Rodriguésia 72: e00782020. 2021
http://rodriguesia.jbrj.gov.br
DOI: http://dx.doi.org/10.1590/2175-7860202172076

Original Paper

Ipomoea lanifolia sp. nov. (Convolvulaceae), a new species endemic to the Ibiapaba plateau in northeastern Brazil

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Abstract

A new species of *Ipomoea*, thus far endemic to Caatinga domain, is described. The species occurs in a "carrasco" physiognomy - a shrubby vegetation on sandy soils characterized by the presence of cacti and bromeliads. The new species can be recognized by a combination of morphological characters, including a leaf blade with a lanate abaxial surface with long hairs, and sepals lanceolate, acuminate, tomentose, and smooth. A complete description, diagnosis, an identification key for *Ipomoea* species from the Ibiapaba plateau, illustrations, conservation assessments, a distribution map, and taxonomic comments are provided.
Key words: Brazil, Convolvulaceae, *Ipomoea*, taxonomy, threatened species.

Resumo

Uma nova espécie de *Ipomoea* até agora endêmica no domínio da caatinga, aqui descrita. A espécie ocorre na fisionomia do carrasco - uma vegetação arbustiva em solos arenosos caracterizada pela presença de cactos e bromélias. A nova espécie pode ser reconhecida por uma combinação de caracteres morfológicos, incluindo lâmina foliar com superfície abaxial lanosa com tricomas longos e sépalas lanceoladas, acuminadas, tomentosas e lisas. Nós fornecemos descrição completa, diagnose, uma chave de identificação para espécies de *Ipomoea* do Planalto da Ibiapaba, ilustrações, status de conservação, mapa de distribuição e comentários taxonômicos.
Palavras-chave: Brazil, Convolvulaceae, *Ipomoea*, taxonomia, espécie ameaçada.

Introduction

Several new species of Convolvulaceae have been described recently for Brazil (Bandeira *et al*. 2017; Wood *et al.* 2017a, 2017b, 2017c; Wood & Scotland 2017d; Santos *et al.* 2019, 2020; Santos *et al*. 2020a,b,c), many of them endemic to the northeastern region of that country (Wood *et al*. 2017a; Santos *et al.* 2019, 2020; Santos *et al.* 2020a,b,c). That area is primarily covered by "Caatinga" vegetation - heterogenous seasonally dry forests that experience long dry periods and irregular rainfall (Araújo & Martins 1999). That phytogeographic domain has been historically neglected by taxonomists, but efforts to broaden our knowledge of the Brazilian flora have revealed it as an important center of endemism and diversity (Santos 2011).

Ipomoea is the most species-rich genus of Convolvulaceae (Staples & Brummit 2007), and is characterized by the following set of morphological characters: style entire, stigma 2(3)-capitate, pollen grains echinate, and capsules valvate (Bianchini 1998). Approximately 150 species are now recognized in Brazil, of which 1/3 are endemic, and more than half are found in the northeastern region of the country (BFG 2018). Some species of *Ipomoea* are of economic importance [such as *I. batatas* (L.) Lam., the sweet potato (Joly &

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Leitão-Filho 1979)], or of microbiological [such as *I. cairica* (L.) Sweet (Ferreira *et al.* 2006)], medicinal [such as *I. asarifolia* (Ders.) Roem. et Schul. (Pereira *et al*. 2005)], or ornamental importance [such as *I. indica* (Burm.) Merr. (Souza & Lorenzi 2012)]. Many species have ecological importance as food sources for pollinators, and some are dune fixers as creeping vines, such as *I. imperati* (Vahl) Griseb. and *I. pes-caprae* (L.) R. Br. (Souza & Lorenzi 2012).

During a study of the Convolvulaceae of Ceará state, Brazil, field expeditions and analyses of herbarium collections revealed a morphotype of *Ipomoea* having unusual leaves with a lanate silvery indumentum as well as lanceolate to oblong sepals with acuminate apices. Species of that morphotype were encountered in the municipality of Tianguá, located in the Ibiapaba plateau in "carrasco" vegetation.

