



Original Paper

Flora of Pernambuco, Brazil: *Ipomoea* (Convolvulaceae)

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Abstract

Ipomoea L. is the largest genus in Convolvulaceae with approximately 150 species reported from Brazil, more than 50% of which are from the northeastern region of the country. The genus is represented by 48 species in Pernambuco state, occurring in Atlantic Forest and Caatinga vegetation as well as areas impacted by human activities. We present here an identification key, photographic documentation, taxonomic comments, and the geographical distributions of species in Pernambuco. New records of *Ipomoea cearensis* O'Donell, *I. hirsutissima* Gardner and *I. squamosa* Choisy for the state are reported.

Key words: biodiversity, morning glory, taxonomy, vines.

Resumo

Ipomoea L. é o maior gênero de Convolvulaceae com aproximadamente 150 espécies sendo reportadas para o Brasil, das quais, mais de 50% são encontradas na região Nordeste. No estado de Pernambuco, o gênero é representado por 48 espécies e ocorre na Floresta Atlântica, Caatinga e áreas antropizadas. Este estudo inclui uma chave de identificação, fotos, comentários taxonômicos e distribuição geográfica das espécies. Novos registros de *Ipomoea cearensis* O'Donell, *I. hirsutissima* Gardner and *I. squamosa* Choisy para o estado são reportados.

Palavras-chave: biodiversidade, jitiranas, taxonomia, trepadeiras.

Introduction

Ipomoea L. comprises approximately 800 species and is the largest genus in Convolvulaceae and pantropical in its distribution (Wood *et al.* 2020). It is included in the tribe Ipomoeae, which is characterized by echinulate and panthoporate pollen grains, an entire style, and stigma usually with two globose lobes (Stefanović *et al.* 2003). Molecular analyses suggest that the genus in its traditional sense is paraphyletic and polymorphic, as other genera included in the tribe (*e.g.*, *Argyreia* Lour. and *Turbina* Raf.) are nested within it (Manos *et al.* 2001; Muñoz-Rodríguez *et al.* 2019).

Ipomoea is widely distributed, mainly in the tropics, with the highest number of species (425) being found in the Americas (Wood *et al.*

2020). Approximately 160 species have been reported from Brazil, being found in all states and phytogeographical domains, but mainly in dry areas with open vegetation, such as *Cerrado* and *Caatinga* (Flora do Brazil 2020, continuously updated); they are frequently found, however, along forest edges, in Campos Rupestres, and as pioneer species in disturbed environments (Flora do Brazil 2020; Delgado-Junior *et al.* 2014). In the area of this study, *Ipomoea* is represented by 46 species found in Caatinga and Atlantic Forest areas.

Although the genus has been extensively collected and can be easily recognized, its species are morphologically diverse, varying in habit and in vegetative and reproductive characters, leading to difficulty in delimiting their species due to overlapping characters (Miller *et al.* 1999;

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Stefanović *et al.* 2003). The sepals (their shapes, proportions, indumentum, and ornamentation) are important taxonomic characters, especially when combined with vegetative characters such as leaves, indumentum, and the presence/absence of fleshy spines on the stems (Wood *et al.* 2020).

We provide here a synopsis of the genus *Ipomoea* in Pernambuco state, including a key for species identification, citations of representative specimens of each species, taxonomic comments, distribution details and illustrations.

Materials and Methods

Study area

Pernambuco state (PE) is located in northeastern Brazil and occupies an area of 98,311 km² with three phytogeographical zones (Fig. 1): 1) Atlantic coast; 2) Atlantic Forest and 3) Caatinga (a deciduous vegetation covering approximately 80% of the territory) (Andrade-Lima 1957).

Specimens studied

The analyses were based on the examination of more than 600 specimens deposited in the ALCB, ASE, BHCB, EAC, HVASF, HUEFS, NY, IPA, JPB, PEUFR, SP, UFP, UFRN herbaria (acronyms according to Thiers continuously updated) and the *Herbário Sergio Tavares* (not indexed, HST), as well as images from virtual herbaria (SpeciesLink, Re flora). The authors undertook field trips and studied living plants between 2009 and 2018.

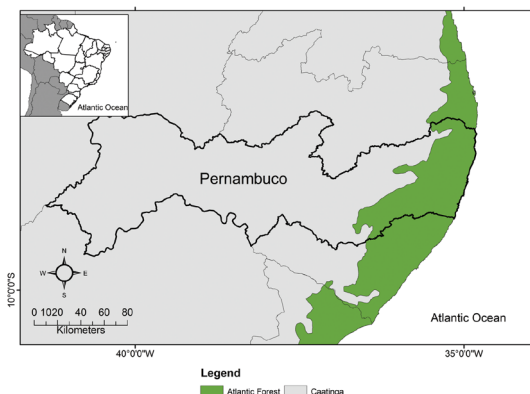


Figure 1 – Map of Pernambuco state, Brazil. Twenty-three species are widely distributed in the state, seven occur exclusively in the Atlantic Forest, three are restricted to the Atlantic coast, and 16 occur only in Caatinga vegetation.

The species were identified using specialized literature (Austin 1978, 1986; Simão-Bianchini 1998; Buriel & Alves 2011; Wood *et al.* 2015, 2017, 2020; Wood & Scotland 2017) and by comparison with material previously identified by specialists, including types. The morphological terminology follows Harris & Harris (2000). The nomenclature mainly follows Austin *et al.* (2015), with some updates (Wood *et al.* 2015, 2020; Staples 2015). Comments concerning species distribution are based on Austin & Huáman (1996), the Flora of Brazil (2020), the World Checklist of *Ipomoea* (Staples 2015), and the most recent monograph of the New World *Ipomoea* (Wood *et al.* 2020). Habitat descriptions follow the classification system of Andrade Lima (1957). We cite for each species some representative specimens (selected based on the species' distribution), and provide field photographs, when available (Fig. 2-5).

Results & Discussion

Ipomoea is represented by 48 species in Pernambuco, of which 23 are widely distributed in the state; seven occur exclusively in the Atlantic Forest, three are restricted to the coast (*Ipomoea imperati* (Vahl) Griseb, *I. pes-caprae* (L.) R.Br., and *I. violacea* L.), and 16 occur only in Caatinga, five of those being endemic to that domain (*I. longistaminea* O'Donell, *I. marcellia* (Choisy) Meisner, *I. parvibracteolata* J.R.I. Wood & L.V.Vasconc, *I. pintoii* O'Donell, and *I. brasiliiana* var. *subincana* (Choisy) Meisner). Two species (*I. batatas* L. and *I. horsfalliae* Hook.) are exclusively cultivated and are not considered in this treatment.

Four species were not included in this treatment: *I. cairica* (L.) Sweet (1826: 287), *I. setifera* Poirlet (1804: 17), *I. triloba* Linnaeus (1753:161) and *I. wrightii* A. Gray (1878: 213). *Ipomoea cairica* was mentioned by Simão-Bianchini *et al.* (2016) as occurring in areas of Atlantic Forest in Pernambuco state. However, we found no records of this species. The specimen Lima, J.L.S. 169, deposited in the HTSA herbarium, was misidentified as *I. cairica*, and is actually *I. rosea*.

Ipomoea setifera is cited in the Flora do Brazil website (Simão-Bianchini *et al.* 2016) as occurring in areas of Caatinga in Pernambuco state. However, the herbarium specimens were misidentified as *I. setifera*, and are actually *I. parvibracteolata*.

Ipomoea triloba and *I. grandifolia* are confused with each other and commonly misidentified. The two species are very similar

and hard to distinguish, and we tried to identify the material using the characters proposed by Austin (1978), but without success, because many of them overlap. Thus, we concur with Wood *et al.* (2015, 2020), who reported that genuine specimens of *I. triloba* do not occur in South America, and examples found there are here treated as *I. grandifolia*.

Ipomoea wrightii is cited in the Flora do Brazil website (Simão-Bianchini *et al.* 2016) as occurring in Caatinga and Atlantic Forest of Pernambuco. Although the name *I. wrightii* has long been used for this species in the Americas, including Brazil, the oldest and correct name for it is actually *I. heptaphylla* Sweet, as typified by Verdcourt (1961: 13) and the nomenclature clarified by Manitz (1983). The name *I. wrightii* is still recognized in the Flora do Brazil website (Simão-Bianchini *et al.* 2016), but in this treatment we use the correct name *I. heptaphylla*.

Ipomoea hirsutissima, *I. cearensis* and *I. squamosa* are reported here for the first time as occurring in Pernambuco state.

Taxonomy

Ipomoea L.

Annual or perennial, woody or herbaceous vines, subshrubs, prostrate herbs, or shrubs; latex present or absent. Leaves alternate, simple or, rarely, compound, margins entire to dentate, rarely revolute, petiolate, nectaries sometimes present. Inflorescence axillary, fundamentally cymose, sometimes reduced to solitary flowers; bracteoles present but often early caducous. Sepals glabrous to variously pubescent, sometimes ornamented with awns, spines, warts, or winged keels; corolla funnel-shaped or hypocrateriform, entire to slightly lobed, plicate, purple, pink, red, white or, rarely, yellow, glabrous or with indument outside on the midpetaline bands; stamens 5, included or rarely exerted, anthers usually oblong; ovary usually globose, 2-, 3- or 4-locular, 1–2 ovules per locule, glabrous or pubescent; style 1, stigmas 2 (or 3), globose; pollen echinulate. Fruit a capsule, dehiscent by 4 or 6 valves, or rarely indehiscent; seeds 4, 6, (or less by abortion), trigonous, glabrous or with varied indumentum; hilum basal, semicircular to D-shaped.

