFR 34362); Pocinhos, 08.VII.1994, fl., A. M. Miranda 1843 (IPA); Ibidem, 08.VII.1996, fl., A. M. Miranda 1843 (FCAB); Remígio, 10.V.2001, T. M. G. Veloso 188 (JPB); Santa Teresinha, 03.V.2011, fl., D. S. Lucena et al. 88 (CSTR); São José da Mata, 28.VII.1972, fl., L. P. Xavier s.n. (JPB 3290); São José dos Cordeiros, 12.IV.2002, fl., M. R. Barbosa 2352 (HUEFS); Ibidem, 02.III.2004, fl., M. R. Barbosa 2879 (JPB).

Geographic distribution, habitats and phenology: Occurs in Venezuela and Brazil (Tropicos, continuously updated), where it can be found throughout the southeastern region and much of the northeast (with the exception of Maranhão State) (Aona et al. 2024), associated with Caatinga (*stricto sensu*), cerrado (*lato sensu*), seasonal semideciduous forest, ombrophilous forest (forest pluvial), and mixed ombrophilous forest (Flora e Funga do Brasil, continuously updated). In the study area, it was recorded with flowers from March to August and with fruits in July, in the Caatinga and Atlantic Forest phytogeographic

domains, predominantly in the latter, associated to shaded areas close to humid.

Notes: *Aneilema brasiliense* can be recognized, especially, by having sparse to dense trichomes, petals from white to light pink, to lilac, and fruits elliptic to obovate; can sometimes be confused with *Tinantia sprucei*, although *A. brasiliense* differs, principally, by having glabrous stamens, a capitate stigma, and fruits purple.

2. *Callisia filiformis* (M. Martens & Galeotti) D. R. Hunt, *Kew Bull.* 41: 410. 1986. *Tradescantia filiformis* M. Martens & Galeotti. TYPE: México. Oaxaca, H. Galeotti 5947, 1840 (BR). *Bull. Acad. Roy. Sci. Bruxelles* 9(2): 376. 1842. (Figure 6c, Figure 7)

Herbs, 20–30 cm tall, semi-decumbent, terrestrial. Stems erect, branched, monomorphic when flowering, glabrous, green. Leaves alternate, distichous, sessile; bracts ca. 2 mm long, glabrous, margins ciliate, sessile; blade 2–5 × 0.5–1 cm, lanceolate, pilose, green, apex acute to acuminate, base cordate, margins ciliates, glabrous on both faces, succulent. Inflorescence axillary or terminal, cincinnus–2, alternate, free, pedunculate; peduncle of the cincinnus 1–4 cm long; cincinnus bracts 0.5–1 × 0.2–0.6 cm, pubescent, spatheaceous to elliptic, cuneate apex, light green. Flowers 2–5, zygomorphic, bisexual, not showy; trichomes on pedicel on hooks ca. 5 mm long, pedicels on the sepals 2–10 mm long; sepals 3.2–3 × 1–1.5 mm, free, linear-oblong, persistent, succulent, apex acuminate, pubescent, green; petals 1.5–2.5 × 0.5–2 mm, equal, sessile, median petals oblong to obovate, white to light green, with short hooks; stamens 6, ca. 2 mm long, glabrous; filaments 2–4 mm long, glabrous, curved; anthers 0.3–0.7 × 0.6–1 mm, rimose, yellow; ovary 5 × 5 mm, sessile, obovate to elliptic, glabrous; styles 3.5–5 mm long, curved; stigma capitate. capsules 1.5–2 mm long, sessile, elliptic to obovate, dehiscent, trilocular, bivalve, bilobate, brown to opaque. Seeds 0.7–1.5 × 1–1.5 mm, 2 per valve, surface with scrobiles, brown, hilum linear.

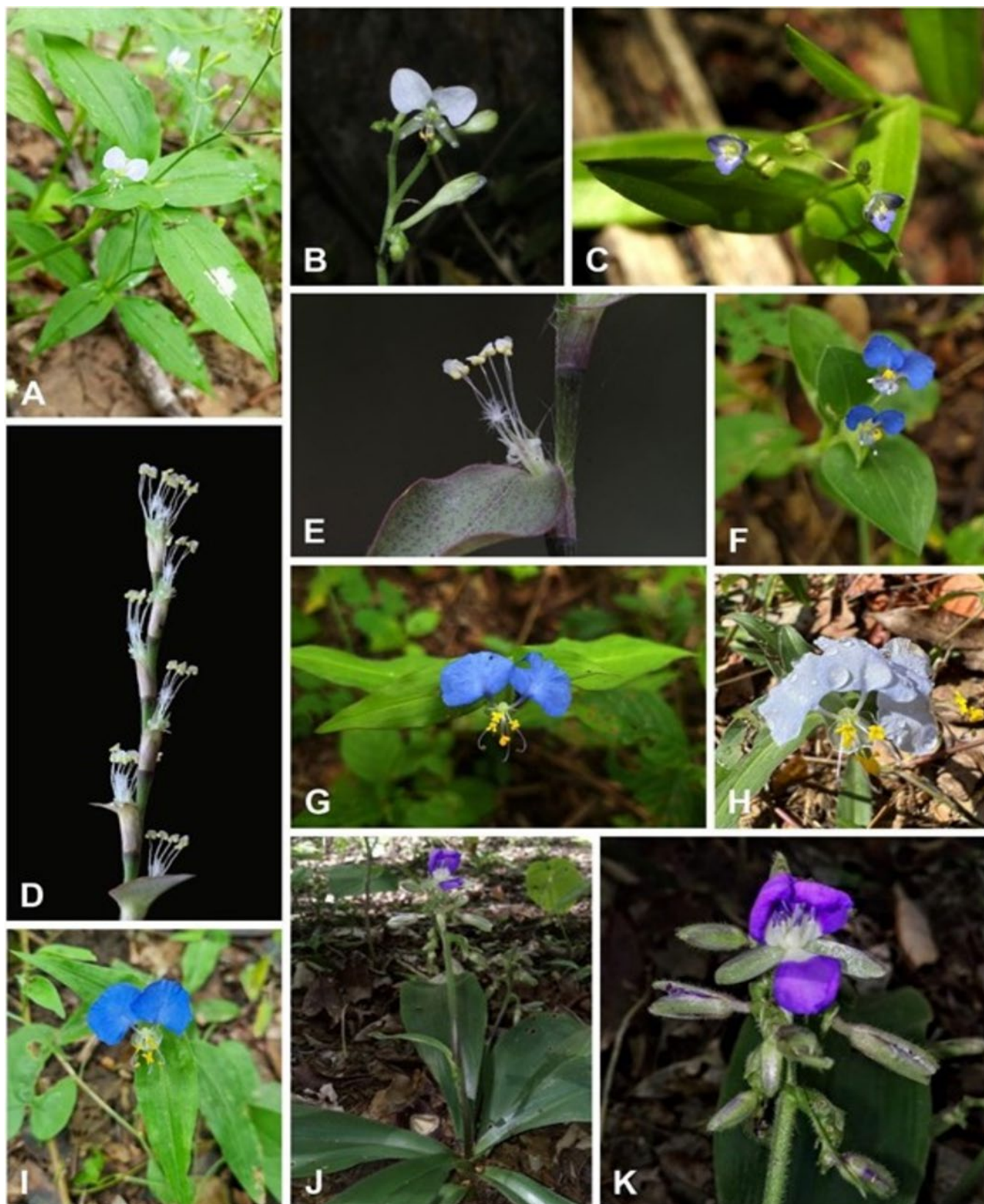


Figure 6. A-B. *Aneilema brasiliense*: A. inflorescence; B. flower, frontal view. C. *Callisia filiformis*: reproductive branch. D-E. *Callisia repens*: D. inflorescence; E. flower, lateral view. F. *Commelina benghalensis*: flowers, frontal view. G. *C. diffusa*: flower, frontal view. H. *C. erecta*: flower, frontal view. I. *C. obliqua*: flower. J-K. *Dichorisandra hexandra*: J. inflorescence; K. flower. (A: Rocha, B.F.; B: Costa, F.C.P.; C: Netto, A.; D-E: Zavatin, D.A.; H: Gonçalves, M.G.M.; F, G, I: Albuquerque, I.M.C.; J-K: Pinto, A.S.).

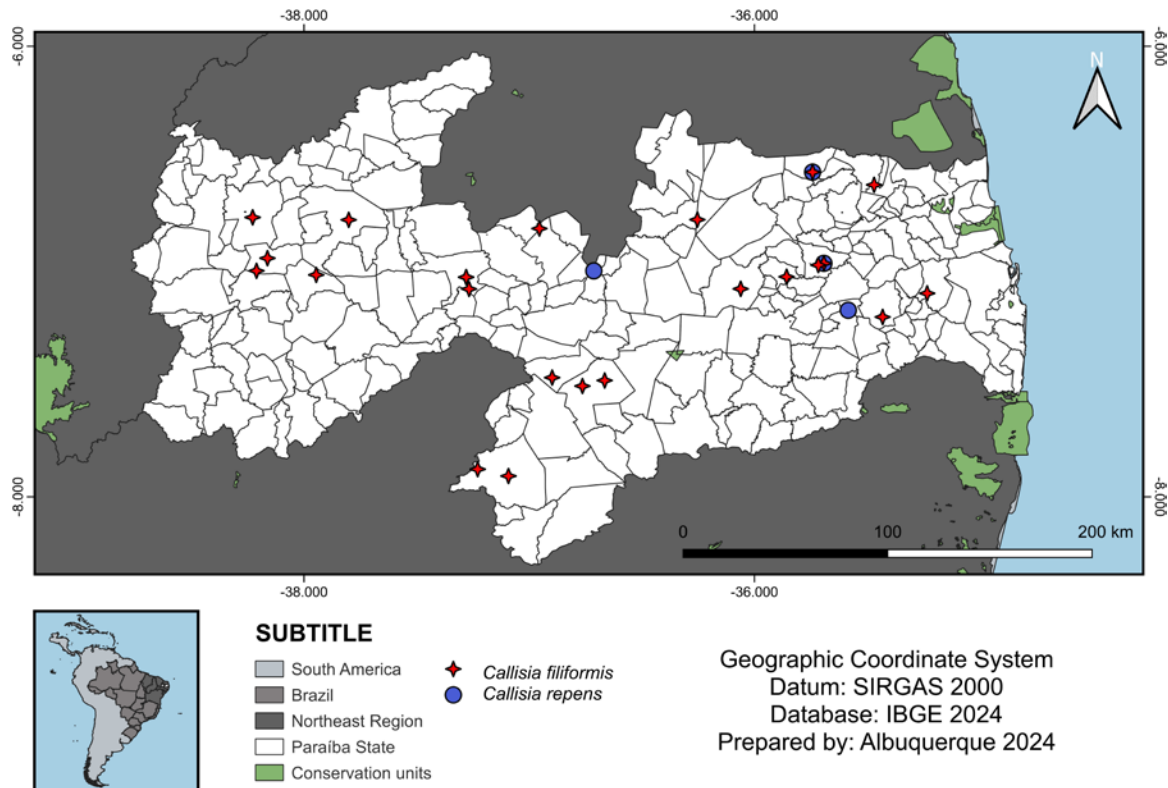


Figure 7. Geographic distribution of *Callisia* in Paraíba state, Brazil. (Prepared by: Albuquerque, I.M.C.).

Material examined selected: Brazil. PARAÍBA: Algodão de Jandaira, 12.VI.2017, fl., *V. F. Sousa s.n.* (HCES 1057); Araruna, 16.VII.2003, fl., *S. Pitrez et al.* 361 (EAN); Areia, 09.VII.1953, fl., fr., *J. C. Moraes Vasconcelos* 955 (NY); Areia, 26.IX.1958, fl., *V. P. B. Fevereiro & P. C. Fevereiro* 591 (EAN); Caiçara, 17.VIII.1942, *L. P. Xavier s.n.* (JPB 1599); Coremas, 09.V.2008, fl., *P. C. Gadelha-Neto* 2216 (JPB); Cuité, 02.VIII.2012, fl., *V. F. Sousa et al. s.n.* (HCES 625); Esperança, 17.VI.2002, fl., *S. Pitrez et al.* 293 (EAN); Gurinhém, 14.VII.2017, fl., *M. Figueira & B. Schindler* 644 (JPB); Monteiro, 14.IV.2009, fl., *M. Oliveira* 3920 (HVASF); Ibidem, 09.VII.2009, fl., *J. A. Siqueira-Filho* 2229 (HVASF); Olivedos, 03.VII.2019, fl., fr., *V. F. Sousa* 891 (HCES); 15.IV.2020, fl., *V. F. Sousa* 1084 (HCES); Patos, 14.IV.2011, fl., *C. Torres* 24 (CSTR); Ibidem, 07.V.2011, fl., fr., *M. F. A. Lucena* 2020 (CSTR); 16.V.2011, fl., *M. K. Rufino* 54 (CSTR); 19.XI.2019, fl., *C. Torres & M. F. A. Lucena* 24 (PEUFR); Pocinhos, 13.VI.1972, fl., *G. Mariz* 713 (UFP); 08.VII.1994, fl., fr., *A. M. Miranda* 1842 (HUTO); 22.VII.2013, fl., *E. C. S. Costa* 126 (HACAM); Pombal, 29.V.2011, fl., *I. S. Queiroga* 78 (CSTR); Puxinanã, 23.VIII.2012, fl., *H. C. S. Araújo s.n.* (HACAM 1260); São José da Lagoa Tapada, 08.V.2010, fl., *P. C. Gadelha-Neto & R. A. Pontes* 2846 (JPB); 15.III.2022, fl., *J. P. S. Gomes & V. P. Moreira* 60 (RN); São José dos Cordeiros, 16.IV.2008, fl., *M. C. Pessoa & J. R. Lima* 308 (JPB); Sapé, 10.VI.2014, fl., *H. O. Machado-Filho* 555 (IPA); Serra Branca, 10.IV.2022, fl., *I. M. C. Albuquerque* 71 (HACAM); Sousa, Perímetro Irrigado de São Gonçalo, 16.IV.1994, fl., *J. Gadelha s.n.* (EAC 37151).

