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# First records of *Ipomoea subrevoluta* Choisy (Convolvulaceae) for the Flora of Maranhão state, northeastern Brazil

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**Abstract**

*Ipomoea subrevoluta* belongs to the Convolvulaceae family and is commonly found in environments close to rivers and lakes. The species is considered vulnerable, being little known and poorly represented in the herbarium material. The objective of this work is to register the occurrence of the species in an area of Maranhão state, collected in the municipality of Bacabal, a region of ecological tension between the Amazon Domain and the Cerrado. We provide a concise description, phenology, ecological observations, as well as photographs, as well as up-to-date data on the species conservation status.

*Keywords:* Bacabal, Cerrado, geographic distribution, new occurrence.

# Primeiro registro de *Ipomoea subrevoluta* Choisy (Convolvulaceae) para a flora do Maranhão, nordeste do Brasil

**Resumo**

*Ipomoea subrevoluta* pertence à família Convolvulaceae e é comumente encontrada em ambientes próximos a rios e lagos. A espécie é considerada vulnerável, sendo pouco conhecida e pouco representada no material herbário. O objetivo deste trabalho é registrar a ocorrência da espécie em uma área do Maranhão, coletada no município de Bacabal, região de tensão ecológica entre o Domínio Amazônico e o Cerrado. Fornecemos uma descrição concisa, fenologia, observações ecológicas, bem como fotografias, além de dados atualizados sobre o status de conservação da espécie.

*Palavras-chave:* Bacabal, Cerrado, distribuição geográfica, nova ocorrência

The Cerrado is the second largest phytogeography domain in Brazil. It presents a great diversity of vegetation types due to the several ecotones that it forms with the other domains. This domain is also considered a global hotspot due to its rich biodiversity and intense anthropogenic pressure (Myers, Mittermeier, Mittermeier, Fonseca, & Kent, 2000).

Maranhão state, northeast of Brazil, has an area of 331,937 km$^2$, of which 64% is occupied by the Cerrado (Maranhão, 2011). In Maranhão state, this domain presents high diversity and occurs in very diverse environments, with great variations in altitude that are indicators of environmental heterogeneity, resulting in several vegetation formations (Silva-Moraes, Cordeiro, & Figueiredo, 2019).

One of the vegetation formations that make up the Maranhão cerrado is the Cocais Forest or Babaçu Forest (Spinelli-Araujo *et al*., 2016). This formation was subjected to intense forest devastation and was gradually replaced by the densification of the *Attalea speciosa* Mart. ex Spreng. palm tree, a secondary vegetation that is well distributed throughout the central region of the state.

Convolvulaceae comprises 1880 species distributed in 58 genus spread around the world (Simão-Bianchinni, Ferreira, & Pastore, 2015). In Brazil, the family is represented by 421 species arranged in 25 genus, present in all states and occurring in all phytogeographic domains, with the cerrado domain being the most representative, with 264 species (Simão-Bianchini *et al*., 2020).

Among the genus of Convolvulaceae, *Ipomoea* L. stands out for being the richest genus, with ca. 700 species, distributed throughout the tropics around the world (Staples, & Brummit, 2007). In Brazil, the genus is represented by 149 species distributed across all states and all Phytogeographic Domains (Simão-Bianchini *et al*., 2020). Recently, a new species of *Ipomoea* was described for Maranhão state, *Ipomoea maranhensis* Santos and Buril (Santos, Saraiva, Ferraz, Arruda, & Buril, 2020) making a total of 40 species for the genus in the state (Simão-Bianchini *et al*., 2020).

Morphologically the genus *Ipomoea* can be identified as climbing or prostrate plants; stylet, with globose stigma; corolla 3-5 cm long, white or pink; untwisted anthers after

anthesis; echinate and porate pollen grains; 4 dehiscent capsules, usually with 4 glabrous, hairy or lanuginous seeds in the longitudinal ribs (Simão-Bianchini *et al*., 2020).