Identification key to the *Ipomoea* species of Pernambuco state, Brazil

1. Shrubs, subshrubs or herbs, stems erect or prostrate 2
- 1'. Climbing plants, stems twining 6
 2. Stems and leaves densely pilose with long, spreading hairs 16. *I. hirsutissima*
 - 2'. Stems glabrous, puberulent, glabrescent, or canescent when young, and leaves sparsely pilose to glabrous 3
 3. Shrubs erect. Corolla pubescent, at least in bud 10. *I. carnea* subsp. *fitulosa*
 - 3'. Subshrubs prostrate. Corolla glabrous 4
 4. Leaves usually longer than wide (oval-oblong, lanceolate, oblong, or ovate). Corolla white to pale yellow 17. *I. imperati*
 - 4'. Leaves usually wider than long (reniform to deltoid, orbicular, ovate, or quadrate). Corolla pink, purple, rarely pure white (a few populations of *I. asarifolia*) 5
 5. Leaf base normally shallowly cordate. Outer sepals mucronate and half as long as the inner sepals 5. *I. asarifolia*
 - 5'. Leaf base normally rounded to broadly obtuse. Outer sepals smooth and slightly smaller than inner ones 30. *I. pes-caprae*
 6. Leaves compound or, when simple, deeply 3–5 or more lobed, rarely pinnately divided 7
 - 6'. Leaves simple, entire, sometimes with a few marginal teeth, or shallowly 3-lobed 13
 7. Leaves pinnately divided to midrib. Corolla red 35. *I. quamoclit*
 - 7'. Leaves palmately lobed or compound, but never pinnately divided. Corolla yellow, pink, purple, or magenta 8
 8. Sepals with a tooth-like appendage 37. *I. rosea*
 - 8'. Sepals without a tooth-like appendage, sometimes mucronate, smooth or verrucose 9

9. Leaves deeply 3–5 lobed to palmately lobed 10
- 9'. Leaves divided into 5 or 7 leaflets 12
10. Sepals flat, acuminate or acute. Corolla yellow, tube purple inside 20. *I. longeramosa*
- 10'. Sepals convex, rounded or obtuse. Corolla purple to magenta 11
11. Leaves relatively small, 3–5 × 4–6 cm, 3-lobed 8. *I. blanchetii*
- 11'. Leaves large, 5–14 × 6–16 cm, 5-lobed 24. *I. mauritiana*
12. Outer sepals prominently fimbriate 46. *I. tenera*
- 12'. Outer sepals not fimbriate 13
13. Peduncles usually spirally twisted. Corolla < 2.5 cm long 15. *I. heptaphylla*
- 13'. Peduncles straight. Corolla 4–6 cm long 45. *I. subrevoluta*
14. Outer sepals with a dorsal, tooth-like appendage or sub-apical awn, or prominently 5-ribbed 15
- 14'. Outer sepals various, but never as above 19
15. Outer sepals with a dorsal tooth-like appendage or sub-apical awn 16
- 15'. Outer sepals prominently 5-ribbed 29. *I. parvibracteolata*
16. Corolla pink. Outer sepals lacking an apical awn but with a dorsal, tooth-like appendage 6. *I. bahiensis*
- 16'. Corolla red, white, or purplish. Outer sepals with an apical awn but lacking a dorsal, tooth-like appendage 17
17. Outer sepals > 3 mm long. Corolla red 14. *I. hederifolia*
- 17'. Outer sepals < 8 mm long. Corolla pale purplish or white .. 18
18. Corolla white, 7–13 cm long. Stamens exserted. Pedicels not reflexed in fruit 2. *I. alba*
- 18'. Corolla pale purplish, 4–6 cm long. Stamens included. Pedicels strongly reflexed in fruit 26. *I. muricata*
19. Stems with fleshy spines or with bristly, blackish trichomes 20
- 19'. Stems without fleshy spines or without bristly .. 21
20. Stems glabrous. Outer sepals sparsely puberulent to glabrescent. Bud apex whitish sericeous
..... 28. *I. parasitica*
- 20'. Stems hispid with bristly, blackish trichomes. Outer sepals glabrous. Bud glabrous
..... 41. *I. setosa*
21. Young stems and/or petioles woolly, sericeous, tomentose or velutinous 21
- 21'. Young stems and/or petioles glabrous, glabrescent, puberulent, hirsute or hispid 30
22. Outer sepals glabrous or glabrescent 23
- 22'. Outer sepals pubescent, villous, velutinous, or tomentose 25
23. Outer sepals convex. Corolla tubular. Stamens exserted
..... 21. *I. longistaminea*
- 23'. Outer sepals flat. Corolla funnel-shaped. Stamens included .. 24
24. Leaves > 8 cm long. Corolla ≥ 10 cm long. Seeds pilose on angles, with long white hairs 22. *I. magna*

- 24'. Leaves < 4 cm long. Corolla \leq 5 cm long. Seeds glabrescent in all surfaces 9a. *I. brasiliana* var. *brasiliana*
25. Outer sepals with margins often wavy-repand. Inner sepals longer than outer ones 42. *I. sidifolia*
- 25'. Outer sepals with entire margins, sometimes scarious. Sepals subequal, unequal or equal 26
26. Corolla pale yellow, white, rarely greenish. Stamens exerted 23. *I. marcellia*
- 26'. Corolla pink or purple. Stamens included 27
27. Sepal apex acute to obtuse 28
- 27'. Sepal apex rounded 30
28. Outer sepals lanceolate tomentellous, with gibbous base ... 25. *I. megapotamica*
- 28'. Outer sepals (ovate with spreading hairs), base not gibbous 29
29. Inflorescence with caducous linear bracteoles 38. *I. rubens*
- 29'. Inflorescence with with persistent filiform bracteoles 39. *I. sericophyla*
30. Adaxial surface of the leaves sparsely pilose. Corolla sericeous outside. Fruit indehiscent 40. *I. sericosepala*
- 30'. Abaxial surface of the leaves densely villose. Corolla glabrous outside. Fruit dehiscent 9b. *I. brasiliana* var. *subincana*
31. Young stems hispid or hirsute, trichomes longer than 1 mm 32
- 31'. Young stems glabrous, glabrescent, pilose, or pubescent, rarely hirsute, but in those cases trichomes shorter than 1 mm (in *I. indica*) 33
32. Sepals with caudate apex; base hispid with long, yellowish hairs 27. *I. nil*
- 32'. Sepals with acute to acuminate apex; base softly pubescent with short hairs and some longer, spreading and whitish hairs 34. *I. purpurea*
33. Outer sepals warty 4. *I. aristolochiifolia*
- 33'. Outer sepals smooth 34
34. Sepals completely glabrous 33
- 34'. Sepals with some trichomes 48
35. Outer sepals convex or boat-shaped 36
- 35'. Outer sepals flat 40
36. Leaves elliptic to oblanceolate 32. *I. pintoii*
- 36'. Leaves ovate, cordate, subreniform, subtrilobate, or suborbicular 37
37. Outer sepals \geq 6 mm long. Corolla \geq 5 cm long. Seeds woolly 38
- 37'. Outer sepals \leq 4mm long. Corolla \leq 3.5 cm long. Seeds tomentose and pilose on their margins, or glabrous 39
38. Seed covered by trichomes 7. *I. batatoides*
- 38'. Seed with trichomes only in margins 44. *I. subalata*
39. Corolla \geq 3.5 cm long. Seeds tomentose and pilose on their margins 3. *I. amnicola*
- 39'. Corolla \leq 2.5 cm long. Seeds glabrous 36. *I. ramosissima*
40. Pedicels on open flower or fruit < 5 mm long 41

- 40'. Pedicels on open flower or fruit > 9 mm long 42
41. Stems stout and prominently winged 33. *I. pterocaulis*
- 41'. Stems not stout and winged 43
42. Inflorescence cymous. Bracteoles scale-like, caducous < 3 mm 1. *I. acanthocarpa*
- 42'. Inflorescence subcapitate. Bracteoles lanceolate, persistent, ca. 5 mm long ... 12. *I. fasciculata*
43. Inflorescence a corymb. Outer sepals half the size of the inner 43. *I. squamosa*
- 43'. Inflorescence a solitary flower, a thyrse, or a cyme. Outer sepals equal or subequal to inner sepals, or one outer sepal smaller than the others 44
44. One outer sepal smaller than the others 47. *I. tiliacea*
- 44'. Outer sepals equal or subequal to inner sepals 45
45. Outer sepals oblong to lanceolate, apex acute, membranaceous .. 18. *I. incarnata*
- 45'. Outer sepals rounded or ovate to orbicular, obtuse, or with rounded apex, coriaceous or subcoriaceous 46
46. Corolla white to pale yellow. Sepals equal in shape 48. *I. violacea*
- 46'. Corolla pink. Sepals unequal in shape 47
47. Inflorescence cymose. Outer sepals with cuneate to rounded bases. Inner sepals with margins prominently scarious 11. *Ipomoea cearensis*
- 47'. Inflorescence a thyrse. Outer sepals with subcordate bases. Inner sepals without margins prominently scarious 31. *I. philomega*
48. Corolla > 4 cm long. Sepals with long-attenuate apex 19. *I. indica*
- 48'. Corolla ≤ 2.5 cm long. Sepals with acute apex, mucronate 13. *I. grandifolia*

1. *Ipomoea acanthocarpa* (Choisy) Hochst. ex Schweinf. & Asch., Beitr. Fl. Aethiop. 277 (1867). Type: SUDAN. Kordofan, 28 November 1839, Kotschy C.G.T. 269 (isotype: MPU). Fig. 4h
Selected material: PERNAMBUCO: Buíque, 31.VIII.2013, fl. & fr., G.C. Delgado-Júnior 691 (UFP). Caruaru, 30.VI.1998, fl., E. Locatelli s.n. (UFP39652).

It can be recognized by having short pedicels (less than 5 mm long); leaves usually cordate, with one or two marginal teeth close to the base (sometimes absent); sepals subequal, acute, inner ones with scarious margins; small corollas (shorter than 3 cm); capsule with a persistent style. In a paper on Bolivian *Ipomoea*, Wood *et al.* (2015: 37) reduced *I. piurensis* to synonymy under the African species, *I. acanthocarpa* (Choisy) Aschers. & Schweinf. Molecular studies (Munoz-Rodriguez *et al.* 2019) corroborated this synonymization and indicate that *I. acanthocarpa* is of American origin and has colonized Africa by long-distance dispersal.