Geographic distribution, habitats and phenology: encountered in Brazil, Bolivia, and Venezuela and on islands near Africa (Tropicos, continuously updated). In Brazil, there are records from all the

northeastern region (Aona & Pellegrini 2012), the northern region (Tocantins), and from the states of Mato Grosso and Mato Grosso do Sul, in the central eastern region, associated with Caatinga (*stricto sensu*) and Cerrado (*lato sensu*) (Flora e Funga do Brasil, continuously updated). In the study area, it was recorded with flowers from March to November, and with fruits from May to July in open areas in Caatinga and Atlantic Forest phytogeographic domains.

Notes: *Callisia filiformis* can be recognized, especially, by having a glabrous stem, white petals, and elliptic to obovate capsules. The species is morphologically related to *Callisia repens* although it can be distinguished by having leaves with lilac margins and actinomorphic flowers with white to light green petals.

3. *Callisia repens* (Jacq.) L., *Sp. Pl. ed. 2*, 62. 1762. *Hapalanthus repens* Jacq. TYPE: França, Martinica: no date (holotype: Jacquin, *Select. Stirp. Amer. Hist. pl.* 11. 1763). *Enum. Syst. Pl.* 12. 1760. (Figure 6d-e, Figure 7)

Herbs, 10–15 cm tall, rarely epiphytic, rupicolous or terrestrial. Stems prostrate, decumbent, branched, dimorphic when flowering, pubescent, with trichomes hyaline, green to violet. Leaves alternate, rosulate, sessile; bracts 2–5 mm long, puberulous, margins ciliate, sessile; blade 0.5–3 × 1–1.5 cm, oval to cordate, abaxial face light green, adaxial face dark green, with margins lilac, glabrous on both faces, apex acute to acuminate, base cordate. Inflorescence axillary, sessile, erect, cincinnus 2, alternate; cincinnus bract 2–4 × 1–2 mm, pubescent, elliptic, light green. flowers 1–3, actinomorphic, bisexual, not showy; staminate; sepals 4–5 × 1–2 mm, free, linear-oblong, persistent, succulent, pubescent, green; petals 3–6 × 1–3 mm, equal, sessile, lanceolate,

white to light green, hooks absent; stamens 6, ca. 2 mm long, glabrous; filaments 5–6 mm long, glabrous, curved; anthers $0.1\text{--}0.5 \times 0.2\text{--}0.5$ mm, rimose, yellow; ovary $1\text{--}2 \times 1\text{--}2$ mm, sessile, oblong, glabrous, bilocular; styles ca. 5 mm long, erect; stigma penicillate. Capsules $1\text{--}2.5$ mm long, sessile, oblong, dehiscent, trilocular, bivalve, bilobate, green. Seeds $1\text{--}1.5$ mm long, 2 per valve, coat reticulate, brown, hilum linear.

Material examined: Brazil. PARAÍBA: Araruna, 16.VII.2003, fl., *L. P. Félix* 353 (EAN); Areia, 20.IX.1958, fl., *J. C. Moraes s.n.* (EAN 1853); Cuité, 28.VII.2018, fl., *V. F. Sousa et al.* 787 (HCES); Dona Inês, 27.IX.2001, fl., *L. P. Félix* 9684 (EAN); Juarez Távora, 04.IX.2002, fl., *S. Pitrez* 353 (EAN); Junco do Seridó, 10.VII.1994, fl., *A. M. Miranda* 1891 (HST).

Geographic distribution, habitats and phenology: occurs throughout the Americas and in southern China (Tropicos, continuously updated). In Brazil, the species is found along the eastern coast of the states of Alagoas, Bahia, Ceará, Espírito Santo, Minas Gerais, Paraíba, Paraná, Pernambuco, Rio de Janeiro, Rio Grande do Norte, Rio Grande do Sul, Santa Catarina, São Paulo, and Sergipe (Aona et al. 2024), associated with anthropized areas, caatinga (*stricto sensu*), cerrado (*lato sensu*), and ombrophilous forest (pluvial forest) (Flora e Funga do Brasil, continuously updated). In the study area, it was recorded with flowers in July to September associated with Caatinga and Atlantic Forest vegetation (predominately the latter), forming dense stands near water sources.

Notes: *Callisia repens* can be recognized especially by having dimorphic stems when flowering, green to violet staminate flowers with petals that can vary from white to light green, and by producing oblong

fruits. The species is morphologically similar to *Callisia filiformis*, although it can be recognized, principally, by having leaf blades with ciliate margins and zygomorphic flowers.

4. *Commelina benghalensis* L., *Sp. Pl. 1: 41. 1753. NEOTYPE: INDIA. Habitat in Benghala, s.dat., s. leg., Herb. Linn. 65.16 (LINN), (conserved and designated by Faden 1992). (Figure 6f, Figure 8, Figure 9a-f)*

Herbs, 30–50 cm tall, rupicolous or terrestrial. Stems erect to decumbent, branched, monomorphic when flowering, pubescent, green to violet. leaves alternate, distichous, subsessile to petiolate; leaf bracts $0.5\text{--}1$ cm long, hirsute, margins hispid, erect; petiole 3–6 mm long, trichomes hyaline; leaf blades $3\text{--}10 \times 1\text{--}5$ cm, obovate, villous on both faces, green, apex obtuse to acute, base asymmetrical. Inflorescence terminal, pedunculate; cincinnus 4–6 flowers, erect, opposite; peduncle $0.2\text{--}0.6$ cm long, pubescent; bracts $1.2\text{--}1.5 \times 0.8\text{--}1.2$ cm, navicular, grouped, margins villous, green, glabrous. Flowers zygomorphic, bisexual, pedicellate; pedicel $0.3\text{--}1$ cm long, glabrous; upper sepals $1.2\text{--}3.5 \times 1.5\text{--}2$ mm, cymbiform, glabrous, white to light green, lower sepal 2.4×3 mm long, oblong, apex obtuse, margin smooth, glabrous, white; petals 3, 2 paired, $0.8\text{--}2 \times 0.9\text{--}1.5$ cm, unguiculate, apex rounded, blue, median petal $3\text{--}4 \times 1\text{--}1.5$ mm, sessile, oval, apex acute, light blue to blue; stamens 3, median stamen smaller than the lateral two; filaments 3–7 mm long, glabrous; anthers $1.5\text{--}3 \times 1\text{--}1.5$ mm, elliptic, rimose, lateral anthers purple to blue, median yellow; ovary $0.9\text{--}1.7 \times 1\text{--}1.2$ mm, oval, pilose; styles $1.2\text{--}1.4$ cm long; stigma truncate. Capsules $2\text{--}6 \times 1\text{--}1.5$ mm, oblong to obovate, pilose, dark brown. Seeds $1.5\text{--}2 \times 0.7\text{--}1$ mm, obovate to elliptic, coat reticulate, black, hilum linear.

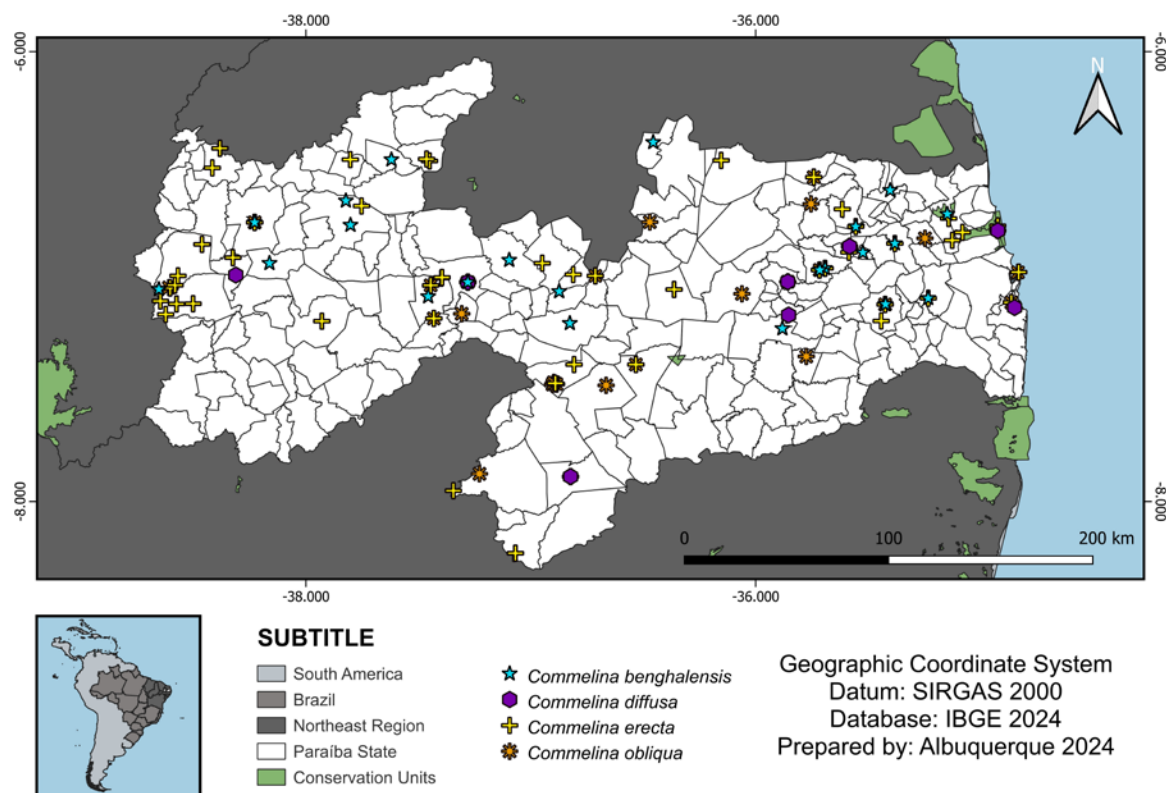


Figure 8. Geographic distribution of *Commelina* in Paraíba state, Brazil. (Prepared by: Albuquerque, I. M.C.).

Material examined selected: Brazil. PARAÍBA: Araçagi, 25.VII.2014, fl., *H. O. Machado-Filho 698* (IPA); Areia, 11.V.2017, fl., *P. C. Gadelha-Neto 4152* (JPB); Ibidem, 13.XII.2017, fl., *R. E. P. Monteiro 27* (EAN); Bananeiras, 31.V.2013, fl., *P. C. Gadelha-Neto et al. 3630* (JPB); Campina Grande, 04.VIII.1987, fl., *P. A. C. Carneiro s.n.* (HACAM 258); Ibidem, 23.VII.1995, fl., *M. F. Agra. et al. 3341* (JPB); Ibidem, 07.VII.2007, fl., *F. Nóbrega s.n.* (HACAM 1451); Cuité, 24.VI.2012, fl., *V. F. Sousa s.n.* (HCES 618); Ibidem, 04.III.2017, fl., *V. F. Sousa 536* (HCES); Cuité, 02.VII.2014, fl., *s. n. 68* (EAN 21025); Frei Martinho, 01.V.2007, fl., *P. C. Gadelha-Neto et al. 1723* (JPB); Gurinhém, 11.VII.1994, fl., *L. P. Félix 1928* (JPB); João Pessoa, 01.VII.2009, fl., *G. B. Freitas et al. 258* (JPB); Ibidem, 07.VIII.2009, fl., *A. H. L. Cariri et al. 47* (JPB); Logradouro, 12.VII.1998, fl., *E. A. Rocha 454* (JPB); Mamanguape, 21.VIII.2002, fl., *A. C. Sevilha 2313* (CEN); Passagem, 19.IV.2015, fl., *M. F. A. Lucena 310* (CSTR); Patos, 20.XI.2012, fl., *T. O. Ribeiro 33* (CSTR); Remígio, 26.IV.2001, fl., *T. M. G. Veloso 178* (JPB); Riacho dos Cavalos, 21.III.2017, fl., *R. A. P. Almeida 200* (JPB); Santa Teresinha, 02.IV.2011, fl., *V. Noel 47* (CSTR); São José de Piranhas, 11.VI.2014, fl., *E. Bruns 1309* (HRSN); Sapé, 19.V.2014, fl., *H. O. Machado-Filho 417* (CSTR); Serra Branca, 19.IV.2018, fl., *L. P. Félix 17460* (EAN Sousa, 04.I.1996, fl., *P. C. Gadelha-Neto 352* (UFP); Ibidem, 14.V.2000, fl., *P. C. Gadelha-Neto 587* (JPB).

