

ELEVEN NEW RECORDS OF MALVOIDEAE (MALVACEAE) SPECIES FROM PARAIBA STATE, BRAZIL

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Abstract. This work presents 11 new records for species of Malvoideae (Malvaceae) found in Paraíba state, northeastern Brazil: *Herissantia crispa*, *Malachra fasciata*, *Malvastrum coromandelianum*, *Pavonia malacophylla*, *Sida acuta*, *S. castanocarpa*, *S. glaziovii*, *S. glomerata*, *S. jussiaeana*, *S. urens*, and *Sidastrum micranthum*. Data on geographical distribution, habitats, flowering, and fructification and notes about morphological characters are presented for the species.

Keywords: diversity, flora, Malvales, northeastern Brazil

Malvaceae in their current circumscription are composed of nine subfamilies: Bombacoideae, Browlowioideae, Byttnerioideae, Dombeyoideae, Grewioideae, Helicterioideae, Malvoideae, Sterculioideae, and Tilioideae (Judd and Manchester, 1997; Le Péchon and Gigord, 2014) as recommended by APG I (1998), APG II (2003), APG III (2009), and APG IV (2016). Malvoideae is the largest group, comprising the genera treated as Malvaceae s.str. as well as some genera belonging to the subfamilies Sterculioideae and Bombacoideae (Grings, 2011).

Malvaceae subfam. Malvoideae includes 110 genera and 1,730 species with Pantropical distribution (Bayer and Kubitzki, 2003). It is estimated that 65% of its genera are concentrated in the Americas (Fryxell, 1997). *Pavonia* Cav. is the largest genus, with 250 species, of which 224 occur in the Americas, absent only from Chile (Esteves,

2001). However, considering Malvaceae as a whole, 73 genera and 785 species have been reported in Brazil, with 44 genera and 291 species found in the northeastern region, and 23 genera and 56 species recorded in Paraíba state (Flora do Brasil, 2020, in progress).

While conducting floristic-taxonomic studies focusing on Malvaceae in an area of Caatinga vegetation (Engenheiro Ávidos Ecological Park) and the subfamily Malvoideae in an Atlantic Forest/Caatinga transition area (Mesoregion Agreste), both located in Paraíba state, northeastern Brazil, 11 new records were found for Malvoideae. The results presented in this work expand to 67 and 45 the number of species for Malvaceae and for Malvoideae, respectively, in the state's flora (an increase of ca. 20% for the family and almost 32.5% for the subfamily).

MATERIAL AND METHODS

Collections were undertaken between May 2014 and February 2016 in Paraíba state, northeastern Brazil (Fig. 1). We collected fertile specimens (with flowers and/or fruits) of all of the Malvoideae species encountered during random walks in the areas (Fig. 2A–C), recording data on plant habitats, habits, the colors of the reproductive structures (androecium and gynoecium), and any other aspects that could be important for the identification of genera and species. The collection points were recorded using a GPS unit (Global Positioning System), registering latitude, longitude, and the altitude of each individual and population; digital photographs were made of the species and their respective environments. Reproductive structures (flowers and/or fruits) were preserved in 70% alcohol in the field.

Specimen were processed according to usual techniques

and deposited in the Manuel de Arruda Câmara Herbarium (ACAM) of the State University of Paraíba (UEPB), Campina Grande, Paraíba state, Brazil.

The identifications were based on the classic and modern bibliography: Schumann (1891), Fuertes (1993), Fryxell (1997), Bovini (2001), Esteves (1998, 2001), Krapovickas (2003, 2007), and Rondón (2009). The geographic distribution was based on W³ Tropicos and *Flora do Brasil* 2020 (in progress), as well as the literature cited above for the family.

The herbaria JPB, EAN, UFPB, and RB also were consulted, where several of the new records were detected after specimens were correctly identified (acronyms follow Thiers, continuously updated).

Data on geographical distribution, habitats, flowering, and fructification, as well as notes about morphological characters, are presented for all species.