During field work a morphospecies of the genus *Ipomoea* was collected. After a deeper analysis, we came to the conclusion that it is *I. subrevoluta* Choisy, species is not registered for the Maranhão state. Thus, we provide a complete description of the species, with photography, comments on its geographic distribution, habitat, phenology, conservation status, and relationships to morphologically similar species.

*Ipomoea subrevoluta* was collected during field work in "Lagoa da Brisa", municipality of Bacabal, Maranhão state. The municipality is located in the central portion of the state, between two important hydrographic basins: the Mearim River and the Grajau River.

The identification of the material was based on literature review, as well as online data platforms (Flora do Brasil 2020 and Species*Link*) and consultation with specialists to confirm the species. The material collected from *I. subrevoluta* was incorporated into the collection of the BMA Herbarium (the acronym of Thiers, 2020). The terminology of morphological structures was standardized according to Radford, Dickison, Massey, and Bell, (1974). The conservation status of the species was assessed based on criteria adopted by the International Union for the Conservation of Nature (IUCN 2001).

***Ipomoea subrevoluta* Choisy**, Prodr. [AP de Candolle] 9: 386 (1845) (Fig. 1)

Type: Guiana, Demara. Parker 269 (Photo: Holótipo G!; isotype GH! and NL!)

Prostrated subshrub, hyaline latex, cylindrical branches, glabrous, stem voluvel, with internodes 7.6-9.1 cm long. LEAVES alternate, spiralate, peciolate; petiole 2.6-3.7 cm long, glabrous; blade digitately divided into 5 free leaflets; leaflets 4.9-6.7 x 0.4-0.8 cm, lanceolate ou linear-lanceolate, acute in the base and apex, apiculate, margim intere, glabrous on both surfaces, green, prominent main vein, sessile; petioles glabrous, green, 3-4.2 cm long. FLOWERS lonely, axillary, pedunculated; peduncles 2.3-2.8 cm long, straight, glabrous, round; bracteoles 2, opposite, scale-like; pedicels 1.5-1.8 mm long, glabrous, round; sepals iqual, 7 × 3 mm, ovate, cuneate, apiculate, intire margins, inner sepals with membranous margin, glabrous, green; corolla 6-6.8 cm long, purple, glabrous, funnel shaped, limb c. 5.8-6.4 cm diam., lobes rounded; stamens unequals, the longer 2.8 cm long, the shorter ca. 1.6 cm long, epipetalous for 3-4 mm long; filaments pilose at base only; anthers included, ca. 3 mm long, lanceolates, whute; ovary ca. 2.3 mm long, pyramidal, glabrous; style glabrous; stigma ca. 1 mm long, capitate, papillose. FRUIT unknown.

New records: BRAZIL, Maranhão, Bacabal, Lagoa da Brisa, near the Crystale Residential, 04º12’50”S and 44º48’16”W, fl., 19.II.2020, Daniela Amorim 50, Raissa Lopes e Jordânia Sousa (BMA).

Additional specimen examined: BRAZIL, Amapá, rio Oiapoque, 03º27-371N e 51º18-34’W, fl., 18/10/1960, J.M. Pires, L.Y.Th. Westra (Photo NYBG 48887!); Mato Grosso, Transpantaneira Highwau, near rio Pixain on left side, fl., 06/05/1978, M. Macedo 697, S. Assumpção (Photo NYBG!); Pará, Almeirim, Rio Paru, About 50km above mouth of Rio Paru, Amazon tributary, 01º29’15”S and 52º45’02”W, fl., 15/10/2012, Householder, J.E. 2144 (Photo INPA!)

*Ipomoea subrevoluta* can be easily recognized as a prostrated subshrub with alternate leaves, digitately divided into five leaflets, with large purple infundibuliform flowers with straight peduncle and tiny chalice, both glabrous. In Bacabal-MA, it was located in “Lagoa da Brisa” (04º12’51”S, 44º48’15”W), in the sub-shrubs that border the edge of the lagoon, facing west. It is an annual species, observed mainly during the rainy season, which comprises the months of December to May, when the land becomes flooded and the rosette of its flowers can be observed in the distance between the green foliage of the sub-shrubs that border the lake.