Widely distributed in tropical South America and Africa, with an isolated record from Costa Rica (Wood *et al.* 2020). In Brazil occurs in Amazonian, Caatinga and Atlantic Forest vegetation along the Brazilian coast, from Roraima to Bahia states (Simão-Bianchini *et al.* 2020) It can be found throughout Pernambuco state in both the Caatinga and Atlantic Forest domains, frequently in disturbed areas.

2. *Ipomoea alba* L., Sp. Pl. 161 (1753).

Type: INDIA. Malabar, illustration in Rheede, Hortus Malabaricus 11: 103, plate 50 (1,2) (1692). Fig. 2a-b
Selected material: PERNAMBUCO: Maraial, 22.IX.2006, fl. & fr., M. S. Leite 198 (HST; IPA). São Lourenço da Mata, 31.VIII.2006, fl., L. Primo s.n. (IPA 89222; UFP 44333). Triunfo, 22.XI.1992, fl., A. M. Miranda *et al.* 689 (HST).

Ipomoea alba can be easily confused when in fruit with *I. muricata* (L.) Jacquin, due to the presence of fleshy spines on the stems, and outer sepals with an awn. However, its pedicel is erect and the outer sepals are > 13 mm long (vs. pedicels strongly reflexed and outer sepals < 14 mm long in *Ipomoea muricata*). When in flower, *Ipomoea alba* can be easily identified by its white corolla with nocturnal anthesis and exerted stamens (vs. the diurnal anthesis, pale purplish corolla and included stamens typical of *I. muricata*).

Ipomoea alba has a pantropical distribution as it is widely cultivated as an ornamental and escapes from cultivation (Wood *et al.* 2020). In Brazil it is widely distributed in all states and phytogeographical domains (Simão-Bianchini *et al.* 2020). In Pernambuco state, it appears to be native to the Atlantic Forest in humid areas and is frequently found in disturbed areas or as a cultivated plant.

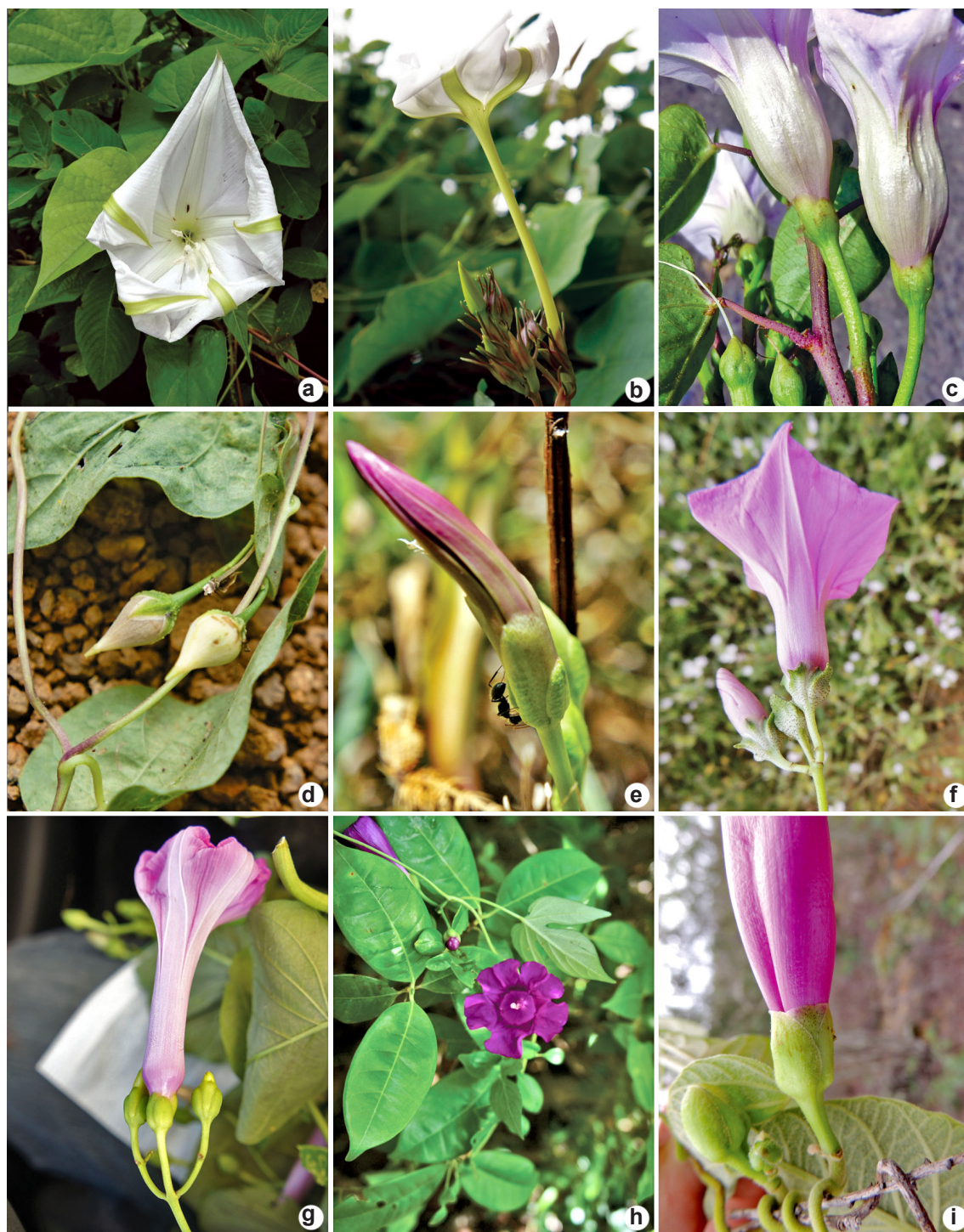


Figure 2 – a-b: *Ipomoea alba* – a. corolla; b. outer sepals with an awn. c. *Ipomoea amnicola* – corolla with convex sepals. d. *Ipomoea aristolochifolia* – outer sepals warty. e. *Ipomoea asarifolia* – outer sepals warty and shorter than the inner ones. f. *Ipomoea bahiensis* – outer sepals with a dorsal tooth-like appendage. g. *Ipomoea batatoides* – convex, equal and glabrous sepals. h. *Ipomoea blanchetii* – inflorescence and 3-lobed leaf. i. *Ipomoea brasiliana* – sepals. Photographs: Laboratório de Sistemática Integrativa (LASI).

3. *Ipomoea amnicola* Morong, Ann. New York Acad. Sci. 7: 170 (1893).

Type: PARAGUAY. Pilcomayo River, *T. Morong 974* (holotype: NY, isotypes: MO, NDG, PH, R).

Fig. 2c

Selected material: PERNAMBUCO: fl., *L.H. Piedade s.n.* (SP319349). Petrolina, 29.VII.1984, fl., *G.C.P. Pinto 198* (ALCB19617).

It can be easily recognized by its completely glabrous, entire, cordate leaves, the basal sinus shallow and broad, sunken nectary present at the petiole base, convex sepals ≤ 4 mm long, corolla > 3.5 cm long, and seeds tomentose, pilose along their margins.

Found in southern United States of America, and from Colombia to Argentina (Wood *et al.* 2020). In Brazil is found in Caatinga, Atlantic Forest and Pantanal areas of Alagoas, Bahia, Pernambuco, Mato Grosso do Sul and Minas Gerais state (Simão-Bianchini *et al.* 2020). In Pernambuco, it occurs in the Atlantic Forest and Caatinga, normally associated with swampy areas.

4. *Ipomoea aristolochiifolia* G. Don, Gen. Hist. iv. 277 (1838).

Type: VENEZUELA. La Venta propre Caracas, *Bonpland 679* (holotype: P).

Fig. 2d

Selected material: Bezerros, 9.XI.2015, fl. & fr., *G. Staples 1714* (PEUFR). Gravata, 1.VIII.1996, fl., *J.E.G., Lima de & E.B. Souza 87* (HST). Mirandiba, 28.X.2008, fl., *K. Pinheiro 1226* (UFP).

It can be easily recognized by its entire cordate leaves, short corolla (shorter than 2.5 cm), subequal sepals, the outer ones warty and slightly shorter than the inner ones, margins pale when in fruit, and capsule with a persistent style.

Widely distributed from Arizona to Mexico and from Central America to the Andes and Brazil (Wood *et al.* 2020). In Brazil it is found in Amazon, Cerrado and Atlantic Forest areas and in Pernambuco, it occurs in disturbed areas within the Atlantic Forest, in transition areas, or in the Caatinga on quartzitic-sandy soils (Simão-Bianchini *et al.* 2020).

5. *Ipomoea asarifolia* Roem. & Schult., Syst. Veg., ed. 15 bis, 4: 251 (1819). Type: SENEGAL, *Roussillon s.n.* (holotype: P-Lam).

Fig. 2e

Selected material: Buique, 7.V.2013, fl., *G.C. Delgado-Junior 624* (UFP). Goiana, 20.IX.2010, fl., *D.M. Cavalcanti 250* (JPB, NY). Triunfo, 18.VI.1999, fl. & fr., *F.V. Silva 53* (UFRN, IPA, HUEFS).

Ipomoea asarifolia, together with *I. pes-caprae*, can be easily distinguished from other species in Pernambuco by their prostrate habit,

reniform to orbicular leaves, and outer sepals warty and half as long as the inner ones. The species are both highly polymorphic and intermediates occur. *Ipomoea asarifolia* usually has cordate leaf bases (vs. rounded to broadly obtuse in *I. pes-caprae*), and the outer sepals are warty and half the size of the inner ones (vs. smooth and slightly shorter).