Geographic distribution, habitats and phenology: occurs throughout the Americas, in the southern region of the African continent, and Asia (Tropicos, continuously updated). It has been recorded in all the Brazilian states (Aona et al. 2024), associated with anthropized areas, Caatinga (*stricto sensu*), Cerrado (*lato sensu*), seasonal deciduous forests, ombrophilous forests (pluvial forests), mixed ombrophilous forests, restinga, and growing on rock outcrops (Flora e Funga do Brasil, continuously updated). In Paraíba state, it was found flowering from March to November, associated with Caatinga and Atlantic Forest phytogeographic domains, predominantly in the former, in shaded areas.

Notes: *Commelina benghalensis* can be readily recognized by having stems green to violet, leaves alternate, subsessile to petiolate, flowers bisexual, bracts cymbiform, fruits oblong to obovate and seeds obovate to elliptic, black. It differs from the other species of the genus *Commelina* by having leaf blades ovate to elliptical, with hispid margins, and small flowers in relation to the other species.

5. *Commelina diffusa* Burm f., *Fl. Ind. inn Prodr. Fl. Cap. 18, pl. 7, f. 2. 1768. TYPE: INDIA. Coromandel, s.dat., D. Outgaerden s.n. (G). (Figure 6g, Figure 8, Figure 9g-l)*

Herbs, 20–40 cm tall, growing in terrestrial, swampy, or aquatic environments. Stems erect to decumbent, branched, monomorphic when flowering, glabrous, green. Leaves alternate, distichous, sessile or petiolate, petiole 0.6–1 cm long, erect to slightly recurved, trichomes hyaline; bracts 1.3–1.7 cm long, hirsute, margins ciliate, erect; blade 3.5–10 × 0.9–2 cm, elliptic to lanceolate, green, slightly hirsute on both faces, apex acute, base symmetrical, cuneiform to rounded, margin smooth to ciliate. Inflorescence axillary and opposite to the leaf, pendulous, cincinnus with 3–7 flowers, erect, opposite; peduncle 0.6–2.5 cm long, erect, pubescent; bracts 1 × 2 cm, navicular, solitary, pubescent, margin hirsute, green, pubescent. Flowers zygomorphic, bisexual or staminate; pedicels 0.1–1.5 cm long, pubescent; upper sepal 1. 3–4 × 1–2 mm, cymbiform, apex acute, glabrous, margin smooth, white, lower

sepals 2, 4–5 × 2–3 mm, oblong, apex acute, glabrous, margin smooth, white; petals 3, 2 paired 4–9 × 2.5–7 mm, reinform to rhomboidal, blue to lilac, apex rounded, median petal 4–5 × 3–5 mm, sessile, oval, with short hooks, reniform to orbicular, blue to lilac, apex acute; stamens 3, one median, two lateral, Filaments 6–7 mm long; anthers 0.5–2 × 1–1.5 mm, elliptic, rimose, yellow to bluish-purple; ovary 0.7–2 × 0.5–1.5 mm, oval, tuberculate; styles 7–9 mm long, erect; stigma capitate. Capsules 2–9 × 2–5 mm, sessile, oblong, glabrous, brown. Seeds 1–1.5 × 2–3.5 mm, oblong, coat reticulate, brown, hilum linear.

Material examined selected: Brazil. PARAÍBA: Areia, 15.IX.2017, fl., *P. C. Gadelha-Neto 4197* (EAN); Bananeiras, 27.V.2022, fl., *I. M. C. Albuquerque 78* (HACAM); Borborema, 27.V.2022, fl., *I. M. C. Albuquerque 80* (HACAM); Camalaú, 14.IV.2014, fl., *H. O. Machado-Filho 384* (CSTR); Carrapateira, 24.IX.2014, fl., *J. L. Costa-Lima 1835* (HRSN); Cuité, 15.IV.2022, fl., *V. F. Sousa 1650* (HCES); João Pessoa, 26.II.2009, fl., *G. B. Freitas et al. s.n.* (JPB 58081); Passagem, 18.IV.2015, fl., *E. M. P. Fernando 280* (CSTR); Lagoa Seca, 13.XI.2004, fl., *P. C. Gadelha-Neto et al. 1301* (JPB); Picuí, 04.XII.2022, fl., *B. F. Rocha 144* (HACAM); Pilões, 07.III.2012, fl., *D. S. C. Oliveira 49* (ALCB); Rio Tinto, 01.VIII.2012, fl., *F. V. Rocha 133* (JPB); Sumé, 08.VI.2014, fl., *E. M. P. Fernando 101* (CSTR).

Geographic distribution, habitats and phenology: occurs throughout the Americas and in the southern regions of the African and Asian continents (Tropicos, continuously updated). Occurs in all of the Brazilian states except Piauí and Rondônia (Aona et al. 2024), associated with anthropized areas, Caatinga (*stricto sensu*), Cerrado (*lato sensu*), gallery forests, igapó forests, ombrophilous forests (pluvial forests), restinga, and vegetation growing on rock surfaces (Flora e Funga do Brasil, continuously updated). In the study area, it was encountered with flowers from February to December, associated with Caatinga and Atlantic Forest phytogeographic domains, predominantly in the latter, in shaded areas.

Notes: *Commelina diffusa* is characterized, principally, by having stems glabrous, petiole slightly recurved, cincinnus axillary, bracts navicular, flowers casmogamic, a characteristic that easily distinguishes it from the other congeners recorded in Paraíba state, and by having oblong fruits with brown seeds, without any lateral appendage.

6. *Commelina erecta* L., *Sp. Pl. 1: 41. 1753. LECTOTYPE: Habitat in Virginia. "Commelina erecta, ampliore subcaeruleo flore" in Dillenius, Hort. Eltham. 1: 91. t. 77, f. 88. 1732. (designated by Clarke 1881). (Figure 6h, Figure 8, Figure 9m-q)*

Herbs, 0.2–1 m tall, rupicolous or terrestrial. Stems erect to decumbent, branched, monomorphic during flowering, glabrous, green. Leaves alternate, distichous, sessile or petiolate, petioles 0.2–0.3 cm long, trichomes hyaline; foliar bracts 0.8–2 cm long, pubescent, margins serrate; leaf blades 1–10 × 1–4 cm, lanceolate, green, glabrous on abaxial face and hirsute on adaxial face, or hirsute on both faces, base attenuate, apex acute to acuminate. Inflorescence terminal, erect, peduncular; peduncle 3–8 mm long; cincinnus, 2–4 flowers, erect, opposite; bracts 1–2.5 × 0.9–2 cm, navicular, grouped, green, glabrous, dorsal margin fused to base. Flowers zygomorphic, bisexual, rarely staminate; pedicels 3–9 mm long, glabrous; sepals 3, 1 superior 4 × 3 mm long, cymbiform, apex acute, ovate, margin smooth, white to light green, glabrous; lower sepals 4–9 × 4.5–6 mm, cymbiform, apex acute, obovate, margin

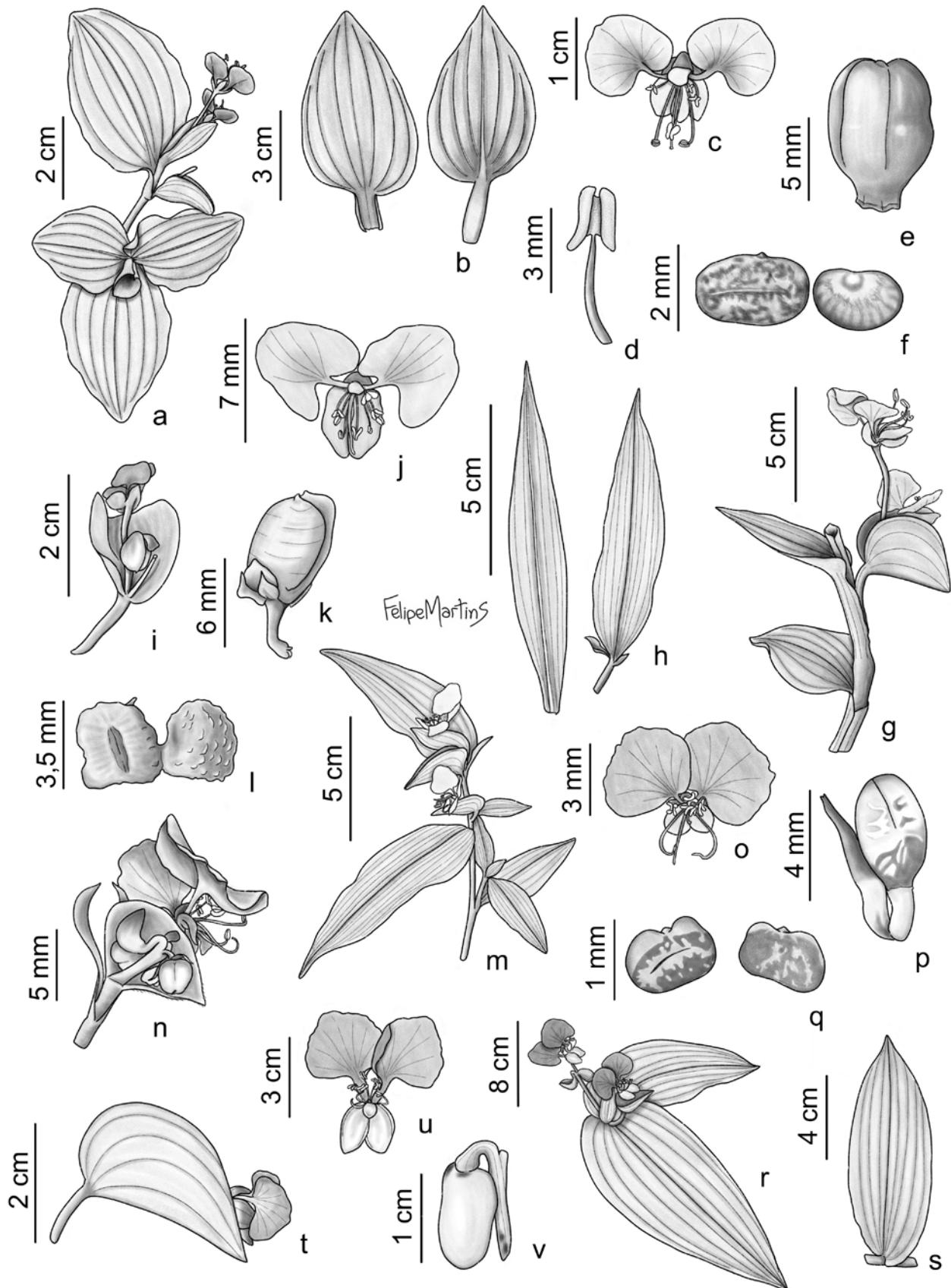


Figure 9. A-F. *Commelina benghalensis*: A. habit; B. leaf, abaxial and adaxial surfaces; C. flower, frontal view; D. fruit; E. stamen; F. seeds. G-L. *C. diffusa*: G. habit; H. leaf, adaxial and abaxial surfaces; I. inflorescence; J. flower, frontal view; K. fruit; L. seeds. M-Q. *C. erecta*: M. habit; N. inflorescence; O. flower, frontal view; P. fruit; Q. seeds. R-V. *C. obliqua*: R. habit; S. leaf, adaxial surface; T. flower, frontal view; U. navicular bract; V. fruit.

smooth, white, glabrous; petals 3, 2 lateral 5×6 cm long, reniform, unguiculate, apex rounded, blue to purple, rarely white, median petal 5×15 mm, sessile, elliptic to spatulate, hyaline, apex acute; stamens 3, median smaller than 2 lateral, filaments 5–9 mm long, anthers 1.5×1.8 mm, yellow; ovary $1-1.5 \times 0.8-1$ mm, oblong, trichomes sparse; styles $1-1.5$ cm long, erect; stigma capitate. capsules $3-6 \times 3-4$ mm, sessile, obovate, glabrous, brown. Seeds $1-6 \times 1-4$ mm, coat reticulate, elliptic, brown, hilum linear.