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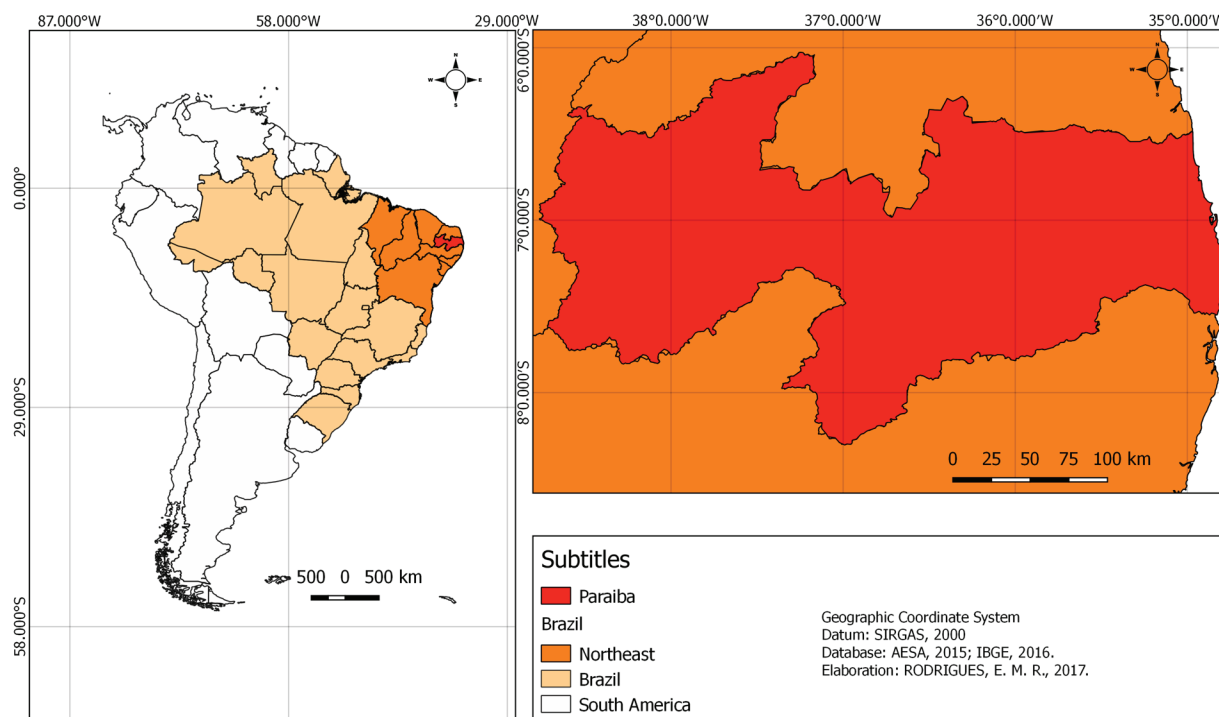


FIGURE 1. Study area, Paraíba state, northeastern Brazil.

RESULTS

1. *Herissantia crispa* (L.) Brizicky, J. Arnold Arbor. 49(2): 279. 1968.

Basionym: *Sida crispa* L., Sp. Pl. 2: 685. 1753. TYPE: INDONESIA (as "FILIPINAS"). Java, s.d., C. L. von Blume s.n. (not seen).

Distribution and habitat: this species shows pantropical distribution (Fryxell, 1997). In Brazil, it is distributed exclusively in the northeastern region (states of Alagoas, Bahia, Pernambuco, and Sergipe), growing in Caatinga and Cerrado vegetation, including disturbed areas (*Flora do Brasil* 2020, in progress).

Phenology: found flowering in May, June, and August, and fruiting in June and August.

Additional specimens examined: BRAZIL. Paraíba state: Araruna, 29/31 August 2002, M. F. Agra et al. 6237 (JPB); *Ibidem*, 02 August 2005, M. F. Agra et al. 6517 (JPB); Campina Grande, 23 June 1995, M. F. Agra et al. 3347 (JPB); Tacima, 18 May 2002, M. F. Agra et al. 5868 (JPB).

The species is characterized especially by having inflated fruits and a corolla with white petals; morphologically similar to *Herissantia tiubae* (L.) Brizicky, from which it differs principally by having stellate trichomes on its branches and simple trichomes on its fruits (Amorim et al., 2009).

2. *Malachra fasciata* Jacq., Collectanea 2: 352. 1788[1789]. TYPE: VENEZUELA. Crescit in America ad Caraccas. In caldariis nostris annua planta sero floret, sub finem demum Octobres & Novembri, N. J. Jacquin s.n. (Holotype: W, photograph).

Distribution and habitat: this species is native to South America (Rondón, 2009). In Brazil, it is distributed in the northeastern (Bahia, Maranhão, and Pernambuco) and southeastern (Minas Gerais and Rio de Janeiro) regions, being encountered in the Amazon, Cerrado, and Atlantic Forest domains, including disturbed areas (*Flora do Brasil* 2020, in progress).