Widely distributed in the Americas, Africa, and Asia (Wood *et al.* 2020). In Brazil it is found in Amazonian, Caatinga and Atlantic Forest areas in North and Northeastern regions of the country (Simão-Bianchini *et al.* 2020). In Pernambuco, it is a quite common species and occurs in disturbed areas from the Atlantic Forest to Caatinga, especially along roads.

6. *Ipomoea bahiensis* Willd., Syst. Veg., ed. 15 bis [Roemer & Schultes] 4: 789 (1819).

Type: BRAZIL. *Hoffmannsegg s.n.* (holotype: B-W, photo F).

Fig. 2f

Selected material: Arcoverde, 8.V.2015, fl., *G.C. Delgado-Junior et al. 802* (UFP). Buique, 31.VIII.2013, fl. & fr., *G.C. Delgado-Junior 706* (UFP). Triunfo, 18.VI.1998, fl., *F.V. Silva 58* (ASE, BHCB, EAC, HST).

Highly polymorphic regarding leaf shape and size, corolla size and color, and the ornamentation of the outer sepals. In its typical form, it has sagittate leaves, and the outer sepals have a dorsal, tooth-like appendage. The character cordate leaves are not rare in this species, however, and the sepals can have granular and black dots, or the tooth may be reduced to a raised, dark green line.

Ipomoea bahiensis occurs in Brazil and Bolivia (Wood *et al.* 2020). In Brazil it occurs from Amazon to Rio de Janeiro in Amazon, Caatinga, Cerrado and Atlantic Forest areas (Simão-Bianchini *et al.* 2020). It is a quite common species in Pernambuco state, widely distributed, and frequently found in disturbed areas of Caatinga and Atlantic Forest.

7. *Ipomoea batatoides* Choisy Pl., Hartw. [Bentham] 46 (1840). Type: BRAZIL. Bahia, *Blanchet s.n.* (holotype G, not found; probable isotype F, F0054873F).

Fig. 2g

Selected material: Bonito, 2.XI.2003, fl., *A. Rodrigues 45* (UFP). Garanhuns, 2.VIII.1998, fl., *J.I.M. Melo 40* (PEUFR). Maraial, 22.V.1998, fl. fr., *M.F.A. Lucena 516* (PEUFR).

It resembles *I. amnicola* in having convex, equal, and glabrous sepals, but can be easily distinguished from it by having larger sepals (≥ 6 mm) and corollas (≥ 5 cm), and woolly seeds (vs. sepals > 4 mm long and corolla > 3.5 mm long in *I. amnicola*).

It is distributed from Mexico to Brazil (Wood *et al.* 2020). In Brazil it is found in North, Northeast and Midwest regions (Simão-Bianchini *et al.* 2020). In Pernambuco state, it usually occurs in Atlantic Forest or transition areas, especially in sites in a good state of conservation, along forest edges.

8. *Ipomoea blanchetii* Choisy Pl., Hartw. [Benth] 46 (1840).

Type: BRAZIL. Serra Açurua, Rio São João, anno 1838, *Blanchet 2906* (holotype G-DC, G00135666; isotypes K, NY, P). Fig. 2h

Selected material: Exu, 4.III.2011, fl., *J. Alves 117* (IPA). Petrolina, 20.III.2009, fl. & fr., *M.M. Coelho 148* (HVASF). Salgueiro, 31.III.2009, fl., *J.G. Carvalho-Sobrinho 2098* (HVASF).

Ipomoea blanchetii can be recognized by its completely glabrous, 3–5-lobate leaves, convex and equal sepals, with rounded apices, and a large, purple to magenta corolla.

It is endemic to Brazil (Wood *et al.* 2020). In Brazil, is found in Amazon, Caatinga, Cerrado and Atlantic Forest vegetation (Simão-Bianchini *et al.*, continuously updated). In Pernambuco state it occurs in areas of Caatinga and on the Fernando de Noronha archipelago.

9. *Ipomoea brasiliana* Pl., Hartw. [Benth] 46 (1840).

Rivea brasiliana Mart. ex Choisy (1845: 326).

Type: BRAZIL. Piauí, in sylvis Caatingas; Bahia, prope Joazeiro, *Martius Obs. 2478* (holotype: M). Fig. 2i

Wood *et al.* (2020: 254) recognize two varieties (var. *brasiliana* and var. *subincana*) that was previously treat as distinct species. Both taxa occupy the same habitat and geographical range, and their characters are not always consistent, and intermediates can be found. Both are also part of a species complex that includes three others (*I. magna*, *I. calyptrata* and *I. veadeirosii*).

It is endemic to Brazil, occurring in Caatinga and Cerrado areas of all states of the Northeast region and Minas Gerais (Wood *et al.* 2020). In Pernambuco state, it is usually found in well-preserved areas of the Caatinga and Cerrado domains growing on sandy soils and rock outcrops.

9a. *Ipomoea brasiliana* var. *brasiliana*

Selected material: Arcoverde, 28.XI.2012, fl. & fr., *A.C.P. Oliveira 2013* (HVASF). Buíque, 3.VI.2013, fl., *G.C. Delgado-Junior et al. 672* (UFP). Salgueiro, 12.V.2009, fl., *M. Oliveira 4108* (HVASF).

Ipomoea magna was recently described,

being considered a larger form of *I. brasiliana* (with larger flowers, more robust stems, and larger leaves). The distinctions between those species are discussed in the notes for *I. magna*. The distinctions between the varieties *brasiliana* and *subincana* are discussed under the comments of *I. brasiliana* var. *subincana*.

9b. *Ipomoea brasiliana* var. *subincana* (Choisy) J.R.I. Wood & Scotland Pl., Hartw. [Benth] 46 (1840).

Rivea subincana Choisy (1845:325)

Ipomoea subincana (Choisy) Meisn. in *Martius et al.*, (1869: 259).

Lectotype: BRAZIL. March 1817, *Maximilian Pr. Wied s.n.*, (BR000000584452, BR000000584551, BR000000584554). Fig. 5e

Selected material: Buíque, 9.V.2015, fl. & fr., *G.C. Delgado-Junior 812* (PEUFR). Floresta, 18.II.2011, fl., *M.V. Meiado 429* (HVASF). São Caetano, 20.III.2010, fl. & fr., *K. Mendes 441* (UFP).

Ipomoea brasiliana var. *brasiliana* can be distinguished by its outer sepals being glabrous-glabrescent instead of velutinous; in the field it can be distinguished by having green sepals (vs. purple sepals in *I. brasiliana* var. *subincana*).

10. *Ipomoea carnea* Jacq. subsp. *fistulosa* (Mart. ex Choisy) D.F. Austin Pl., Hartw. [Benth] 46 (1840).

Ipomoea fistulosa Mart. ex Choisy (1845: 349).

Type: BRAZIL. *Martius 2378*, lectotype (M).

Fig. 3a

Selected material: Cabrobó, 12.VII.2007, fl., *M. Oliveira 2942* (UFP). Custódia, 18.XI.2009, fl., *D. Araújo 970* (HVASF). Serra Talhada, 3.VII.2012, fl. & fr., *V.M. Cotarelli 1869* (HVASF).

It can be easily identified by being an erect shrub (1–2 m tall) with hollow stems, sepals tomentose to glabrescent, and corolla longer than 6 cm and pubescent (at least in the bud).

It occurs from Mexico to Central America and is widely distributed in South America (Wood *et al.* 2020). In Brazil, this subspecies can be considered an exotic naturalized species (Simão-Bianchini *et al.*, continuously updated). It usually occurs in swampy areas and is often cultivated as an ornamental.

11. *Ipomoea cearensis* O'Donnell, Lilloa 26: 363, tab. 4 (1953).

Type: BRAZIL. Ceará, Salvarão, *A. Lofgren 158* (holotype S07-4422)

Selected material: Buíque, 1.VI.2012, fl., *G.C. Delgado-Junior 364* (UFP).



Figure 3 – a. *Ipomoea carnea* subsp. *fistulosa* – corolla. b. *Ipomoea grandifolia* – corolla small and sepals ciliate. c. *Ipomoea hederifolia* – outer sepals with awn. d. *Ipomoea imperati* – corolla. e. *Ipomoea incarnata* – corolla. f. *Ipomoea indica* – corolla and sepals. g. *Ipomoea longeramosa* – corolla. h. *Ipomoea longistaminea* – corolla bright with rotund and glabrous sepals. i. *Ipomoea marcellia* – corolla. Photos: a-g. Lasi H, Espírito-Santo FS, i. Queiroz JA.

It can be recognized by having cordate leaves, glabrous above and sparsely pubescent below; many-flowered inflorescences; rounded to oblong, subequal sepals, the outer ones coriaceous and inner ones with scarious margins and cordate apices.

It is endemic to Brazil (Wood *et al.* 2020). In Pernambuco, this species represents a new record and was found on sandy soils in the Caatinga domain.

12. *Ipomoea fasciculata* J.R.I.Wood & Scotland PhytoKeys 88: 18 (2017).

Type: BRAZIL. Pernambuco, Agrestina, Inselberg Pedra Cabeça de Velho, 8°23'29.7"S 36°00'37.6"W, 832 m, 22 Oct. 2007, *P. Gomes, M. Alves & B. Maciel* 658 (holotype RB00601358, isotype UFP, n.v.).

Selected material: Agrestina, 22.X.2007, fl., *P. Gomes* 658 (UFP).

It is similar to *Ipomoea acanthocarpa* due to its short pedicel. *Ipomoea fasciculata* can be distinguished by having a subcapitate inflorescence, sepals glabrous, with scarious margins and a prominently mucronate apex.

It is a Brazilian endemic species, occurring in Bahia, Pernambuco and Sergipe (Simão-Bianchini *et al.*, continuously updated). In Pernambuco it was found on rock outcrops in the Caatinga domain.

13. *Ipomoea grandifolia* (Dammer) O'Donnell Arq. Mus. Paranaense 9: 222 (1952).