Material examined selected: Brazil. PARÁIBA: Araçagi, 25.XII.2014, fl., *H. O. Machado-Filho 683* (IPA); Araruna, 16.II.2004, fl., *M. R. Barbosa et al 2845* (JPB); Ibidem, 17.VII.2004, fl., *P. C. Gadelha-Neto 1199a* (UFP); Areia, 15.V.2010, fl., *L. L. Barreto 31* (EAN); Bananeiras, 31.V.2013, fl., *P. C. Gadelha-Neto 3630* (NY); Boa Vista, 08.VIII.2010, fl., fr., *H. O. Machado-Filho 146* (HACAM); Cabaceiras, 29.VII.1993, fl., *M. F. Agra et al. 2219* (JPB); Cabedelo, 21.VII.2006, fl., *A. C. Silva 40* (ASE); Cajazeiras, 11.IV.2012, fl., *V. M. Cotarelli 1619* (HVASF); Camalaú, 14.IV.2014, fl., *H. O. Machado-Filho 384* (PEUFR); Catingueira, 09.XII.2000, fl., *J. L. R. Silva et al. 29* (CSTR); 11.III.2021, fl., *M. F. A. Lucena 3047* (CSTR); Conde, 25.X.2008, fl., *C. M. L. R. Araújo 135* (JPB); Cubati, 21.I.2014, fl., *V. F. Sousa s.n.* (HCES 802); Cuité, 03.IV.2010, fl., *K. Randau 345* (IPA); Ibidem, 30.VI.2012, fl., *V. F. Sousa s.n.* (HCES 626); João Pessoa, 07.VII.1982, fl., *N. F. Montenegro 18* (JPB); Ibidem, 08.IX.2011, fl., *P. C. Gadelha-Neto 3051* (HUEFS); Junco do Seridó, fl., 10.VII.1994, fl., *L. P. Félix 1893* (HST); Ibidem, 22.V.2016, fl., *I. S. A. Cardins 141* (IPA); 10.VII.1994, fl., *L. P. Félix 1894* (HST); Mamanguape, 18.I.1998, fl., *M. F. Agra* (MO 3019041); 07.II.1998, fl., *M. F. Agra 4945* (MO); Monteiro, 06.IX.2019, fl., *L. F. Lima 2029* (HRSN.0); Piancó, III.2002, fl., *M. F. Agra 5672* (HUEFS); Puxinanã, 27.II.2011, fl., fr., *J. C. B. Brasileiro s.n.* (HACAM 1652); Remígio, 26.IV.2001, fl., *T. Grisi 178* (IPA); São Bento, 19.X.2013, fl., *F. G. Silva 29* (HURB); São João do Cariri, 02.IV.2009, fl., *M. T. Buril 275* (UFP); São José de Piranhas, 16.VII.2008, fl., *J. R. Andrade 89* (PEUFR); São José dos Cordeiros, 21.II.2002, fl., *M. R. Barbosa 2114* (HUEFS); Sapé, 26.III.2002, *E. A. César 251* (JPB); Soledade, 21.IV.2009, fl., *A. Trajano 54* (IPA); Sousa, 22.V.2003, fl., *P. C. Gadelha-Neto 911* (UFP); Uiraúna, 04.XII.2013, fl., *C. Correia 1028* (HVASF).

Geographic distribution, habitats and phenology: occurs in Africa and the Americas (Tropicos, continuously updated), and all Brazilian states except Acre, Amapá, and Roraima (Aona et al. 2020), associated with anthropized areas, Caatinga (*stricto sensu*), campo limpo, campo rupestre, Cerrado (*lato sensu*), seasonal deciduous forests, seasonal semideciduous forest, ombrophilous forests (pluvial forest), restinga, aquatic vegetation, and vegetation growing on rock outcrops (Flora e Funga do Brasil, continuously updated). In the study area, it was found flowering from January to December, and with fruits in February and August, in areas of the Caatinga phytogeographic domain.

Notes: *Commelina erecta* can grow to 1 m tall, making it stand out in relation to the other congeneric species recorded in the study area and, principally, by its lanceolate leaves and serrate sheath margins.

7. *Commelina obliqua* Vahl, *Enum. Pl.* 2: 172. 1806. **LECTOTYPE:** *s.loc.*, cultivated in France, ex horto Celsii, Ventenat s.n. (C). (designated by Hunt 1994). (Figure 6i, Figure 8, Figure 9r-v)

Herbs, 30–50 cm tall, rupicolous, or terrestrial. Stems erect to decumbent, branched, monomorphic when flowering, green, trichomes

sparse, hyaline. Leaves alternate, distichous, sessile or petiolate, petiole 0.3–0.7 cm long, glabrous; bracts 1–3.5 cm long, margins ciliate, cilia reddish; leaf blades $4-10 \times 1-4$ cm, lanceolate to oblong-lanceolate, green, apex acuminate, base asymmetrical, cuneiform. inflorescence terminal, erect; peduncle 0.5–1 cm long; cincinnus 2–4 flowers, erect, opposite; bracts 1–2, navicular, margin villous, green, pubescent; peduncle of the cincinnus 0.5–2.5 cm long, green, glabrous. flowers zygomorphic, bisexual or staminate; pedicels 0.5–2.5 cm long, glabrous; sepal superior $3-4.5 \times 1-2.5$ mm, cymbiform, white, glabrous, lower sepals $1.5-2.5 \times 0.2-0.5$ cm, obovate, white, glabrous; petals 3, 2 paired $3-4.5 \times 2-4$ cm, oval, purple or light blue, rarely white, apex acuminate, median petal $1-1.5 \times 0.5-1$ cm, sessile, spatulate to obovate, light blue to lilac, rarely white; stamens 3, median one smaller than lateral ones, filaments 3–7.5 mm long; anthers $1-1.5 \times 0.1-0.7$ mm, yellow to orange; ovary $0.5-0.8 \times 0.5-0.8$ mm, globose, glabrous, tuberculate; styles 6–8 cm long; stigma capitate. Capsules $1-1.5 \times 0.5-1.5$ cm, sessile, elliptic, smooth, glabrous, brown. Seeds $1.5-2.5 \times 1-2$ mm, elliptic, coat rough, orange, hilum linear.

Material examined selected: Brazil. PARÁIBA: Araruna, 16.VII.2003, fl., *S. Pitrez et al. 352* (EAN); Ibidem, 16.II.2004, fl., *M. R. Barbosa et al. 2845* (JPB); Areia, 11.V.2017, fl., *P. C. Gadelha-Neto 4151* (JPB); Ibidem, 15.IX.2017, fl., *P. C. Gadelha-Neto 4197* (JPB); Cacimba de Dentro, 15.III.2003, fl., fr., *R. B. Lima & M. C. Pessoa 1709* (JPB); Cajazeiras, 19.I.2011, fl., *F. F. S. Silva 130* (HVASF); João Pessoa, 01.I.1935, fl., *L. P. Xavier 78* (RBR); Junco do Seridó, 29.IV.2007, fl., *P. C. Gadelha-Neto et al. 1671* (JPB); Maturéia, 12.VII.1997, fl., *M. F. Agra et al. 3980* (JPB); Patos, 20.XI.2012, fl., *T. O. Ribeiro 33* (CSTR); Pedra Lavrada, 30.IV.2007, fl., *P. C. Gadelha-Neto et al. 1693* (JPB); Picuí, 04.XII.2022, fl., *B. F. Rocha 150* (HACAM); Pocinhos, 15.V.2003, fl., *A. Almeida & L. P. Félix 387* (EAN); Ibidem, 16.III.2012, fl., *H. C. S. Araújo s.n.* (HACAM 1289); Santa Teresinha, III.2009, fl., *B. Laine 33* (IPA); São João do Cariri, 02.IV.2009, fl., *J. D. Garcia et al. 1029* (UFP); Ibidem, 15.VIII.2010, fl., *R. M. T. Costa et al. 149* (JPB); Serra Branca, 04.IV.1996, fl., *M. F. Agra & G. Baracho 3543* (JPB).

Geographic distribution, habitats and phenology: occurs throughout Central and South America (Tropicos, continuously updated). In Brazil, this species has been recorded in essentially all states, with the exception of Amapá and Roraima (Aona et al. 2020), associated with anthropized areas, caatinga (*stricto sensu*), campo of altitude, Cerrado (*lato sensu*), gallery forests, terra firme forests, seasonal deciduous forests, seasonal semideciduous forests, ombrophilous forests (Forest Pluvial), and vegetation growing on rock outcrops (Flora e Funga do Brasil, continuously updated). In the study area, was recorded flowering from January to December and fruiting in March, associated to the Caatinga and Atlantic Forest phytogeographic domains, mainly the latter, in shaded and humid areas.

Notes: *Commelina obliqua* can be readily recognized by having alternate leaves, distichous, cincinnus bracts navicular, bracts ciliates, cilia reddish, flowers with sepals cymbiform, fruits and seeds elliptic.

8. *Dichorisandra hexandra* (Aubl.) C B Clarke, *Bull. Torrey Bot. Club* 29 (2): 703. 1902. **BASIONYM:** *Commelina hexandra* Aubl., *Hist. Pl. Guiane* 1: 35, t. 12. 1775. (Jun-Dec 1775). (Figure 6j-k, Figure 10, Figure 11a-f)

Herbs, 0.5–2 m tall, terrestrial or rupicolous. Stems erect to decumbent, branched, monomorphic when flowering, glabrous to

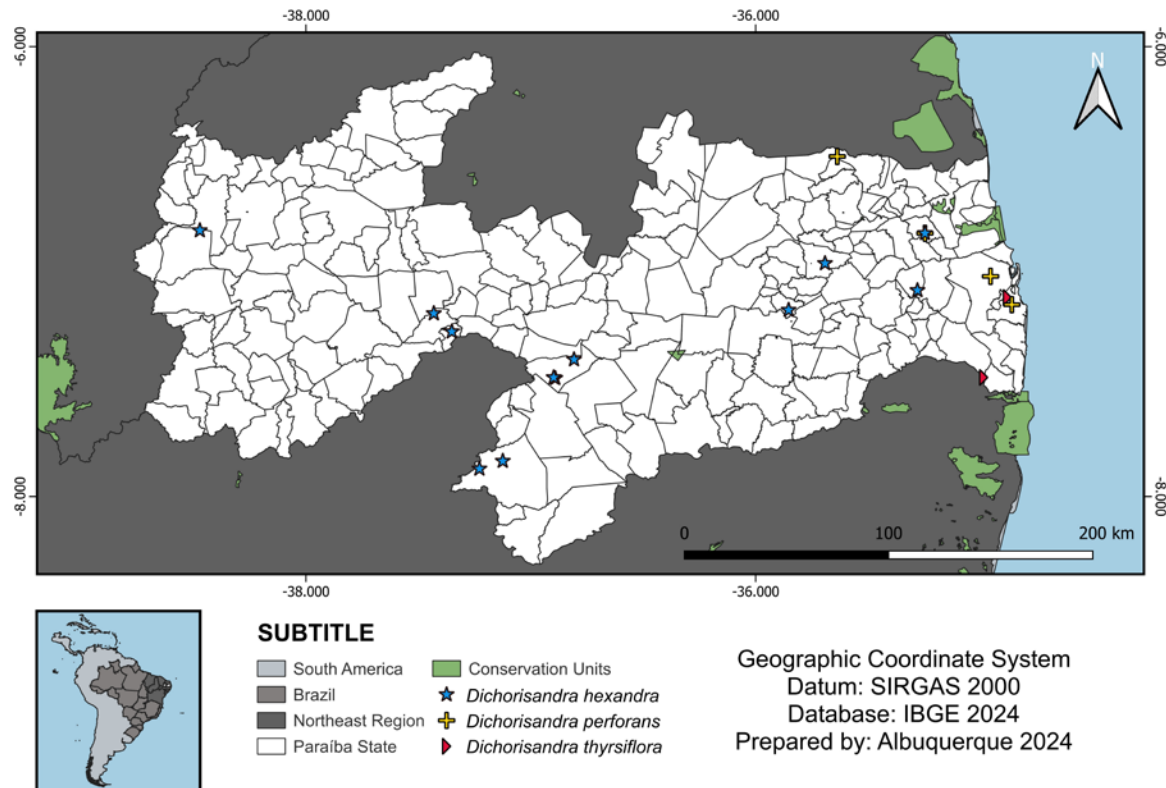


Figure 10. Geographic distribution of the genus *Dichorisandra* in Paraíba state, Brazil. (Prepared by: Albuquerque, I.M.C.).

sparsely pilose, green. Leaves alternate, distichous, petiolate, petiole 1–2 mm long, erect, pubescent; bracts 3–10 × 1–3 cm, glabrous or ciliate, green, laminated margins, trichomes hyaline, brown; leaf blades 5–9 × 1.5–4 cm, elliptic to obovate, abaxial face green, glabrous to sparsely pilose, apex acute, acuminate or cuspidate, base attenuated, margin smooth, apex ciliate. Inflorescence terminal, erect, pedunculate, cincinnus 9–12 flowers; peduncle 5–15 mm long, green; cincinnus subsessile, pilose, 10–15 cincinnus; bracts 2–3.5 × 1–2 mm, lanceolate, apex acuminate, margin smooth, glabrous, green. Flowers zygomorphic, bisexual, pedicellate; pedicel 0.3–0.4 mm long, pubescent; sepals 10 × 4 mm, ovate, apex obtuse, glabrous to little pilose, margins smooth, green; petals 10 × 5 mm, oblong or obovate, apex obtuse or rounded, purple-bluish to purple, basal third white; stamens 6, glabrous; filaments 2–3 mm long; anthers 4–5 × 1–2 mm, poricidal, white to yellow, distal half purple, base sagittate; ovary 1–2.5 × 2–3 mm, globose, glabrous; styles 5–6 mm long, curved; stigma capitate; ovules 2 per locule. Capsules 6–7 × 5–6 mm, globose, sessile, loculicidal, dehiscent, glabrous, purple. Seeds 4.5 × 3 mm, oblong, 2 per locule, aril red, winged, coat smooth, black.