After morphological comparisons with other climbing species of *Ipomoea* from South America (Wood *et al*. 2020), this morphotype was found to be most similar to *I. brasiliana* (Choisy) Meisn. based on leaf blade color, the persistence of its bracteoles, and the indumentum of the sepals. Careful analysis of the type specimen of *I. brasiliana* (<https://plants.jstor.org>), however, indicated that the new morphotype was distinguishable by having a lanate abaxial surface, and sepals with acuminate apices. We consulted a recently published monograph citing all *Ipomoea* species from the Americas (Wood *et al*. 2020) and observed that the combination of those morphological traits did not match any other known species.

Materials and Methods

Specimens were collected and herborized according to the usual taxonomic techniques (Mori *et al.* 1989), and deposited in the EAC, HUEFS, HUVA, K and RB herbaria (acronyms according to Thiers, continuously updated). Morphological observations of the new species were made in the field and with dried specimens. The morphological terminology proposed by Harris & Harris (2001) was adopted. Illustrations were prepared from the type specimen, detailing its diagnostic characters; the distribution map was prepared using DIVA-GIS software; the conservation status of the taxon was based on GeoCAT (Bachman *et al*. 2011) following IUCN (2012). An identification key of *Ipomoea* species from the Ibiapaba plateu is provided here.

Results

Identification key of *Ipomoea* species from the Ibiapaba plateau

1. Stem and leaf blade glabrous.
1'. Stem and leaf blade pubescent, sericeous, or lanate.
    2. Sepals concave ..... *Ipomoea batatoides*
    2'. Sepals flat.
        3. Leaf blade sericeous; sepals gibbous ..... *Ipomoea megapotamica*
        3'. Leaf blade pubescent or lanate; sepals smooth.
            4. Leaf blade composite trifoliolate; sepals rostrate..... *Ipomoea rosea*
            4'. Leaf blade simple hastate to cordate; sepals smooth.
                5. Leaf blade lanate; outer sepals lanceolate with apex acuminate..... ..... *Ipomoea lanifolia*
                5'. Leaf blade pubescent; outer sepals ovate to obovate, apex obtuse to rounded.
                    6. Sepals glabrous..... *Ipomoea brasiliana* var. *brasiliana*
                    6'. Sepals tomentose.
                        7. Sepals tomentose; corolla pink..... *Ipomoea brasiliana* var. *subincana*
                        7'. Sepals sericeous; corolla whitish..... *Ipomoea marcellia*

Taxonomic treatment

Ipomoea lanifolia D. Santos & Buril *sp. nov.* Type: BRAZIL. CEARÁ: Tianguá, Queimadas, Serra da Ibiapaba, 03°52'45"S, 41°09'13"W, 21.V.2017, fl., *E.B. Souza et al. 4626* (holotype EAC!; isotypes HUEFS!, HUVA!, K!, RB!). Figs. 1-2

Ipomoea lanifolia D. Santos & Buril is similar to *I. brasiliana* (Choisy) Meisn. by sharing strongly discolor leaf blades, and tomentose bracteoles and sepals; it differs from the latter by having a leaf blade with a densely lanate abaxial surface with long hairs, and lanceolate outer sepals with acuminate apices (*vs.* leaf blade with a pubescent abaxial surface, and ovate sepals with obtuse apices).

Climbing; stems and branches lanate, silvery, smooth; latex absent. Leaf blade 3.5–8 × 2–4.5 cm, ovate, base cordate, occasionally truncate, apex obtuse to acute, apiculate, margins entire, flat, strongly discolor, sparsely lanate, chartaceous, with 8–10 pairs of flattened secondary veins, adaxial surface greenish, densely lanate and silvery, abaxial surface with long hairs; petiole 1–6.5 cm long, lanate, canaliculate, with a nectary in the distal portion. Dichasium with 2–3 flowers; peduncle 2–10.5 cm long, lanate, silvery; pedicel 0.3–1.2 cm long, lanate; bracteoles 1.1–2 cm long, lanceolate to linear, base cuneate, apex acute to acuminate, abaxial surface lanate, adaxial surface lanate to glabrescent, often deciduous. Sepals unequal, the outer ones 1–2 × 0.4–0.5 cm, lanceolate, base truncate, apex acuminate, tomentose, flat, smooth, margins entire, not hyaline; inner sepals 1.5–1.6 × 0.4–0.5 cm, oblong to lanceolate, base truncate, apex long acuminate, tomentose, flat, margins entire, hyaline at base. Corolla 6.5–8 cm long, funnelform, midpetaline bands lanate to glabrescent outside. Filaments 2.2–2.3 cm long, glabrous; anthers 5–6 mm long, oblong, base sagittate, yellowish. Ovary ca. 2 mm long, ovoid, glabrous, bilocular, each locule biovulate; nectariferous disk sinuous, yellowish; style 3.5–4.2 cm long, glabrous, stigmatic lobes 2, globose and papillose. Fruits and seeds unknown.