Jacquemontia grandifolia Dammer (1897: 41).

Type: BRAZIL. Rio de Janeiro, ad São Christavão, in capoeira, 29 Mar. 1879, *Glaziou 11257* (holotype: B, destroyed, photo F; isotypes: K, R, SP). Fig. 3b

Selected material: Buíque, 1.VIII.2013, fl., *G.C. Delgado-Junior* 722 (UFP). São José do Egito, 14.V.2008, fl. & fr., *C. Ferreira s.n.* (IPA83968). Venturosa, 1.VII.2007, fl., *P. Gomes* 388 (UFP).

It is classified in the section *Batatas*, together with *I. tiliacea* (Willd.) Choisy, *I. grandifolia* has corollas ≤ 2.5 cm long (vs. 3.5 cm in *I. tiliacea*) and sepals ovate (vs. oblanceolate or obovate in *I. tiliacea*).

It is widely distributed in South America (Wood *et al.* 2020). In Brazil, it is found in all regions and phytogeographical domains (Simão-Bianchini *et al.*, continuously updated) and is widespread in Pernambuco state, frequently found in disturbed areas with anthropogenic influences.

14. *Ipomoea hederifolia* L. Syst. Nat., ed. 10. 2: 925 (1759).

Type: "in America" [icon] "*Ipomoea foliis cordatis*" in Plumier, Pl. Amer.: t. 93, f. 2. 1756. Fig. 3c

Selected material: Igarassu, 23.XII.2011, fl. & fr., *D. Cavalcanti* 643 (JPB, UFP). Mirandiba, 3.V.2008, fl. &

fr., *K. Pinheiro* 624 (UFP). Salgueiro, 11.V.2012, fl., *M. Oliveira* 4888 (HVASF).

Ipomoea hederifolia is one of a few species with a red hypocrateriform corolla with exerted stamens - an unusual characteristic among species from Pernambuco state. It can be recognized by its entire to 3-lobate leaves and outer sepals with an apical awn.

It is a common pantropical weed (Wood *et al.* 2020). Widely distributed in Brazil (Simão-Bianchini *et al.*, continuously updated) and in Pernambuco state found mostly along forest borders and in disturbed areas.

15. *Ipomoea heptaphylla* Sweet Hort. Brit. [Sweet], ed. 2. 372 (1830).

Ipomoea wrightii A. Gray (1878: 213).

Type: INDIA. cultivated in Calcutta Botanic Garden, [icon] Roxburgh drawing 1950.

Selected material: Pesqueira, 12.VIII.2014, fl., *M. Grillo* 68 (PEUFR). Venturosa, 1.VII.2007, fl. & fr., *P. Gomes* 387 (UFP). Petrolina, 11.X.2008, fl., *A.E.M. Silva* 2 (HVASF).

Ipomoea heptaphylla can be easily recognized by its compound leaves with 5 or 7 leaflets, small, solitary flowers < 2.5 cm long, and peduncles that are long, slender, and usually spirally twisted or coiled. Although the name *I. wrightii* has long been used for this species in the Americas, including Brazil, the oldest and correct name is actually *I. heptaphylla* Sweet, as typified by Verdcourt (1961: 13), the nomenclature clarified by Manitz (1983) and accepted by Wood *et al.* (2020).

It is widely distributed in the Americas and in the neotropics (Wood *et al.* 2020). In Brazil it is found in Caatinga, Cerrado and Atlantic Forest (Simão-Bianchini *et al.*, continuously updated) but is not a common species in Pernambuco state, usually being found along forest borders in areas in a good state of conservation, or on rock outcrops in the Caatinga domain.

16. *Ipomoea hirsutissima* Gardner Icon. Pl. 5(2): sub t. 471 (1842).

Type: BRAZIL. Goiás, Missião Duro, Oct. 1839, *Gardner* 3355 (lectotype: K000612806; isolectotypes F, BM, GH, NY, K, P, SP).

Selected material: Petrolândia, 10.V.1971, fl., *E. P. Heringer* 12822 (NY).

Ipomoea hirsutissima can be easily distinguished from the other species of *Ipomoea* in Pernambuco state by being an erect herb less than 50 cm tall, and the whole plant densely pilose with long, spreading hairs.

It is distributed from Brazil to Paraguay and Bolivia (Wood *et al.* 2020). In Brazil, can be found in Cerrado vegetation of the states of Goiás, Minas Gerais and São Paulo (Simão-Bianchini *et al.*, continuously updated). *Ipomoea hirsutissima* is a new record for the state of Pernambuco, being found in the Caatinga area.

17. *Ipomoea imperati* (Vahl) Griseb Cat. Pl. Cub. [Grisebach.] 203 (1866).

Convolvulus imperati Vahl (1790:17)

Type: Imperato, Hist. Nat., ed. 2, 671, unnumbered illustration cited as “*Convolvulus marino*”, 1672, lectotype designated by Valva & Sabato (1983:110). Fig. 3d

Selected material: Cabo de Santo Agostinho, 17.IX.2004, fl., *A. Rodrigues* 47 (UFP). Serrambi, 10.X.1997, fl. & fr., *V. Santos* 60 (PEUFR). Recife, 2.X.2011, fl., *J. Alves et al.* 677 (IPA).

It can be distinguished by its prostrate habit, oval-oblong, lanceolate, oblong, or ovate succulent leaves with emarginate apices, and a white to pale yellow corolla.

Widely distributed on sandy tropical beaches (Wood *et al.* 2020). In Brazil it can be found on the atlantic coast in Atlantic Forest vegetation (Simão-Bianchini *et al.*, continuously updated). In Pernambuco state, it occurs along dune crests and on the back slopes of dunes.

18. *Ipomoea incarnata* Choisy, Prodr. [A. P. de Candolle] 9: 360 (1845).

Convolvulus incarnatus Vahl (1798: 12).

Type: CURAÇAO. *J.P.B. von Rohr* 5 (lectotype: C10009674). Fig. 3e

Selected material: Maraial, 8.X.2004, fl., *M.S. Leite & J.F. Oliveira* 5 (HST). Petrolina, 15.V.2009, fl., *M.T. Buriil* 330 (HVASF, UFP). Serra Talhada, 28.IV.2004, fl., *E.L. Araújo* 418 (PEUFR).

Completely glabrous, leaves cordate to sagittate, sepals equal in size, oblong to lanceolate, acute, membranaceous, paleaceous when dry, with prominent longitudinal veins.

It is distributed from Ecuador to Brazil, where it occurs mostly in the northeastern region (Simão-Bianchini *et al.*, continuously updated). Found mostly in disturbed areas in the Caatinga domain in Pernambuco state.

19. *Ipomoea indica* (Burman) Merrill (1917: 445). *Convolvulus indicus* Burm. (1755: 6)

Type: [icon] “*Convolvulus indicus flore violaceo*” in Besler, Hort. Eyst. Aest. Or. 13, fol. 8, f. 2. 1613, lectotype designated by Fosberg (1976). Fig. 3f

Selected material: Brejo da Madre de Deus, 26.V.1995, fl., *I. Andrade* 85 (PEUFR). Caruaru, 21.VII.2007, fl., *M.S. Leite* 371 (UFP). Triunfo, 18.VI.1999, fl. & fr., *F. Silva* 59 (UFRN).

It can be confused with *I. nil* (L.) Roth due to its outer sepals with elongated apices (being caudate in *I. nil* and long-attenuate in *I. indica*) but can be easily distinguished by its glabrous to softly pubescent sepals with short indumentum (vs. bristly hirsute with long, patent hairs in *I. nil*).

Widely distributed throughout the Americas and in the tropics globally (Wood *et al.* 2020). In Pernambuco state, it is known from the borders of Atlantic Forest and in transition areas. In Caatinga, it is found on rock outcrops and in areas under human influence.

20. *Ipomoea longeramosa* Choisy Prodr. [A. P. de Candolle] 9: 384 (1845).

Type: BRAZIL. Minas Gerais, in sepibus ad Morro do Lobo, Jan., *Martius* ‘117’ (holotype: M, M0185026; isotype M). Fig. 3g

Selected material: Buíque, 31.VIII.2013, fl.fr., *G.C. Delgado-Junior* 659 (UFP). Cabrobó, 11.V.2009, fl., *M.T. Buriil* 296 (HVASF). Petrolina, 28.VI.1983, fl., *G. Fotius* 3279 (IPA, HST).

Ipomoea longeramosa is the only species found in Pernambuco state with palmately lobed leaves and a yellow corolla, the tube purple inside.

Distributed from Venezuela to Brazil (Wood *et al.* 2020), where it can be found in Caatinga, Cerrado and Amazon areas (Simão-Bianchini *et al.*, continuously updated). In Pernambuco state, it is found only in the Caatinga domain on rock outcrops or on sandy soils.

21. *Ipomoea longistaminea* O’Donell Lilloa 23: 488, tab. 12 (1950).

Type: BRAZIL. Bahia, Barrinha, 7-8 June 1915, *Rose & Russell* 19784 (holotype: US; isotype: NY). Fig. 3h

Selected material: Afrânio, 3.VI.2006, fl., *I.D. Pequeno* 3 (HVASF). Lagoa Grande, 2.VIII.2011, fl. & fr., *C.T.V. de Dias Martins* 168c (HUEFS). Ouricuri, 5.V.1971, fl., *Academia Brasileira de Ciências* 517 (IPA).

Very distinct from all other *Ipomoea* species in Pernambuco state, due to its dense white indumentum on the stems; sepals convex, subequal, rounded and glabrous; corolla bright reddish to dark pink, tubular with a short-reflexed limb. The plants are usually deciduous when flowering.

It is endemic to Brazil, occurring only in the Caatinga domain on sandy soils (Wood *et al.* 2020; Simão-Bianchini *et al.*, continuously updated).

22. *Ipomoea magna* Sim.-Bianch. & J. R. I. Wood Kew Bull. 72(1)-8: 18 (2017).