Material examined selected: Brazil. PARAÍBA: Areia, 17.V.1953, fl., J. C. Moraes 954 (US); Cuité, 08.XI.2010, fl., C. A. G. Santos et al. s.n. (HCES 0102-102); Ibidem, 23.IV.2019, fl., V. F. Sousa et al. 862 (HCES); Lagoa Seca, 29.VII.2001, fl., C. E. L. Lourenço 243 (JPB); Maturéia, 25.II.1994, fl., M. F. Agra 2681 (MO); Monteiro, 21.V.2008, fl., P. C. Gadelha-Neto 2272 (JPB); Santa Rita, 19.VI.2010, fl., P. C. Gadelha-Neto 2870 (JPB); São José dos Cordeiros, 23.III.2003, fl., I. B. Lima 88 (HUEFS); Ibidem, 22.XI.2010, fl., fr., G. C. Delgado-Júnior 263 (JPB); Sapé, 08.II.2012, fl., W. W. Thomas 15624 (NY).

Geographic distribution, habitats and phenology: occurs in the Americas (Tropicos, continuously updated; SpeciesLink). In Brazil, the species was encountered in all states (Aona et al. 2020), associated with Carrasco, gallery forest, terra firme forest, seasonal deciduous forest, seasonal semideciduous forest, ombrophilous forest (pluvial forest), restinga, and vegetation associated with rock outcrops (Flora e Funga do Brasil, continuously updated). In the study area, it was found with flowers from February to November and with fruits in the months of May and November, in areas of Caatinga and Atlantic Forest phytogeographic domains, mainly in the latter, in shaded places; dependent on water for fruit production, as it was found bearing fruit during the rainy season.

Notes: *Dichorisandra hexandra* has an inflorescence covered with short trichomes, dehiscent anthers with 2 apical pores and seeds with red arils.

9. *Dichorisandra perforans* C. B. Clarke, *Monogr. phan.* 3: 281. 1881. TYPE, Goyaz, dry shady wood near Arrayas, flower blue, March 1840. Gardner 4019 (Holotype K; Isotype BM). (Figure 10, Figure 11g-k)

Herbs, 0.2–1.5 m tall, terrestrial. Stems erect, not branched, monomorphic at flowering, glabrous, green. leaves alternate, distichous, rosulate, petiolate; petiole ca. 3 mm long, erect, with trichomes short on margins; bracts 1–2 cm long, glabrous, green, margin sparsely ciliate, cilia brown; leaf blades 7–20 × 3–6 cm, obovate to oblong-lanceolate, both faces glabrous, apex acuminate, base cuneate, margin glabrous to ciliate. inflorescence terminal, erect, pedunculate, cincinnus 4–7 flowers; peduncle 3.5–10 cm long, lilac; cincinnus subsessile, short-pilose, 15–20 cincinnus; bracts 10–25 × 2–4 mm, lanceolate, pubescent, parallel to the cincinnus, apex acuminate, margin sparsely ciliate, glabrous,

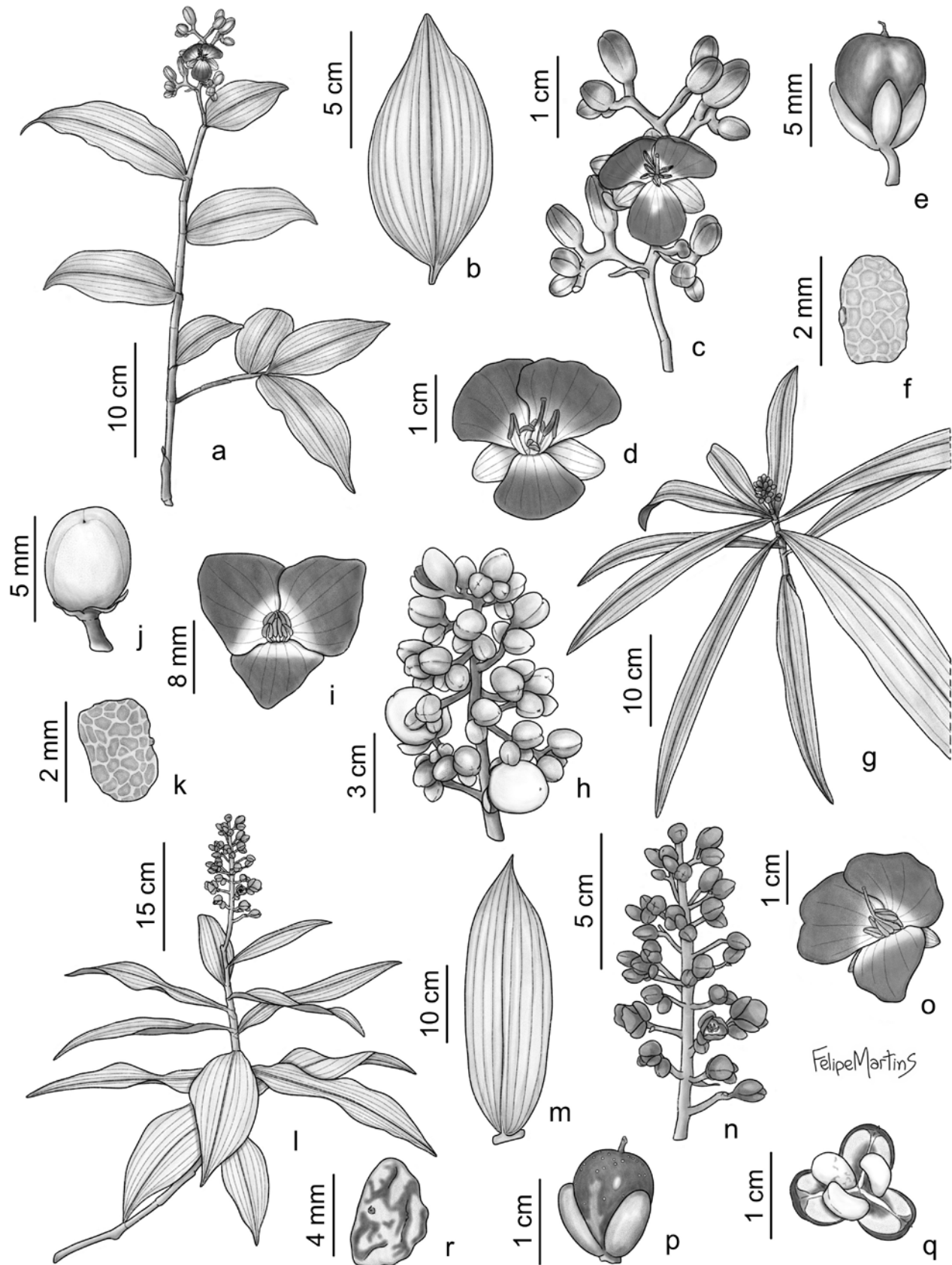


Figure 11. A-F. *Dichorisandra hexandra*: A. habit; B. leaf, abaxial and adaxial surfaces; C. inflorescence; D. flower, frontal view; E. fruit; F. seed. G-K. *D. perforans*: G. habit; H. inflorescence; I. flower, frontal view; J. fruit; K. seed. L-R. *D. thyrsiflora*: L. habit; M. leaf, adaxial surface; N. inflorescence; O. flower, frontal view; P. fruit; Q. open fruit; R. seed.

green. Flowers zygomorphic, bisexual, pedicellate; pedicel 1–2 mm long, green, pubescent; sepals 5–10 × 4–5 mm, elliptic to oval, apex obtuse, pilose, margin glabrous, green; petals 10–15 × 5–8 mm, elliptic to obovate, apex acute, blue; stamens 6, glabrous; filaments 2–3 mm long; anthers 3–4 mm long, poricidal, purple to bluish, base sagittate; ovary 1–2 × 1–1.5 mm, globose, glabrous, smooth; styles 4–6 mm long, curved, stigma truncate; ovules 4 per locule. capsules 10–20 × 4–5 mm, cylindrical, sessile, glabrous, smooth, purple. Seeds 5 × 3 mm long, elliptic, 4 per locule, winged, coat rough, black.

Material examined selected: Brazil. PARAÍBA: Itapororoca, 04.V.1997, *L. P. Félix s.n.* (UFP 27803); São José da Mata, 31.VII.2004, fl., *P. C. Gadelha-Neto et al. 1215* (JPB); Ibidem, 31.XII.2004, fl., *P. C. Gadelha-Neto et al. 1215* (UFP); Sapé, 20.VI.2000, fl., *M. Costa-Santos 33* (JPB); Ibidem, 23.III.2001, fl., *M. Costa-Santos & K. M. Souza 49* (JPB).

Geographic distribution, habitats and phenology: endemic to Brazil (Tropicos, continuously updated), with records for the states of Ceará, Goiás, and Tocantins (Aona et al. 2024), principally, on rock outcrops in the Caatinga and Cerrado domains (Flora e Funga do Brasil, continuously updated). In the study area, the species was recorded flowering from March to July, coinciding with the coldest season of the year, and in December. New occurrences were recorded in areas of Atlantic Forest and Caatinga vegetation, close to humid and shaded areas.

Notes: *Dichorisandra perforans* can be readily recognized by having glabrous stems, not branched, leaves pinkish with brown trichomes, inflorescence with zygomorphic flowers with blue petals, capsules cylindrical and smooth, seeds elliptic.

10. *Dichorisandra thyrsiflora* J.C. Mikan, *Del. Fl. Faun. Bras.*, t. 3. 1820. **NEOTYPE:** Brazil. Rio de Janeiro, Restinga de Marambaia, 14.V.2004, *L. Y. S. Aona et al. 882* (UEC). (Figure 10, Figure 111-r)

Herbs, 1–2 m tall, erect, not branched. Stems erect, not branched, monomorphic during flowering, glabrous, green. Leaves alternate, distichous, petiolate; petiole 1–2 mm long, erect, pubescent; bracts 2–3.5 cm long, glabrous to pubescent, green, margin glabrous; leaf blades 10–30 × 3–5 cm, elliptic-lanceolate to elliptic, green, adaxial face darker than abaxial face, apex acuminate, base symmetrical, margins glabrous on both faces. Inflorescence terminal, erect, peduncular, cincinnus 3–4 flores; peduncle 1–10 cm long, green; cincinnus subsessile, pilose, 10–30 cincinnus; bracts 1–1.5 × 1–2 mm, lanceolate, diminishing towards the apex, apex acuminate, margins smooth, purple. Flowers zygomorphic, bisexual, pedicellate; pedicel 2–3 mm long, pilose; sepals 5–10 × 3–5 mm, elliptic-obovate, apex obtuse, glabrous to little pilose, margin glabrous, purple to lilac; petals 1–1.5 × 0.5–1 cm, unguiculate, apex obtuse or rounded, purple, lilac, purple to dark blue; stamens 6, glabrous, unequal; filaments ca. 1 mm long; anthers ca. 5 mm long, poricidal, yellowish, base cordate; ovary 2–3 × 2 mm, globose, glabrous, smooth; styles 4–5 mm long, curved; stigma capitate. Capsules 1 × 1.5 cm, globose, sessile, loculicidal, dehiscent, green or yellow, purple, glabrous, smooth. Seeds 4–5 × 4–5 mm, elliptic to reniform, 4 per locule, winged, coat rough, black.

Material examined: Brazil. PARAÍBA: Caaporã, 04.IX.2012, fl., fr., *I. B. Lima et al. 1291* (JPB); João Pessoa, 24.IX.1985, fl., *C. A. B. Miranda et al. 6290* (JPB); Sapé, 06.VII.1998, fl., *A. C. A. Moura 195* (JPB).