Material examined: Novo Oriente, Planalto da Ibiapaba, 3.V.1991, fl., *F.S. Araujo 424* (EAC, HST).

Distribution, ecology, and conservation status: *Ipomoea lanifolia* is known from only two localities in the Ibiapaba-Araripe Complex in Ceará state, Brazil (Fig. 3). That area is known as Jaburuna, and comprises the leeward side of the sedimentary Ibiapaba plateau. Elevations there range from 700 to 900 m a.s.l., with mean annual temperatures varying from 22 to 24° C. Mean rainfall varies between 700 and 1,300 mm/year. The predominant vegetation there is "carrasco" - a phytoecological type established mostly on sandy quartzite soils and characterized by very dense and deciduous shrubby xerophytic vegetation, intermingled with lianas and species of cacti and bromeliads, and having an irregular canopy with sparse emergent trees (Araújo *et al.* 1990; Araújo & Martins 1999).

Ipomoea lanifolia is known from only two populations and, based on criteria B1a (extent of occurrence less than 5 thousand km² and locality numbers less than 10) of the IUCN (2012), this species should be considered endangered (EN), even though it occurs in a priority area for biodiversity conservation in the Caatinga domain (MMA 2004) in a protected site on the Ibiapaba plateau (MMA 2004).

The material with flowers was collected in May.

The name of this species refers to the remarkable dense woolly indumentum covering the entire plant.

Discussion

Ipomoea lanifolia has been misidentified in herbarium collections from Ceará state as *I. brasiliana* var. *subincana* (Choisy) J.R.I. Wood & Scotland. That misidentification may have occurred because both species share strongly discolor leaf blades and tomentose bracteoles and sepals. By careful analysis of the type specimen of *I. brasiliana* var. *subincana* (<https://plants.jstor.org>) we concluded that *I. lanifolia* can be morphologically distinguished from that species by having a leaf blade with a densely lanate abaxial surface, and lanceolate outer sepals with acuminate apices, (*vs.* leaf blade with pubescent abaxial surface, and sepals ovate, obtuse). Among the Brazilian *Ipomoea* species with twining habits, ovate leaf blades, and lanceolate outer sepals, *Ipomoea lanifolia* is the only one that shows a combination of the following characters: leaf blade with a densely lanate abaxial surface with long hairs, and sepals tomentose, acuminate and smooth. Leaf morphology, the type of indumentum, and sepal shapes have great importance in recognizing species of *Ipomoea* (Bianchini 1998; Wood *et al*. 2015, 2020).

Other species growing in northeastern Brazil that also show lanceolate outer sepals, similar to those found on *I. lanifolia*, include: *I. indica* (Burm.) Merr., which differs by having sericeous