Type: BRAZIL. Minas Gerais, 13 km W of Januária on road to Serra das Araras, 575 m, 19 April 1973, *W. R. Anderson, P. A. Fryxell, S. R. Hill, R. Reis dos Santos & R. Souza 9184* (holotype UB; isotypes FTG, NY).

Selected material: Salgueiro, 21.V.1971, fl., *E. P. Heringer et al. 721* (IPA, SPF).

It is similar to *Ipomoea brasiliana* due to its equal, oblong, glabrous sepals, but can be distinguished by the leaves > 8 cm long (vs. ca. 4 cm long in *I. brasiliana* var. *brasiliana*), corolla \geq 10 cm long (vs. ca. \leq 5 cm long) and by the long hairs on its seeds (vs. the glabrescent seeds of *I. brasiliana*).

It occurs in Paraguay and Brazil (Wood *et al.* 2020). In Brazil, recorded until now from the states of Bahia, Minas Gerais, São Paulo, and Pernambuco in dry forest areas (Caatinga and Cerrado) (Simão-Bianchini *et al.*, continuously updated). Only one record was found for Pernambuco, in an area of Caatinga vegetation.

23. *Ipomoea marcellia* Meisn., Fl. bras. (Martius) 7: 257 (1869).

Marcellia villosa Choisy (1844: 443).

Lectotype: BRAZIL. Piauí, inter Capoculo et Serrinha, May, *Martius Obs. 2437* [field ticket 98] (M0184915, M0184913, M0184914, M0184916, NY00336562). Fig. 3i

Selected material: Alagoinha, 29.IX.1995, fl. & fr., *L. Griz et al. 14* (IPA). Buíque, 9.V.2015, fl. & fr., *G.C. Delgado-Júnior 817* (PEUFR). Salgueiro, 12.V.2009, fl., *M. Oliveira 4110* (HVASF).

It can be recognized by having villous leaves with prominent veins underneath, the funnellform, pale yellow or white, rarely greenish corolla tube, with a wide limb, and exerted stamens.

Endemic to the Caatinga region of northeastern Brazil (Wood *et al.* 2020; Simão-Bianchini *et al.*, continuously updated). Present only in well-preserved areas, on sandy soils or rock outcrops.

24. *Ipomoea mauritiana* Jacq. Collectanea [Jacquin] 4: 216 (1790).

TYPE: Plant cultivated in Vienna, probably not preserved.

Selected material: Fernando de Noronha, Morro da Quixaba, 8.IV.1999, fl. & fr., *A.M. Miranda 3214* (EAC); 20.X.1955, *Andrade-Lima 55-2217* (IPA).

Frequently found in humid tropical lowlands, *I. mauritiana* is a very variable plant, mainly in the leaf form, varying from unlobed prominently lateral toothed, 3-lobed or 5 lobed.

Ipomoea mauritiana is widely distributed with a pantropical distribution (Wood *et al.* 2020). In Brazil, it is found in the northern part of the country, in Amazon, Caatinga and Atlantic Forest areas (Simão-Bianchini *et al.*, continuously updated). In Pernambuco state is found only in Fernando de Noronha Island.

25. *Ipomoea megapotamica* Choisy Prodr. [A. P. de Candolle] 9: 375 (1845).

Type: — BRAZIL. Mato Grosso do Sul, Terrenos, *G. Hatschbach 23711*, (neotype NY; isoneotype F, MBM). Fig. 4a

Selected material: Caruaru, 21.VI.2009, fl., *M. Sobral-Leite 906* (UFP). Mirandiba, 3.V.2008, fl., *K. Pinheiro 626* (UFP). Pedra, 10.V.2015, fl. & fr., *G.C. Delgado 822* (PEUFR).

It is easily identified by its many-flowered inflorescences, sepals unequal, the outer ones acute, with gibbous bases (with nectaries). Wood *et al.* (2017) proposed a subspecies *I. megapotamica* subsp. *velutina* J.R.I. Wood & Scotland characterized by the abaxial surface of the leaves being densely pilose, the hairs adpressed, long, and conspicuous, while *I. megapotamica* subsp. *megapotamica* is characterized by the abaxial surface of the leaves being minutely puberulent to scabridulous.

It is widely distributed in the South American lowlands and is very variable (Wood *et al.* 2020; Simão-Bianchini *et al.*, continuously updated). In Pernambuco state, it is found on rock outcrops or in sandy soils in the Caatinga domain, and rarely in transitional zones.

26. *Ipomoea muricata* (L.) Jacq., Pl. Rar. Hort. Schoenbr. 3: 40 (t. 323) (1803).

Convolvulus muricatus L. (1767: 44).

Type: INDIA. Surat, *Braad s.n.*, LINN 218.18. **Selected material:** Carpina, 1.I.1986, fl., *B. Ramesh 75* (IPA). Fernando de Noronha, 17.VI.2003, fl., *A. Miranda 4117* (HST).

Its distinction from *I. alba* was discussed in the comments for that species. The ambiguous nomenclature and typification were settled by Staples *et al.* (2005).

Widely distributed in the tropics (Wood *et al.* 2020), but in Brazil is found only from Ceará to São Paulo in Caatinga, Cerrado and Atlantic Forest vegetation (Simão-Bianchini *et al.*, continuously updated). In Pernambuco state, it occurs in Atlantic Forest and transition areas.



Figure 4 – a. *Ipomoea megapotamica* – corolla and sepals with gibbous base. b. *Ipomoea nil* – corolla and sepals with a long and linear acumen. c-d. *Ipomoea parasitica* – c. flower; d. stems with fleshy spines and fruits. e. *Ipomoea pes-caprae* – corolla. f. *Ipomoea philomega* – sepals. g. *Ipomoea pintoii* – corolla. h. *Ipomoea acanthocarpa* – flower. i. *Ipomoea quamoclit* – flower. Photos: LASI.

27. *Ipomoea nil* (L.) Roth Catal. Bot. 1: 36 (1797). *Convolvulus nil* L. (1762: 219).

Type: [icon] Dillenius, Hort. Eltham., 1: 96, t. 80, f. 91 (1732). Fig. 4b

Selected material: Buíque, 3.VII.2013, fl. & fr., *G.C. Delgado-Junior 678* (UFP). Igarassu, 28.X.2009, fl., *J.D. García-González 1251* (JPB, UFP). Serra Talhada, 11.VIII.1996, fl., *G.S. Baracho 51* (UFP).

It can be easily recognized by the usually trilobed leaves, sepals with a long, caudate apex, hirsute at the base. Comparisons with *I. indica* were discussed in the comments for that species.

Pantropical in distribution, greatly aided by human dispersal (Wood *et al.* 2020). Found throughout the Brazil in all phytogeographical domains (Simão-Bianchini *et al.*, continuously updated). In Pernambuco state it is found in Caatinga and Atlantic Forest domains.

28. *Ipomoea parasitica* G.Don, Gen. Hist. iv. 275 (1838).

Convolvulus parasiticus Kunth (1819: 163).

Type: VENEZUELA. Caracas. *Humboldt & Bonpland 660* (holotype: P00670753).

Fig. 4c-d

Selected material: Bezerros, 9.XI.2015, fl. & fr., *G. Staples 1713* (PEUFR). Goiana, 1985, fl., *R. Pereira s.n.* (IPA49834). Serra Talhada, 6.VI.1997, fl. & fr., *A.M. Miranda et al. 2683* (HST).

It differs from all other *Ipomoea* species in Pernambuco state by having usually stems with fleshy spines, acute sepals sparsely puberulent to glabrescent, without awns, a finely sericeous corolla (easily seen in buds), and peduncles recurved and thicker in the fruit, with a persistent style on the capsule. Wood *et al.* (2015) suggested that the flowers are nocturnal, but we found open flowers in the morning.

Ipomoea parasitica is known from Mexico to Brazil, where it is found from Maranhão to Minas Gerais (Simão-Bianchini *et al.*, continuously updated). An uncommon species in Pernambuco state that can mostly be found in the Atlantic Forest domain, transition areas between Atlantic Forest and Caatinga, and in disturbed areas of Caatinga.

29. *Ipomoea parvibracteolata* J. R. I. Wood & L. V. Vascon. Kew Bull. 72(1)-8: 5 (2017).

Type: BRAZIL. Bahia, Casa Nova, estrada para a Fazenda Santarém, 9°24'05"S 41°22'04"W, 468 m, 9 October 2004, *L. P. de Queiroz et al. 9615*, (holotype HUEFS88992, isotype MBM).

Selected material: Petrolina, fl., *G. Fottus 3393* (HTSA,

HST); 13.VI.1995, fl. & fr., *M.M. Silva 18* (HUEFS); 18.IV.1971, fl., *Academia Brasileira de Ciências 71* (IPA).

Morphologically close to *I. setifera* and *I. fimbriosepala* sharing the remarkable prominently ribbed sepals. It can be distinguished by its small leaves, large corolla ≥ 10 cm long, and tiny, linear and deciduous bracteoles. Flora do Brazil website (Simão-Bianchini *et al.* 2016) treat *I. parvibracteolata* as synonymous of *I. setifera* which it cited as occurring in Pernambuco Caatinga, but we follow the monograph of the genus (Wood *et al.* 2020) that distinguish both species. The herbarium specimens misidentified as *I. setifera* are actually *I. parvibracteolata*.

Endemic to Brazil, apparently only found in the states of Pernambuco and Bahia, near the São Francisco River, growing on sandy soils in the Caatinga domain (Wood *et al.* 2020; Simão-Bianchini *et al.*, continuously updated).

30. *Ipomoea pes-caprae* (L.) R.Br., Observ. Congo 58 (1818).

Convolvulus pes-caprae L. (1753: 159).

Type: INDIA. collector unknown LINN 218.59.