*Ipomoea subrevoluta* can be confused in the field with *I. cairica* (L.) Sweet and *I. wrightii* Gray, which have a similar distribution. Both are lianas with voluble stems, with digitate leaves and pinkish, lilac or purple axillary flowers (Simão-Bianchini *et al*., 2020). They can be distinguished mainly by the absence of stipules in *I. subrevoluta* (vs. presence in *I. cairica*) and by the linear-lanceolate leaflets in *I. subrevoluta* (vs. oblong to elliptical). It can also be distinguished from *I. writte* by having a straight peduncle (vs. spiraled) and larger flowers (6-6.8 vs. 0.7-1.6 cm).


**Figure 1:** *Ipomoea subrevoluta* Choisy. **A.** Appearance of the plant in the field. **B.** Pressed material for exsiccate showing alternate digitiform leaves with five leaflets. **C.** Detail of the glabrous peduncle and calice.

It has a tropical distribution, Northeastern Argentina, Bolivia, Brazil, Colombia, Cuba, French Guiana, Guyana, Paraguay, Suriname, Trinidad-Tobago, Venezuela. In Brazil, *I. subrevoluta* is widely distributed, occurring in 10 states: Amapá, Bahia, Mato Grosso, Mato Grosso do Sul, Minas Gerais, Pará, Paraná, Pernambuco, Rondônia and São Paulo (Simão Bianchini *et al*., 2020). The collection of *I.*

*subrevoluta* in the municipality of Bacabal is the first record of the species for the Maranhão state, northeastern Brazil.

Despite its wide distribution, the species has a disproportionate collection in the areas of occurrence and is poorly represented in Brazilian herbaria. Of the 46 images analyzed in the SpeciesLink network (2021), one image does not have a location and only 32 were collected in Brazil. The state with the highest number of collections is Mato Grosso, with seven collections, followed by Mato Grosso do Sul, with six collections, and Pernambuco, with 5 collections; the other states have three to one collection. Despite the largest number of collections being on Brazilian soil, only 54.4% of collections are in Brazilian herbariums (INPA-herbarium, CEN, UEC, HVASF-herbarium, ICN, HUEFS and IAN); 21 exsiccates are found in foreign herbaria.

Austin and Cavalcante (1982), studying Amazonian Convolvulaceae, mention that the flowering time of *I. subrevoluta* is between October and January. Consulting the digital images provided by the herbaria on SpeciesLink and Reflora, we could see that the species blooms all year round, with a peak in May. In Bacabal-MA, I. subrevoluta was found in flowering in February.

As for its conservation status, *I. subrevoluta* is classified as "Vulnerable (VU)" due to "developing in Capoeiras environments, riverside fields and Seasonal Semideciduous Forest. It has only five records for the Mato Grosso, Mato Grosso do Sul and Paraná and has a restricted AOO with 20 km²" (CNCFlora 2012). However, at the time of this evaluation, *I. subrevoluta* was known from collections in the states of Paraná, São Paulo, Mato Grosso do Sul, Mato Grosso and Amapá. Currently, the species' distribution area has increased and new information has been added. We therefore recommend transferring *I. subrevoluta* from (VU) to "Insufficient Data (DD)" since despite the wide distribution, it is necessary to obtain more information about the species, and the possibility that it may be threatened is recognized, and that future research might indicate a threat category. In Bacabal-MA, in the only point of observation of the species, the main threats to *I. subrevoluta* are related to intense losses of occupied areas for real estate speculation and also to the degradation of the habitat quality, since with the real estate expansion the lakes pass receiving waste from urban squatters. Thus, urgent conservation measures must be put in place in the municipality of Bacabal to prevent or mitigate biodiversity loss. Thus, it will be important to establish proactive environmental actions and policies within the municipality of Bacabal and, in particular, in the lake areas, with a focus on stricter inspection and the implementation of measures to prevent the alteration of these areas.

Many species of the genus have already been registered for the Maranhão state, with some endemic to the state. Therefore, we recommend field expeditions in little or unexplored areas that may reveal new occurrence records or new species, which would contribute to the conservation of species and other rare and endemic species of the Brazilian flora.

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