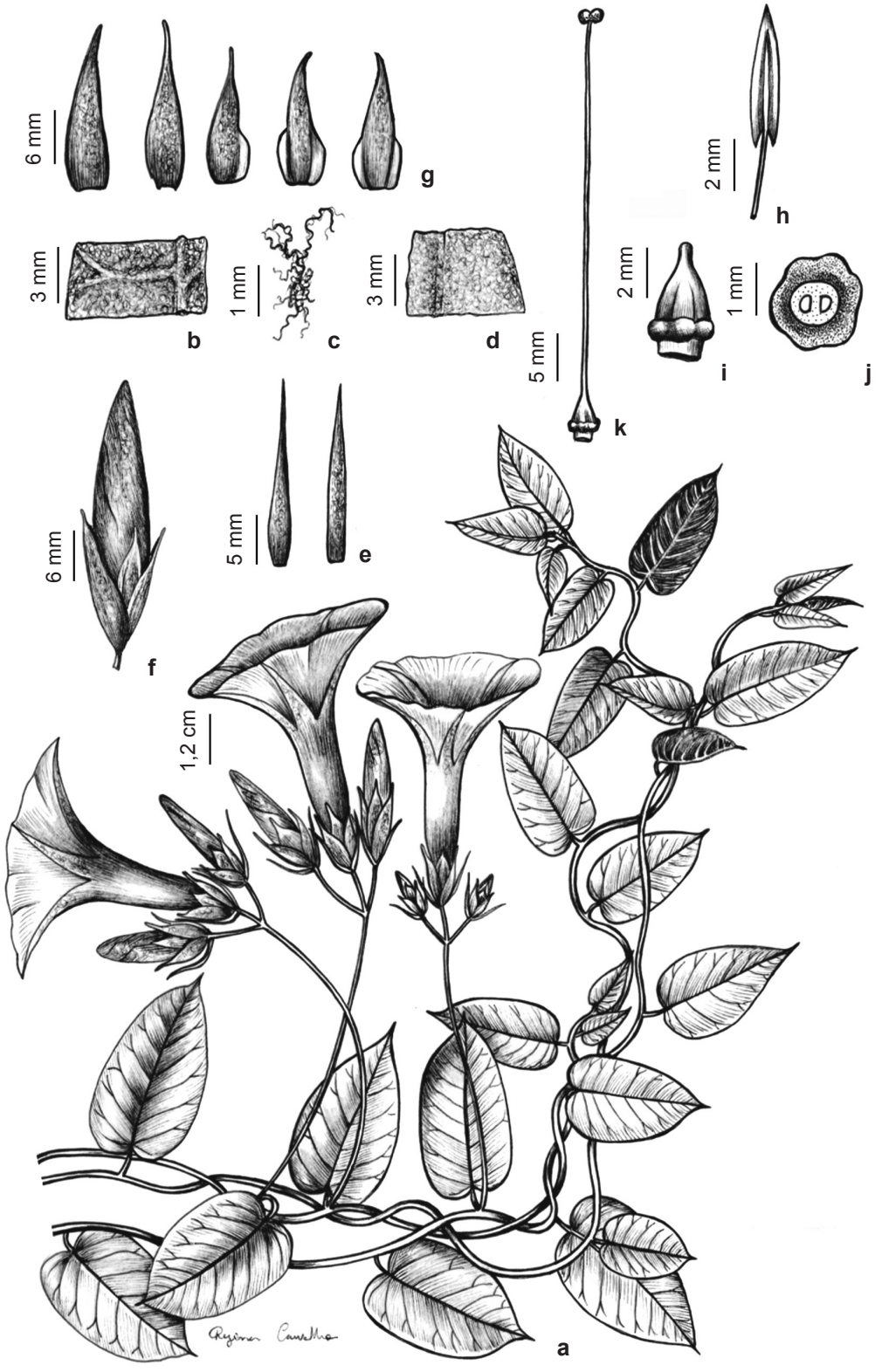

Figure 1 – a-k. *Ipomoea lanifolia* sp. nov. – a. twining habit; b. lower leaf surface; c. simple long hairs; d. adaxial leaf surface; e. bracteoles lanceolate to linear; f. floral bud; g. lanceolate sepals with apex acuminate; h. anther; i. ovary; j. transversal section of the ovary, showing two locules; k. gynoecium. Drawn from the holotype.

leaf blades and sepals; *Ipomoea longeramosa* Choisy, which differs by having 5-lobed leaf blades and a yellow corolla; *Ipomoea melancholica* J. R.I. Wood & Buril, which differs by having leaf blades with glabrous abaxial surfaces, pubescent adaxial surfaces, and pubescent to ciliate sepals; *Ipomea meyeri* G. Don, which differs by having leaf blades 3-lobed to cordate and sericeous, and hirsute sepals; *Ipomoea hewittacea* (Kuntze) J.R.I. Wood & R.W.Scotland, which differs by its sericeous leaf blade, and setose sepals; and *Ipomoea procumbens* Mart. *ex* Choisy that differs by having leaf blades linear to elliptic and glabrous, and glabrous sepals (Tab. 1). This discovery emphasizes the importance of investigating small herbarium collections as well as carrying out floristic inventories in areas historically neglected by taxonomists, such as the Caatinga vegetation in Ceará state.

Figure 2 – a-d. *Ipomoea lanifolia* sp. nov. – a. twining habit; b. ovate leaves and flowers in side view, showing the lanceolate outer sepals, and lanceolate to oblong inner sepals; c. leaf abaxial surface; d. leaf adaxial surface. Type specimen photos a-d. *E.B. Souza et al. 4626*.