Fig. 4e

Selected material: Fernando de Noronha, 1.VI.1993, fl., *A.M. Miranda 847* (PEUFR). Goiana, 24.XI.2013, fl., *L.R. Silva 377* (HST). Recife, 9.XI.1996, fl. & fr., *M.B. Santos s.n.* (UFP17620).

The distinction between *Ipomoea pes-caprae* and *I. asarifolia* was discussed in the notes for the latter species.

Widely distributed globally on tropical beaches (Wood *et al.* 2020). It is found on all Brazilian coast in humid environments (Simão-Bianchini *et al.*, continuously updated). In Pernambuco state, it is restricted to beach zones, on frontal dunes, close to the water line.

31. *Ipomoea philomega* (Vell.) House, Ann. New York Acad. Sci. 18: 246 (1908).

Convolvulus philomega Vellozo (1829: 74).

Type: [icon] Flora Fluminensis Icones 2: tab. 63. 1831. Fig. 4f

Selected material: Igarassu, 24.V.2008, fl., *A. Melo et al. 358* (UFP); 7.III.2009, fl. & fr., *J.D. Garcia et al. 935* (UFP). Recife, 19.VI.1950, fl., *Andrade-lima 50-518* (IPA).

It can be recognized by being a liana with large, cordate leaves (usually wider than 20 cm); abundant white latex; many-flowered inflorescences, corolla with a broad cylindrical tube, orbicular, glabrous, convex sepals, outer sepals flat with obtuse to rounded apex, longer than the 3 inner ones, usually purple to pink in color.

It occurs from Mexico to Brazil (Wood *et al.* 2020). In Brazil can be found in almost all states in humid environments (Simão-Bianchini *et al.*, continuously updated). In Pernambuco state, it can be found in the Atlantic Forest domain, either along forest edges or in the forest canopy.

32. *Ipomoea pintoi* O'Donnell Lilloa 26: 380, tab. 12 (1953).

Type: BRAZIL. Bahia: Municipio de Muritiba, Fazenda Velo-Vale, May 1950, *G.C.P. Pinto s.n.* (holotype not traced “herb. Inst. Agron. do Leste” now in ALCB?; isotype LIL, LIL001278).

Fig. 4g

Selected material: Buíque, 8.VIII.2012, fl. & fr., *G.C. Delgado-Júnior 400* (UFP, HST). Pesqueira, 2.VIII.1979, fl., *Andrade-Lima et al. 79-9442* (IPA).

In Pernambuco state, it is the only climber with elliptic to oblanceolate leaves. Also distinctive are the many-flowered inflorescences, borne on a short peduncle, the completely glabrous convex sepals, the outer slightly shorter than the inner ones.

It is endemic to the Caatinga region of Brazil (Wood *et al.* 2020; Simão-Bianchini *et al.*, continuously updated). In Pernambuco state, it is found on rock outcrops and on sandy soils.

33. *Ipomoea pterocaulis* J. R. I. Wood & L. V. Vasconc. Kew Bull. 72(1)-8: 8 (2017).

Type: BRAZIL, Bahia, Morro do Chapéu, c. 1 km após Lagoinha na Estrada para Cafarnaum, 11°41'01"S 41°20'11"W, 902 m, *L. P. de Queiroz, J. R. I. Wood & H. Huaylla 15957* (holotype HUEFS 209791; isotypes K, OXF).

Selected material: Taquaritinga do Norte, 17.VIII.2017, fl., *S.C. Nepomuceno 38* (PEUFR). Gravatá, 26.IX.2017, fl., *S.C. Nepomuceno 59* (PEUFR).

Ipomoea pterocaulis can be easily recognized by its winged and glabrous stems, coriaceous sepals, and seeds glabrous with long white hairs restrict to the margins. Flora do Brazil website (Simão-Bianchini *et al.* 2016) treat *I. pterocaulis* as a synonym of *I. chondrosepala* and cited that this latter as occurring in Pernambuco, but we follow the monograph of the genus (Wood *et al.* 2020) that distinguishes the two species.

Endemic to Brazil, it is apparently found only in the states of Pernambuco, Bahia, Minas Gerais and São Paulo on sandy soils in the Caatinga and Cerrado domain (Wood *et al.* 2020; Simão-Bianchini *et al.*, continuously updated).

34. *Ipomoea purpurea* (L.) Roth Bot. Abh. Beobacht. 27 (1787).

Convolvulus purpureus Linnaeus (1762: 219).

Type: [icon] Dillenius, Hort. Elth. 1: tab. 84 f. 97, 1732.

Selected material: Gravatá, 4.IV.1995, fl., *E. Inácio 21* (PEUFR).

It resembles *I. indica* due to the mostly soft pubescence on the outer sepals, however the shape of their sepals are very distinct – the apex being acute to acuminate in *I. purpurea*, and long-tapering acuminate in *I. indica*; the former species also has sparse, long hairs at the base of the outer sepals.

Widely distributed as a cultivated species but native in America and abundant in dry areas of the Andes and Mexico (Wood *et al.* 2020). In Brazil it is found in almost all states and phytogeographical domains (Simão-Bianchini *et al.*, continuously updated). In Pernambuco state, it can be found in the Atlantic Forest, but is not a common species, and is probably introduced.

35. *Ipomoea quamoclit* Linnaeus Sp. Pl. 1: 159 (-160) (1753).

Type: INDIA. *Herb. Clifford 66*, ‘Ipomoea 1’ (lectotype BM, BM000558077). Fig. 4i

Selected material: Escada, 10.VI.1967, fl., *I. Pontual 546* (PEUFR). Igarassu, 28.VII.2007, fl., *N.A. Albuquerque et al. 408* (IPA). São Lourenço da Mata, 23.II.1931, fl. & fr., *B. Pickel 2534* (IPA).

It can be easily identified by having pinnate leaves and red, hipocrateriform corollas with exerted stamens and style.

It is native to the American tropics and distributed globally as a cultivated species (Wood *et al.* 2020). In Brazil it is widely distributed in all areas and vegetation (Simão-Bianchini *et al.*, continuously updated). In Pernambuco state, it grows in disturbed areas and in gardens.

36. *Ipomoea ramosissima* Choisy, Prodr. [A. P. de Candolle] 9: 377 (1845).

Convolvulus ramosissimus Poirlet (1814: 468).

Type: PERU. Huánuco, *Ruiz & Pavon s.n.*, lectotype: (MA; isolectotypes: F, MA, OXF).

Selected material: Fernando de Noronha, 9.VI.1999, fl., *A.M. Miranda 3466* (HST, UFRN). Triunfo, 8.VI.1997, fl., *A. M. Miranda 2711* (UFP, HST).

It resembles *I. grandifolia* due to its small corolla (shorter than 3 cm) and convex (boat-shaped) sepals but it can be recognized by having outer sepals obovate to oblong-elliptical (vs. lanceolate-acuminate in *I. grandifolia*), shorter than the inner ones (mostly subequal).

Known from Mexico to Argentina (Wood *et al.* 2020) and widely distributed in Brazil (Simão-Bianchini *et al.*, continuously updated) but uncommon in Pernambuco state, from where there are records from both Caatinga and Atlantic Forest areas.

37. *Ipomoea rosea* Choisy Prodr. [A. P. de Candolle] 9: 384 (1845).

Type: BRAZIL. Piauí, *Martius* '103' (holotype: M, M0184974). Fig. 5a

Selected material: Buíque, 9.V.2015, fl. & fr., *G.C. Delgado Junior 814* (PEUFR). Custódia, 16.IV.2011, fl., *F.F.S. Silva 357* (HVASF). Salgueiro, 31.III.2015, fl. & fr., *J.L. Costa-Lima 1095* (HUEFS).

Ipomoea rosea can be recognized by having consistently trifoliolate leaves, fleshy sepals with tooth-like appendages, and large, funnellform corollas.

Endemic to Brazil, restricted to the northeastern region (Wood *et al.* 2020; Simão-Bianchini *et al.*, continuously updated). Most frequently found in Caatinga vegetation, but there are some records from transition zones in Pernambuco state.

38. *Ipomoea rubens* Choisy Mém. Soc. Phys. Genève 6: 463 (1833).

Type: BANGLADESH. Sylhet, *Wallich Cat. 1421*. lectotype (G00227258; isolectotypes G-DC, K-W). Fig. 5b

Selected material: Cabrobó, 12.IV.2017, fl., *F.D.S. Santos 549* (PEUFR); Petrolina, 22.V.2002, fl., *F.C.R. Costa 2101* (HTSA); 30.V.2011, fl., *J.V.A. Ferreira 53* (HUEFS).

It can be distinguished by having consistently cordate leaves, pubescent on both sides, sepals equal, ovate to elliptic, pubescent with long-spreading hairs, and fine pubescence on the midpetaline bands (most obvious in buds).

Globally distributed in freshwater habitats (Wood *et al.* 2020). In the Americas, it ranges from Mexico southward to Argentina. In Pernambuco state, it is only found along the São Francisco River in the Caatinga domain.

39. *Ipomoea sericophylla* Meisn. Fl. bras. (Martius) 7: 260 (1869).

Type: BRASIL. Minas Gerais, *P. Clausen 289* (lectotype BR, BR00005837199; isolectotypes BR, NY, K, S)

Selected material: Tapera, IX.1933, fl., *B.J. Pickel 3037* (NY, P).

Ipomoea sericophylla is recognized by its short, compact cymes with persistent filiform bracteoles, glands absent on sepals and acute, not mucronate, tomentose sepals.

Ipomoea sericophylla is endemic to Brazil, found in Caatinga, Cerrado and Atlantic Forest domains; in Pernambuco it was found in Caatinga area (Wood *et al.* 2020; Simão-Bianchini *et al.*, continuously updated).

40. *Ipomoea sericosepala* J.R.I. Wood. & R.W. Scotland Kew Bull. 70(3)-31: 21 (2015).

Turbina cordata (Choisy) D.F. Austin & Staples (1983: 64).