Geographic distribution, habitats and phenology: endemic to Brazil (Tropicos, continuously updated), with records for the states of Bahia, Minas Gerais, and Rio of Janeiro (Aona et al. 2018), associated, principally, with areas of restinga (Flora e Funga do Brasil, continuously updated). In the study area, it was found with flowers in July and September and fruits in September, being recorded for the first time for the Paraíba state, in this study. The species was recorded in the Atlantic Forest near shady and flooded areas.

Notes: *Dichorisandra thyrsiflora* has entirely lilac to purple flowers, elliptical to obovate sepals and erect styles.

11. *Floscopa glabrata* (Kunth) Hassk., *Withmelin. Ind.* 166. 1870. **BASYONIM:** *Dithyrocarpus glabratus* Kunth, *Enum. Pl. On. Huc. Cognit.* 4: 77. 1843. (Figure 12, Figure 13a-b)

Herbs, 30–80 cm tall, aquatic or in marshes. Stems erect, branched, monomorphic during flowering, trichomes hyaline, red. Leaves alternate, spiraling, petiolate; petiole 3–6 mm long, glabrous; bracts 0.5–1 cm long, ciliate, serrated margins, trichomes green to red; leaf blades 3–10 × 0.7–2.5 cm, elliptic to lanceolate, adaxial face scabrous, abaxial face pubescent, apex acute to acuminate, base symmetrical, cuneate to rounded, margin setose, green. Inflorescence terminal, erect, peduncular, cincinnus solitary, alternate, 6–15 flowers; peduncle 1–5 cm long, pilose; bracts 2.5–6 × 0.5–0.8 cm, lanceolate, apex acuminate, margin smooth, pubescent, green. Flowers actinomorphic, bisexual, pedicellate, pedicel 0.7–1.2 mm long, glabrous; sepals 1.5–3 × 1–2 mm, oblong, apex obtuse, pubescent, margin glabrous, green at base; petals 1–2.5 × 1–1.5 mm, oblong, equal, apex obtuse, lilac or pink; stamens 6, dimorphic, unequal; filaments 2–3.5 mm long, anthers 0.5–1 mm long, glabrous, rimose, yellow; ovary 0.2–0.6 × 0.2–0.5 mm, globose, glabrous; styles 2–5 mm long, curved; stigma truncate. Capsules 3–4 mm long, discoidal, sulcate in the central region, glabrous, smooth, green. Seeds 1 × 1.5 mm long, 1 per locule, subglobose, coat smooth, black.

Material examined: Brazil. PARAÍBA: Sousa, VI.1936, fl., *P. Luetzelburg 28264* (IPA 47609).

Geographic distribution, habitats and phenology: endemic to the Americas (Tropicos, continuously updated). In Brazil, the species is encountered in all states except Acre, Amapá, Rio Grande do Norte, Roraima, and Sergipe (Aona et al. 2020), associated with várzea, campo limpo, cerrado (*lato sensu*), gallery forest, várzea forest, ombrophilous forest (pluvial forest), restinga (Flora e Funga do Brasil, continuously updated). In the study area, was recorded with flowers in June, associated with Caatinga vegetation. However, this species was recorded almost 90 years in the studied area where it can be probably extinct.

Notes: *Floscopa glabrata* is a perennial herb, with red stems, leaves green, corolla zygomorphic, styles curved, stigma truncate, and fruit discoid.

Floscopa glabrata was previously confirmed in Paraíba state by Luetzelburg (1936) based on a collection made in the municipality of Sousa, in the Caatinga vegetation, since that time there have been no other reports of occurrences in that state.

12. *Gibasis geniculata* (Jacq.) Rohweder *Abh. Auslandsk., Reihe C, Naturwiss.* 61(18): 143 1956. **BASYONIM:** *Tradescantia geniculata* Jacq., *Select. Stirp. American. Hist.* 94, t. 64. 1763. (Figure 12, Figure 13c-d)

Herbs, 15–50 cm tall, terrestrial or rupicolous. Stems trailing, branched, monomorphic when flowering, densely villous to pubescent,

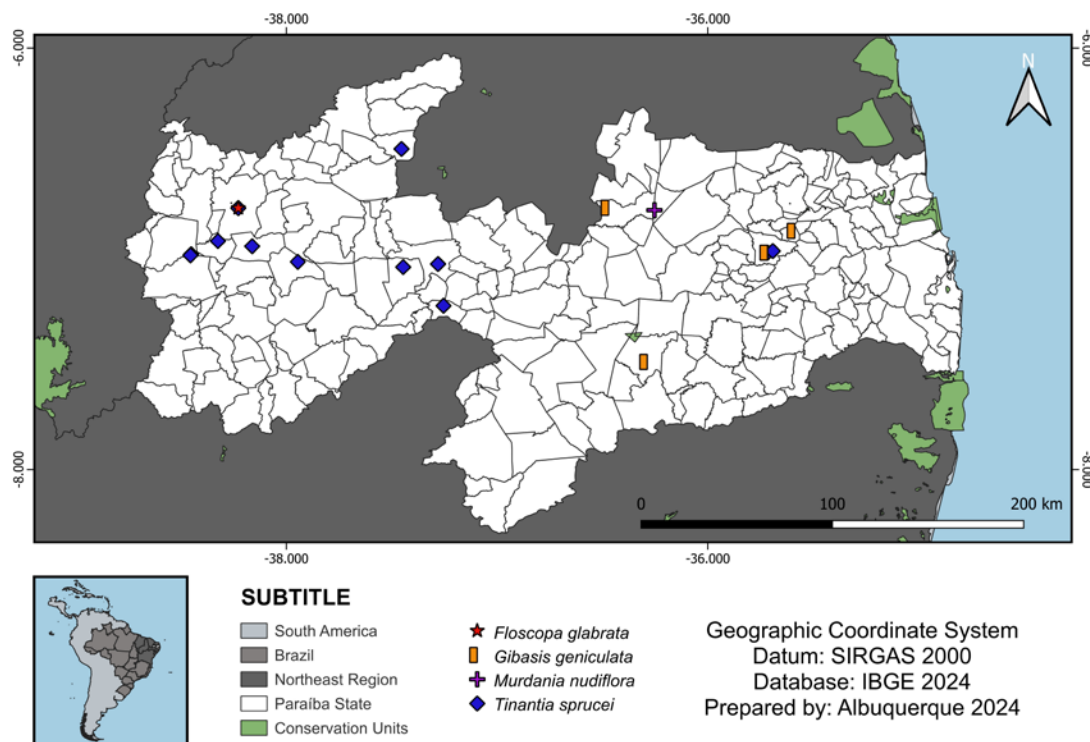


Figure 12. Geographic distribution of the species *Floscopa glabrata*, *Gibasis geniculata*, *Murdannia nudiflora*, and *Tinantia sprucei* in Paraíba state, Brazil. (Prepared by: Albuquerque, I.M.C.).

trichomes hyaline, green. leaves alternate, distichous, sessile; bracts 0.2–1.1 cm long, laminated margins, sessile, green; leaf blades 2–10 × 1–3.5 cm, obovate, green, margins ciliate, cilia purple, adaxial face villous to pubescent, abaxial face glabrous, apex acuminate, base asymmetrical, rounded. Inflorescence terminal, erect, peduncular; peduncle 2–7 cm long; cincinnus 2, solitary, stipitate, subopposite, 4–7 flores; bracts 1–2 mm long, free of the peduncle, linear, apex acuminate, base symmetrical, green. Flowers actinomorphic, bisexual, pedicellate, pedicel 1–1.5 cm long, pubescent; sepals 2–5 × 2–3 mm, elliptic, villous to pubescent, margins smooth, green; petals 3–5 × 1–2.5 mm, ovate, apex obtuse, white; stamens 6, homomorphic, glabrous; filaments 1–3 mm long, bearded at base; anthers 0.2–0.7 × 0.5–0.6 mm, rimose, yellow; ovary 0.5–1 × 0.5–1 mm, oblong, glabrous; ovules 2 per locule; styles 2–3 mm long, erect; stigma truncate. Capsules 2–4 × 2–3 mm, globose, sessile, glabrous, green. Seeds 1–2 × 1–1.5 mm, globose, 2 per locule, winged, coat smooth, brown.

Material examined: Brazil. PARAÍBA: Areia, 25.X.2017, fl., *P. C. Gadelha-Neto* 4209 (JPB); Cabaceiras, 15.IV.2008, fl., *M. C. Pessoa & J. R. Lima* 292 (JPB); Pedra Lavrada, 30.IV.2007, fl., *P. C. Gadelha-Neto et. al* 68 (JPB); Pilões, 04.IV.2015, fl., *P. C. Gadelha-Neto* 3955 (NY).

Geographic distribution, habitats and phenology: occurs in the Americas (Tropicos, continuously updated). In Brazil, the species occurs in the states of Alagoas, Amazonas, Bahia, Espírito Santo, Mato Grosso, Mato Grosso do Sul, Minas Gerais, Paraíba, Paraná, Pernambuco, Rio de Janeiro, Rio Grande do Sul, Rondônia, Santa Catarina, São Paulo, and Sergipe (Aona et al. 2020), associated with anthropized areas (Flora e Funga do Brasil, continuously updated). Encountered flowering between

April and October, coinciding with the rainy season. In Paraíba state, it was recorded in Caatinga and Atlantic Forest, predominating in the Atlantic Forest in shady and humid environments.

Notes: *Gibasis geniculata* has decumbent stems, densely villous, leaf blades obovate, with adaxial face villous, margin purplish, flowers actinomorphic, with petals white, and fruits globose and green, characteristics that readily distinguish it from the other species of Commelinaceae encountered in the study area.

13. *Murdannia nudiflora* (L.) Brenan, *Kew Bull.* 7(2): 189. 1952. *BASIONYM: Commelina nudiflora* L. *Sp. Pl.* 1: 41–42. 1753. (1 May 1753). (Figure 12, Figure 13e)

Herbs, 10–30 cm tall, terrestrial or rupicolous. Stems creeping, branched, dimorphic when flowering, glabrous, green. Leaves alternate, spiraling, sessile, caulinary, linear; sheath foliar 5–10 mm long, hirsute, green, margin smooth, sometimes glabrous; leaf blades 1–10 × 0.2–1 cm, lanceolate to oblong, green, apex obtuse to acuminate, base cuneate, margin smooth. Inflorescence terminal, erect, in panicles, with various flowers densely arranged, pedunculata, or flowers solitary; peduncle 1–4 cm long; bracts ca. 10 mm long, lanceolate, apex acuminate, margin smooth, green, glabrous. Flowers zygomorphic, bisexual, pedicellate, glabrous; pedicels 3–4.5 mm long; sepals 2–3 mm long, ovate to elliptic, apex obtuse, glabrous, green; petals 3, 3–3.5 × 2–6 mm, obovate, orbicular, apex obtuse, glabrous, purple; stamens 2, glabrous; filaments 1–2 mm long, barbate at base; anthers 2–5 × 1–2 mm, poricidal, white to yellow, upper half purple; ovary 1–2 × 1–3 mm, globose, glabrous, ovules 2 per locule; styles 2–4 mm long, curved; stigma capitate.



Figure 13. A-B. *Floscopa glabrata*: A. inflorescence, lateral view; B. inflorescence, view from above. C-D. *Gibasis geniculata*: C. inflorescence; D. flower, frontal view. E. *Murdannia nudiflora*: flower, frontal view. F-G. *Tinantia sprucei*: F. flower, frontal view; G. inflorescence, view from above. H-I. *Tradescantia ambigua*: H. inflorescence; I. flower, frontal view. J. *T. pallida*: flower, frontal view. K. *T. spathacea*: flower, frontal view. L. *T. zebrina*: flower, frontal view (A: Morais, I.; B: Ferreira, P.; C-D: Zavatin, D.A.; E: Gayoso, Z.; F: Pinto, A.S.; G: Costa, F.C.P.; H-I: Sousa, M.F.B.; J-L: Albuquerque, I.M.C.).

Capsules 3–4 mm long, ovoid-globose, sessile, trilocular, glabrous, brown. Seeds 1–2 mm long, oblong, 2 per valve, coat smooth, brown.

Material examined: Brazil. PARAÍBA: Sossego, 04.II.2010, fl., *Gerlandio* 72 (EAN).

Geographic distribution, habitats and phenology: species native to tropical Asia, introduced into the Americas, now extending north to the United States and south into Brazil (Grant et al. 2003). Recorded with flowers in February. In Paraíba state, was recorded in the Atlantic Forest near pastureland, along riverbanks, and in swamps, in open areas.

Notes: *Murdannia nudiflora* can be recognized, especially, by having branched stems, creeping and glabrous, leaves spiraling, leaf blades lanceolate to oblong, inflorescences paniculate, terminal, flowers with sepals green, corolla purple, filaments barbate at base, and capsules ovoid to globose, brown.