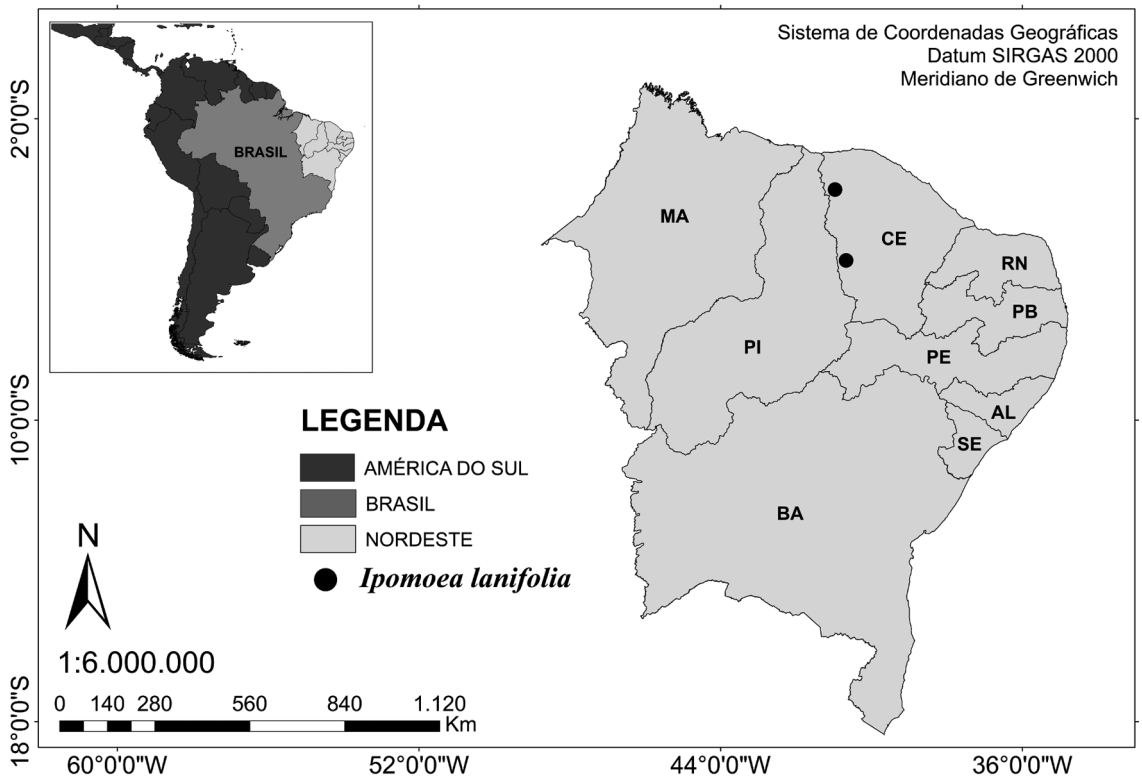

Figure 3 – Distribution of *Ipomoea lanifolia* sp. nov.

Table 1 – Morphological distinctions between *Ipomoea* species having lanceolate outer sepals in northeastern Brazil.

Species	Leaf blade shape	Leaf indumentum	Sepal indumentum	Corolla color
Ipomoea lanifolia	ovate	lanate with long hair	tomentose	pink
Ipomoea indica	cordate	sericeous	sericeous	purple
Ipomoea longeramosa	5-lobed	pilose	hirsute	yellow
Ipomoea meyeri	3-lobed	sericeous	hirsute	pink
Ipomoea hewittacea	cordate	sericeous	setose	pink
Ipomoea procumbens	linear to elliptic	glabrous	glabrous	pink
Ipomoea melancholica	3-lobed to cordate	pubescent	pubescent and ciliate	pink

Acknowledgements

We thank the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPQ), for the financial support of our field expeditions, under the project: "Sistemática de Convolvulaceae da América do Sul: construir em direção ao conhecimento global" (Process: PVE 314725/2014-8); CAPES, for the scholarship awarded to the first author; and Regina Carvalho, for the illustrations and to Elnatan Bezerra de Souza thanks the Cearense Foundation for Support for Scientific and Technological Development for the BPI/FUNCAP productivity grant (Process: BP4 - 0172-00170.01.00/20).

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Area Editor: Dra. Liz Bohórquez
Received in May 11, 2020. Accepted in June 23, 2020.