Rivea cordata Choisy (1845: 326).

Type: BRAZIL. Minas Gerais, São Francisco prope Salgado, *Martius s.n.* lectotype (M0184947).

Fig. 5c

Selected material: Buíque, 28.XI.1996, fl., *M. Miranda et al. 2485* (HST). São Caetano, 30.V.2010, fl., *K. Mendes 480* (UFP 70328). Serra Talhada, 2.VI.1995, fl. & fr., *M.L. Gomes 72* (IPA).

It can be distinguished by having a liana habit, leaves sericeous or tomentose underneath, many-flowered panicles of showy, pink flowers, buds sericeous, and unequal, oblong-elliptic sepals that are sericeous on the outer surface. The fruits are indehiscent rather than valvate capsules.

Widely distributed throughout Brazil and in Bolivia (Wood *et al.* 2020; Simão-Bianchini *et al.*, continuously updated). In Pernambuco state, *I. sericosepala* occurs only on sandy soils in the Caatinga domain.

41. *Ipomoea setosa* Ker Gawler Bot. Reg. 4: t. 335 (1818).

Type: [icon] in Bot. Reg. 4: pl. 335, 1818. Fig. 5d

Selected material: Buíque, 19.VI.2006, fl., *R. Pereira 2702* (HUEFS). Caruaru, 4.VI.1992, fl., *A.M. Miranda 482* (PEUFR). São Lourenço da Mata, 13.II.1977, fl. & fr., *I. Pontual 1482* (PEUFR).

It can be distinguished from other *Ipomoea* species in Pernambuco state, due to its hispid, bristly, blackish trichomes in all axils, outer sepals glabrous, and lobed leaves with irregularly dentate margins.

Distributed from Mexico to South America (Wood *et al.* 2020). In Brazil it is distributed along the coast from Piauí to Santa Catarina (Simão-Bianchini *et al.*, continuously updated). In Pernambuco state, it is usually found in the Atlantic Forest and transition zones, growing on rocky outcrops. There are some records in Caatinga vegetation, where it grows on sandy soils.

42. *Ipomoea sidifolia* Schrad., Gött. Gel. Anz. 1821(2): 719 (1821).

Ipomoea tubata Nees (1821: 301)

Type: BRAZIL. Prince Wied 49 (isotype GOET).



Figure 5 – a. *Ipomoea rosea* - sepals with tooth-like appendages. b. *Ipomoea rubens* – corolla. c. *Ipomoea sericosepala* – flower. d. *Ipomoea setosa* – dried fruit and stems with blackish hairs. e. *Ipomoea brasiliana* var. *subincana* – sepals. f. *Ipomoea subrevoluta* – corolla. g. *Ipomoea tenera* – flower. h. *Ipomoea tiliacea* – flower. i. *Ipomoea violacea* - rounded sepals. Photos LASI.

Selected material: Sanharó 5.V.1966, fl., *Andrade-Lima 66-4538* (IPA). Taquaritinga do Norte, 6.VI.1992, fl., *A. M. Miranda 492* (HST, HUEFS, INPA, UEC). Vivência, fl. & fr., 30.VII.1968, *O.C. Lira 275* (IPA).

This species was long known as *I. tubata*, but the name *I. sidifolia* was published earlier and should be used for this species (Delgado-Junior *et al.* 2017). It can be easily recognized by its hypocrateriform corolla, the outer sepals often recurved or reflexed, their margins often wavy-repand, with a gibbous base.

Endemic to Brazil (Wood *et al.* 2020; Simão-Bianchini *et al.*, continuously updated). An uncommon species in Pernambuco state, growing along the edges of Atlantic Forest fragments.

43. *Ipomoea squamosa* Choisy Prodr. [A. P. de Candolle] 9: 376 (1845).

Type: BRAZIL, Para, Martius 76 (lectotype M0184961).

Selected material: Taquaritinga do Norte, 17.VIII.2017, fl., *S.C. Nepomuceno 40* (PEUFR).

It can be distinguished by having scarious sepals, the outer ones conspicuously smaller than the inner ones.

Widely distributed in the neotropics (Wood *et al.* 2020). In Brazil it is found in almost all areas and in all types of vegetation (Simão-Bianchini *et al.*, continuously updated). An uncommon species in Pernambuco state, represent by only one population in Taquaritinga do Norte.

44. *Ipomoea subalata* Hassl. Repert. Spec. Nov. Regni Veg. 9: 157 (1911).

Type: PARAGUAY. San Luis, *K. Fiebrig 4485* (holotype G, G00175183; isotype G, G001751820)

Selected material: Buíque, Sítio Breu, 1.VI.2012, fl., *G.C. Delgado-Junior et al. 364* (UFP). Buíque, Trilha das torres, 11.VI.2009, fl., *M.T. Buril et al. 382* (UFP). Ibimirim, 23.VII.1994, fl., *A.M. Miranda et al. 1946* (HST).

Ipomoea subalata can be recognized by the very large pubescent corolla (usually 9–10 cm long), the usually winged stems and the leaves puberulent adaxially.

It occurs in humid and dry environments of Brazil, Bolivia and Paraguay. In Brazil is found in Caatinga (rocky outcrops) and Atlantic Forest areas of Bahia, Maranhão and Pernambuco states (Wood *et al.* 2020; Simão-Bianchini *et al.*, continuously updated).

45. *Ipomoea subrevoluta* Choisy Prodr. [A. P. de Candolle] 9: 386 (1845).

Type: GUYANA. Demerara, Berbice, *C.S. Parker 269* (holotype: CGE, CGE14419; isotypes K, K000612842, K000612843). Fig. 5f

Selected material: Cabrobó, 12.IV.2017, fl., *F.D.S. Santos 548* (PEUFR); 15.VIII.2012, fl., *M.V. Meiado 847* (HVASF); 16.II.2012, fl., *V. Cotarelli 1321* (HVASF).

It can be recognized by having compound leaves divided into 5 elliptic leaflets with their margins revolute, few-flowered inflorescences, corolla 4–6 cm long, and sepals equal, acute, and glabrous.

Known from the West Indies and South America (Wood *et al.* 2020). In Brazil, it is found mostly in *Cerrado*, but also in Caatinga areas (Simão-Bianchini *et al.*, continuously updated). It was found along the margins of the São Francisco River in Pernambuco state.

46. *Ipomoea tenera* Meisn. Fl. bras. (Martius) 7: 289 (1869).

Lectotype: BRAZIL. Minas Gerais, Salgado, Rio São Francisco, August, *Martius s.n.* (M0184955); Maranhão, insula São Luís de Maranhão, June, *Martius '99'* (M0184954). Fig. 5g

Selected material: Petrolina, 11.VIII.1983, fl., *G. Fotius 3539* (HST, HTSA, IPA); 11.IV.2017, fl. & fr., *F.D.S. Santos 520* (PEUFR).

It can easily be distinguished by having compound leaves with 5–7 linear to elliptic leaflets, and fimbriate sepals.

Endemic to eastern Brazil (Simão-Bianchini *et al.*, continuously updated). In Pernambuco, it is only found near the city of Petrolina (Caatinga domain) in disturbed and usually swampy areas.

47. *Ipomoea tiliacea* Choisy, Prodr. [A. P. de Candolle] 9: 375 (1845).

Convolvulus tiliaceus Willdenow (1809: 203).

Type: BRAZIL. *Hoffmannsegg s.n.* (holotype: B-W03691-01). Fig. 5h

Selected material: Garanhuns, XI.1929, fl., *B. Pickel 2180* (IPA, UFP). Maraial, 8.XI.1996, fl. & fr., *J. A. Siqueira-Filho 372* (HVASF, UFP). São Lourenço da Mata, 27.X.2004, fl., *A. Rodrigues et al. 30* (IPA, UFP).

It is characterized by its climbing habit, flat sepals with one raised vein, and one outer sepal smaller than the others.

Distributed from Mexico to South America (Wood *et al.* 2020). In Brazil is found mostly in humid and swamp environments (Simão-Bianchini *et al.*, continuously updated). In Pernambuco state it is usually found along the edges of Atlantic Forests, often in disturbed areas.

48. *Ipomoea violacea* L. Sp. Pl. 1: 161 (1753).

Type: [icon] Plumier, Codex Boerhaavianus, tab. sub. no. 851. Fig. 5i

Selected material: Igarassu, 10.XI.2015, fl. & fr., *G. Staples 1715* (PEUFR); Fernando de Noronha, 1.VI.1993, fl. & fr., *A.M. Miranda et al. 842* (ALCB, HST, HUEFS, PEUFR).

Ipomoea violacea is similar to *I. alba* in the large, hypocrateriform, white to pale yellow corollas. It can be distinguished by having odorless flowers, rounded sepals without awns, stems smooth and angular, and without fleshy spines.

Distributed along tropical and subtropical coasts (Wood *et al.* 2020). In Brazil, it had been known only from the Fernando de Noronha archipelago (Simão-Bianchini *et al.*, continuously updated). We recently collected it on an ocean-facing sandbank in Pernambuco state, and later found two records (ALCB) from Bahia state.

Cultivated species

1. *Ipomoea batatas* (L.) Lam. (1793: 465) is widely cultivated globally; Highly polymorphic, with leaves varying from entire to 3-lobate, and sepals frequently ciliate or rarely pubescent. It is classified in the section *batatas*, together with *I. grandifolia* and *I. tiliacea*. Can be recognized by having sepals convex (boat-shaped) with 3–5 raised veins, and corolla ca. 4–7cm long.

2. *Ipomoea horsfalliae* Hook. (1834: pl. 3315) was described from cultivation in England and is of unknown wild origin. In Brazil, it is found mostly in cultivation. Can be compared to other species with red, hypocrateriform corollas (*I. hederifolia*, *I. longistaminea*, and *I. quamoclit* Linnaeus). Can be easily distinguished by being the only species with leaves 5–7-lobate, undulate margins, and a large, deep red corolla.

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