14. *Tinantia sprucei* C.B. Clarke, *Monogr. Phan. [A. DC. & C. DC.]*, 3: 287. 1881. TYPE: Brazil; in vicinibus Santarem, Prov. Pará, March, 1850. Spruce, R. 763 (Holotype K; Syntype GDC). (Figure 12, Figure 13f-g)

Herbs, 40–60 cm tall, terrestrial. Stems erect, branched, monomorphic when flowering, glabrous, green. Leaves alternate, spiraling, sessile to subsessile; bracts ca. 0.2 mm long, margins ciliate, cilia green; leaf blades 5–10 × 2–4 cm, elliptic-lanceolate, glabrous to thinly pilose, apex acute to acuminate, base cuneate, green. Inflorescence terminal, erect, peduncular, peduncle 3–6 cm long, green; cincinnus 1–5 flowers; bracts 2–3.5 × 1–2 mm, oval, apex obtuse, base cuneate, margin smooth, glabrous, green; flowers zygomorphic, bisexual, pedicellate, pedicel 1–4 cm long, glabrous; sepals 3, 7–10 × 4–6 mm, elliptic, glabrous, puberulent, margins smooth, green; petals 3, 10–10 × 5–10 mm, rhomboidal to obovate, apex obtuse to rounded, base symmetrical, lilac; stamens 6, dimorphic, pubescent, lilac; filaments 1–2 mm long, lilac; anthers 0.2–0.7 × 0.5–0.6 mm, rounded, rimose, white to yellow, glabrous; ovary 7–5 mm long, globose, glabrous; styles, 3 mm long, curved; stigma truncate. Capsules 0.8–1 × 0.4–0.5 cm, globose, sessile, green. Seeds 3–3.5 × 2–2.5 mm., oblong, 4 per locule, coat smooth, brown.

Material examined selected: Brazil. PARAÍBA: Areia, 03.VIII.2017, fl., fr., P. C. Gadelha-Neto 4176 (JPB); Cajazeiras, 11.V.2008, fl., P. C. Gadelha-Neto 2241 (JPB); Coremas, 09.V.2008, fl., P. C. Gadelha-Neto 2213 (JPB); Cuité, 02.VII.2013, fl., V. F. Sousa s.n. (HCES 682); Ibidem, 03.VI.2023, fl., V. F. Sousa 2183 (HCES); Patos, 07.IV.2013, fl., M. F. Lucena & D. S. Lucena 360 (CSTR); Ibidem, 18.III.2022, fl., A. G. C. Guimarães 32 (CSTR); São Bento, 12.IV.2015, fl., F. G. Silva et al. 86 (CSTR); São José da Lagoa Tapada, 17.III.2022, fl., fr., J. P. S. Gomes & V. P. Moreira 113 (RN); São José de Piranhas, 06.V.2010, fl., A. P. Fontana et al. 6642 (UFP); Serra Branca, 19.IV.2018, fl., L. P. Félix et al. 17443 (EAN); Sousa, 23.III.2000, fl., A. Furlan 566 (UFP).

Geographic distribution, habitats and phenology: *Tinantia sprucei* occurs in Brazil and Venezuela, being frequent in degraded areas (Flora e Função do Brasil, continuously updated). In Brazil, there are records of this species in all the northeastern states (Aona and Pellegrini 2012) as well as in the states of Pará and Mato Grosso. *Tinantia sprucei* was found flowering from March to August and fruiting during the months of March and August, associated with the phylogeographic

domains of Caatinga and Atlantic Forest, close to anthropized, exposed areas with high humidity levels.

Notes: This species can be recognized by its erect habit, generally with apical branching, elliptic-lanceolate blades, ciliate margin, slightly hairy, terminal inflorescence, erect and peduncular. It can, however, be confused with *Aneilema brasiliense*, although it can be distinguished by having stamens barbate, stigma truncate, and fruits green.

15. *Tradescantia ambigua* Mart. ex Schult. & Schult.f., *Syst. Veg.* 7: 1170 1830. LECTOTYPE: Brazil, In sylvis Provinciae Bahiensis, s.d. *Tradescantia ambigua* Mart. ex Schult. & Schult.f. s.n. (M). (Figure 13h-i, Figure 14l-n, Figure 15)

Herbs, 10–40 cm tall, terrestrial to rupicolous. Stems erect, succulent, not branched; internodes green to reddish, sparsely pubescent, trichomes hyaline. Leaves alternate, spiral, sessile, bracts 2–8 × 1–4 mm, green, hispid, trichomes hyaline, margins ciliate; blade 3–15 × 0.5–4 cm, lanceolate to ovate, apex acuminate, green, glabrous, base truncate, margins ciliate. Inflorescence axillary, peduncular, 8–10 flowers, peduncle 0.2–0.3 cm long, glabrous; bracts 0.5–1 cm long, obovate, hispid, apex acute, base cuneate, margins ciliate, light green. Flowers actinomorphic, bisexual, flattened, pedicellate; pedicel 0.3–0.8 mm long, pubescent, trichomes hyaline; sepals 8–11 mm long, ovate, cuculiform, glabrous, light green; petals 12–15 mm long, sessile, elliptic to rhomboidal, apex acute, base cuneate, margin entire; stamens 6, ca. 8 mm long, densely pilose; filaments 2–3 mm long; anthers 2–5 × 1–2 mm, poricidal, white to yellow; ovary 1–2 × 2–3 mm, subglobose, glabrous; styles 2–4 mm long, erect; stigma capitate. Capsules ca. 3.5 mm long, subglobose, apiculate, sessile, dehiscent, glabrous, green. Seeds 0.5–3 mm long, ellipsoidal to flattened, 2 per locule, uniseriate, coat rough, gray to brown, hilum linear.

Material examined selected: Brazil. PARAÍBA: Araruna, 14.IV.2002, fl., M. R. Barbosa et al. 2406 (JPB); Cuité, 29.V.2021, fl., V. F. Sousa 1483 (HCES); Monteiro, 12.VI.2008, fl., M. C. Pessoa 439 (JPB); Passagem, 16.V.2015, fl., E. M. P. Fernando 326 (CSTR); Pedra Lavrada, 30.IV.2007, fl., P. C. Gadelha-Neto et al. 1686 (JPB); Pocinhos, 04.VII.2013, fl., E. C. S. Costa 115 (HACAM); Remígio, 08.VIII.1958, fl., J. C. Moraes s.n. (EAN 1854); São João do Tigre, 03.VI.2016, fl., fr., L. P. Félix et al. 15938 (EAN); São José dos Cordeiros, 23.III.2003, fl., I. B. Lima 83 (HUEFS); Ibidem, 27.III.2010, fl., R. M. T. Costa et al. 71 (JPB).

Geographic distribution, habitats and phenology: *Tradescantia ambigua* is endemic to northeastern Brazil (states of Alagoas, Bahia, Ceará, Paraíba, Pernambuco, Piauí, Rio Grande do Norte, and Sergipe), reaching to the states of Goiás, Minas Gerais, and Tocantins (Aona et al. 2020). It grows in humid and shaded areas among shrubs and forested areas in the Caatinga and Cerrado domains (Flora e Função do Brasil, continuously updated). Recorded flowered from March to August, coinciding with the rainy and colder season in the studied area, and with fruits in the month of June. In the studied area, it was recorded in Caatinga vegetation in shaded areas close to humid places.

Notes: *Tradescantia ambigua* It is morphologically characterized by its stem having green to reddish internodes and its alternate leaves, arranged in a spiral, forming a rosette, with a ciliated margin and truncated base. It presents a dehiscent capsule fruit, green, with flat seeds presenting a rough top.

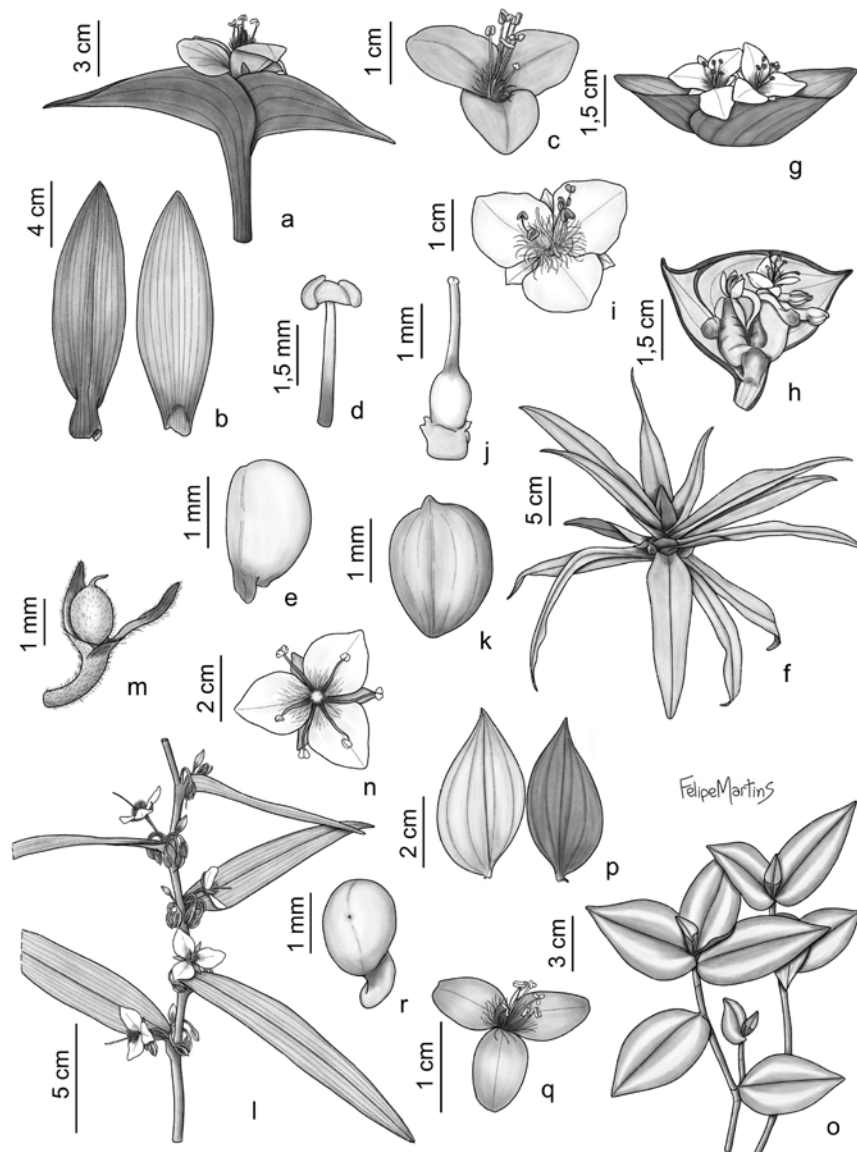


Figure 14. A-E. *Tradescantia pallida*: A. inflorescence; B. leaf, abaxial and adaxial surface; C. flower, frontal view; D. stamen; E. fruit. F-K. *T. spathacea*: F. habit; G. inflorescence, external view; H. inflorescence, internal view; I. flower, frontal view; J. Gynoecium; K. fruit. L-N. *T. ambigua*: L. habit; M. fruit; N. flower, frontal view; O-R. *T. zebrina*: O. habit; P. leaves, adaxial and abaxial surfaces; Q. flower, frontal view; R. fruit.

16. *Tradescantia pallida* (Rose) D. R. Hunt, *Kew Bull.* 30 (3): 452. 1975. **BASIONYM:** *Setcreasea pallida* Rose Palmer, E., s.n. (K). **TYPE,** Mexico, near Victoria, Tamaulipas, 1907, E. Palmer (US 572818). (Figure 13j, Figure 14a-e, Figure 15)

Herbs, 10–60 cm tall, terrestrial or rupicolous. Stems creeping to erect, branched, monomorphic when flowering, pubescent, purple. Leaves alternate, spiraling, slightly petiolate, petiole 1–2 mm long, erect, glabrous; sheath 2–5 × 3–5 mm, glabrous, purple; leaf blades 4–12 × 2–3.5 cm, lanceolate, apex acute, base cuneate, margin ciliate, glabrous, purple. Inflorescence terminal, erect, pedunculate, cincinnus 4–8 flowers; peduncle 2–8 cm long; cincinnus foliaceous, generally leaves opposite; bracts 4–5 cm long, spathaceous, apex cuneate, base cuneate, margin closed, glabrous, purple to violet. Flowers actinomorphic, bisexual, sessile to pedicellate; pedicel 3–7 mm long, pilose, white at

apex; sepals 8–11 mm long, free, oblong to lanceolate, glabrous, purple; petals 12–15 mm long, sessile, elliptic, apex acute, base symmetrical, pink to purple; stamens 6, 8 mm long, glabrous; filaments 1–3 mm long; anthers 1–5 × 1–3 mm, poricidal, white to yellow, base sagittate; ovary ca. 1.5 mm diam., globose to oblong, pilose to glabrous, tricarpeal; styles 1–3 mm long, erect; stigma capitate. Capsules 3–5 mm diam., globose, glabrous, sessile, dehiscent, trilocular, purple. Seeds 2, 5–3 mm long, 4 per locule, ovoid, uniseriate, striated, coat costate, brown.

Material examined: Brazil. PARAÍBA: João Pessoa, 26.XI.1968, fl., E. J. Andrade s.n. (JPB 2961).

Geographic distribution, habitats and phenology: occurs in North America, Central America, and Africa (Tropics, continually updated). In Brazil, it occurs in the states of Alagoas, Bahia, Distrito Federal, Espírito Santo, Goiás, Maranhão, Mato Grosso do Sul, Minas

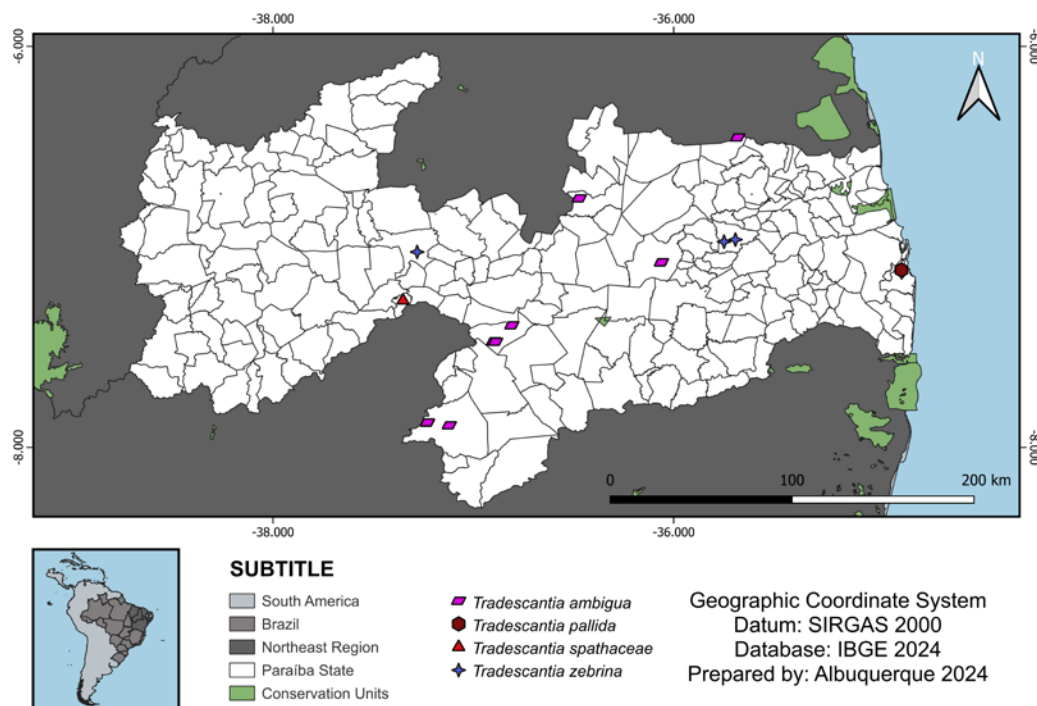


Figure 15. Geographic distribution of *Tradescantia* in Paraíba state, Brazil. (Prepared by: Albuquerque, I.M.C.).

Gerais, Paraíba, Paraná, Pernambuco, Rio de Janeiro, Rondônia, São Paulo, and Sergipe (Aona et al. 2020), associated with anthropized areas (Flora e Funga do Brasil, continuously updated). This species was recorded flowering in November. In the study area, it was found in phytogeographic domains of Caatinga and Atlantic Forest, predominantly in the latter, in open areas between rocks and fallen tree trunks, close to urban areas, which characterizes it as a cultivated species (Flora and Funga of Brazil, continuously updated).

Notes: *Tradescantia pallida* has purple stems, leaves lanceolate, purple to violet, margin ciliate, flowers with pedicel umbelliform, stamens epipetalous, capsule globose, and seeds ovoid. *Tradescantia pallida* morphologically resemble *T. ambigua* as both have sepals ovate, cuculiform. It differs from the other species of the genus *Tradescantia* present in the study area by having leaves and stems completely purple or violet, and flowers purple. Although it is generally described as cultivated for various uses (Teixeira 2012, Xisto 2018), in Paraíba state, this species was found growing spontaneously within anthropized areas. Andrade-Lima (1968) also collected *T. pallida* in João Pessoa, in the Atlantic Forest vegetation.

17. *Tradescantia spathacea* Sw., *Prodr. Veg. Ind. Occ.*: 57. 1788. **BASIONYM:** *Jamaica*; *India occidentalis*, *Campechia*, 1788. **Swartz**, *OP. s.n.* (Figure 13k, Figure 14fl-k, Figure 15)

Herbs, 10–40 cm tall, terrestrial, rupicolous or epiphytic. Stems erect, trailing or prostrate, not branched, glabrous to little pubescent, trichomes hyaline, purple to green. Leaves alternate, spiraling, imbricate in a rosette, sessile; leaf blades 20–35 × 3–9 cm, lanceolate, apex acuminate to apiculate, base cuneate, succulent, glabrous, margins serrated, bifacial, adaxial face green, abaxial face purple.

inflorescence axillary, sessile to pedunculate, erect; peduncle 2–5 cm long, simple or branched; cincinnus 2, cincinnus 5–8 flowers; symmetrical, base saccate, solitary; bracts 2–4.5 × 2.5–5 cm, sessile, obovate to oval, apex obtuse, base truncated, purple. Flowers actinomorphic, bisexual, numerous, white, pubescent; pedicel ca. 15 mm long, curved, rhomboidal; bracts, 0.5–1 × 0.5–2 cm spatheaceous, purple; sepals 5–7 mm long, oblong to lanceolate, pink to white, glabrous, margins smooth; petals 4–6 mm long, sessile, elliptic, apex acute, base cuneate, white; stamens 6, 5–7 mm long, white, glabrous; filaments ca. 1 mm long, erect; anther 2–3 × 1–2 mm, rimose; stigma truncate; ovary ca. 1 mm diam., globose, pilose, tricarpeal; styles 1–3 mm long, erect; stigma capitate. Capsules 1–3 mm long, globose, sessile, dehiscent, glabrous, trilocular, brown. Seed ca. 3 mm long, 1 per locule, coat rough, brown.

Material examined: Brazil. PARAÍBA: Campina Grande, 26.XI.1984, fl., *I. Cavalcanti s.n.* (HACAM 238); Ibidem, 02.VIII.2002, fl., *I. C. Dantas s.n.* (HACAM 1450); João Pessoa, 04.II.2004, fl., fr., *P. C. Gadelha-Neto 1083* (JPB 32734).

Geographic distribution, habitats and phenology: occurs in Central America and southern China (Tropicos, continuously updated). In Brazil, it occurs all along the eastern coast and in Minas Gerais state (Aona et al. 2020), associated with anthropized areas (Flora e Funga do Brasil, continuously updated). Recorded with flowers in the months of February, August and November and with fruits in February. In the study area, it was found in Caatinga and Atlantic Forest phytogeographic domains among rocks and fallen tree trunks in open areas.

Notes: *Tradescantia spathacea* can be easily recognized by having short stems, not branched, leaf blades lanceolate, bifacial, and flowers white, grouped in axillary cincinnus. Although it is generally described

as cultivated for ornamental purposes (Silva 2020; Morais et al., 2024), in Paraíba state, this species was found growing spontaneously within anthropized areas.

18. *Tradescantia zebrina* Bosse, *Vollst. Handb. Blumengart.* 4: 655. 1849. EPITYPE: Puerto Rico. Bo. Limón. Along Road 146, ca. 2 km E of Lago dos Bocas dam, Acevedo-Rodríguez, P. 15559, 16 May 2013 (US). (Figure 13l, Figure 14o-r, Figure 15)

Herbs, 15–30 cm tall, terrestrial, or rupicolous. Stems prostrate or decumbent, branched, monomorphic at flowering, glabrous to pilose, purple. Leaves alternate, spiraling, sessile; bracts 5–10 × 3–6 mm, glabrous, margins glabrous, purple; leaf blades 3–5 × 1–5 cm, elliptic to obovate, apex acuminate to apiculate, base cuneate, glabrous, abaxial face purple and adaxial face green. Inflorescence terminal or axillary, pedunculate; peduncle, 0.5–2 cm long, glabrous, purple; cincinnus 2, sessile, cincinnus 4–6 flowers; bracts 0.5–2 × 0.5–1.5 cm, spatheaceous, margins purplish. Flowers actinomorphic, bisexual, subsessile to pedicellate; pedicels 3–10 mm long; sepals 1–3 × 1–2 mm, spatheaceous, apex attenuated, connate at base, green; petals 3–5 × 8–10 mm, elliptic to rhomboidal, apex acute, base cuneate, margins entire, white to pink, blue or violet; stamens 6, ca. 6 mm long; filaments 1–3 mm long, barbate or glabrous, erect; anthers 0.5–1 mm long, rimose, white, base sagittate; ovary 0.8–1 × 0.4–0.6 mm, globose, ovules 2 per locule; styles 1.5–2.5 mm long, erect, pubescent; stigma capitate. Capsules 1–5 mm, globose, trilocular, dehiscent, sessile, black. Seeds 1–5 mm long, oblong to linear, 2 per locule, coat rough, brown.

Material examined: Brazil. PARAÍBA: Areia, 05.II.2014, fl., fr., P. C. Gadelha-Neto 3769 (NY); João Pessoa, 28.IV.2004, fl., P. C. Gadelha-Neto 1130 (JPB); Lagoa Seca, 21.VIII.1995, fl., F. Rômulo s.n. (HACAM 550).

Geographic distribution, habitats and phenology: *Tradescantia zebrina* Heynh. ex Bosse is widely cultivated throughout the world, occurring in Brazil as an invasive species (Hunt 1986; Pelegrini 2018). Recorded with flowers from February to August, and with fruits in February. In the study area it was found in the phytogeographic domains of Caatinga and Atlantic Forest along the edges of shaded forests, usually near to urbanized areas. However, due to its ease of adaptation and vegetative reproduction, it is currently considered a naturalized species for the Flora of Brazil (Flora and Funga of Brazil, continuously updated).

Notes: *Tradescantia zebrina* can be readily recognized as a perennial and creeping herb, leaf blades with adaxial face green with white stripes, and abaxial face purple, those being the principal characteristics distinguishing it from the other species of *Tradescantia* encountered in the study area, in addition to the glabrous pedicel, sepal's oval, and ovary pilose.

Conclusion

The present work represents an important contribution to knowledge concerning the flora of Paraíba, especially as concerns the family Commelinaceae. The results presented here allow morphological characterizations of the species occurring in Paraíba state and their geographic distribution. The first records of *Dichorisandra perforans* and *D. thyrsiflora* recorded here demonstrate the importance of such taxonomic surveys.

There have previously been few efforts to collect some of the species of Commelinaceae in Paraíba state, which indicates that taxa with few collections deposited in local and region herbaria may represent species at risk (and/or the lack of investments in taxonomic studies focusing on many phanerogamic groups).

It was not possible to confirm the occurrence of *Callisia monandra* (Sw.) Schult.f. or *Tripogandra diuretica* (Mart.) Handl. for the flora of Paraíba state. Both species had confirmed presence in the Flora and Funga of Brazil (continuously updated). However, they were not found in the field and, upon analyzing the exsiccatae it was found that they were not the corresponding species.

These results are useful to the taxonomy of Commelinaceae, and we hope that they will be used for defining public policies to conserve species of the family and their respective natural environments.

Floscopa glabrata and *Murdannia nudiflora* were recorded only in the Caatinga phytogeographic domain, while *Dichorisandra perforans*, *D. thyrsiflora* and *Gibasis geniculata* were exclusive to the Atlantic Forest phytogeographic domain, taking into account that *Tradescantia pallida* and *T. zebrina* were also found growing spontaneously in areas of the Atlantic Forest phytogeographic domain, however, they are considered cultivated and naturalized, respectively, in the study area; the other species were recorded in both domains. Based on the analyses of density and richness, gaps in the Commelinaceae records were detected, principally in conservation areas, and mostly in the Atlantic Forest - localities where high density indices of Commelinaceae species would otherwise be expected, and where new records for Paraíba were found.

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Author Contributions

Igor Meneses Cavalcanti de Albuquerque: design, collections, data analysis and interpretation, the reading, writing, revision and corrections of the manuscript.

Fernanda Kalina da Silva Monteiro: collection, graphic production, corrections and reading of the manuscript.

José Iranildo Miranda de Melo: conception, supervision, incorporation of intellectual content, revision, writing, manuscript editing, and corrections.

Conflicts of Interest

The authors declare no conflicts of interest related to the publication of this work.

Ethics

This study did not involve humans or clinical trials that required approval by an Institutional Committee.

Data Availability

The datasets generated during and/or analyzed during the current study are available at: <https://zenodo.org/doi/10.5281/zenodo.12694644>.

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