Phenology: found flowering in May and September, and fruiting in May.

Additional specimens examined: BRAZIL. Paraíba state: Alagoinha, 08 September 1942, L. P. Xavier s.n. (JPB 860); Caldas Brandão, 16 May 1986, M. F. Agra 532 (JPB); Sossego, s.d., G. S. Gonçalves 03 (EAN).

The species is characterized by having long, rigid trichomes that are slightly irritating and distributed throughout the branches, which readily distinguishes it from the other species of Malvoideae encountered in the study area.

3. *Malvastrum coromandelianum* (L.) Garcke, Bonplandia 5(18): 295. 1857.

Basionym: *Malva coromandeliana* L., Sp. Pl. 2: 687. 1753.

TYPE: PERU, without locality designation, s.d., A. Weberbauer 3196 (F [0BN009310], photograph).

Distribution and habitat: this species shows pantropical distribution, occurring principally in South America (Peru, Argentina, and Brazil) (Bovini, 2001). In Brazil, it is distributed in the north (Amazonas), northeast (Bahia, Ceará, and Pernambuco), central-west (Goiás), southeast (Espírito Santo, Minas Gerais, Rio de Janeiro, and São Paulo),



FIGURE 2. Some of the explored areas and species of Malvoideae, Paraíba state, northeastern Brazil. **A**, Ecological Park Engenheiro Ávidos (PECEA), municipality of Cajazeiras; **B**, *Sida acuta*, inflorescences; **C**, Pedra da Boca State Park, municipality of Araruna; **D**, *Sida castanocarpa*, inflorescences; **E**, *Sida jussiaeana*, inflorescences; **F**, *Sidastrum micranthum*, inflorescence. Photographs A–B and D–F by F. C. P. da Costa; photograph C by F. K. da S. Monteiro.

and south (Paraná, Rio Grande do Sul, and Santa Catarina), associated with the Amazon, Caatinga, Cerrado, and Atlantic Forest domains, in disturbed areas, and seasonal semi-deciduous and ombrophilous forests (*Flora do Brasil* 2020, in progress).

Phenology: found flowering and fruiting in July.

Additional specimen examined: BRAZIL. Paraíba state: Areia, 31 July 2006, *M. F. Mata* 603 (EAN).

This species can be recognized by having fewer bracteoles in the epicalyx than sepals, in general 4, with solitary flowers, occasionally congested, characteristics that easily identify it.

4. Pavonia malacophylla (Link & Otto) Garcke, Jahrb. Königl. Bot. Gart. Berlin 1: 221. 1881.

Basionym: *Sida malacophylla* Link & Otto, Icon. Pl. Select.: 67. 1828. TYPE: BRAZIL. Rondônia, 17 km N de Vilhena, camino a Juína, 20 July 1985, *A. Krapovickas, J. F. Valls, C. Simpson & G. Silva* 40143 (Neotype: NY; Isoneotypes: C, CEN, CTES, F, G, K, UC; Neotype and Isoneotypes designated by Fryxell, 1988).

Distribution and habitat: this species shows Neotropical distribution, occurring in southern Mexico, Central America, Cuba, Peru, Bolivia, and Brazil (Bovini, 2001). In Brazil, it is distributed in the northern (Amapá, Amazonas, Pará, Rondônia, and Roraima), northeastern (Alagoas, Bahia, Ceará, Maranhão, Pernambuco, and Sergipe), central-western (Federal District and Mato Grosso), and southeastern (Espírito Santo, Minas Gerais, Rio de Janeiro, and São Paulo) regions, associated with the Amazon, Caatinga, Cerrado, and Atlantic Forest domains (*Flora do Brasil* 2020, in progress).

Phenology: found flowering in August and October, and fruiting in October.

Additional specimens examined: BRAZIL. Paraíba state: Areia, 24 August 1956, *J. C. Moraes s.n.* (EAN 1602); Boa Vista, 18 October 2005, *M. F. Agra* 6244 (JPB).

This species is characterized morphologically by having a schizocarp with 5 mericarps (4 equal and 1 atrophied).

5. Sida acuta Burman f., Fl. Indica: 147. 1768. TYPE: INDONESIA. Java, no locality cited, s.d., *N. L. Burman s.n.* (Lectotype: G, photograph, designated by B. Walkes, 1966). Fig. 2B.

Distribution and habitat: this species occurs in the Americas as well as in Asia and Africa (Krapovickas, 2003). In Brazil, it is distributed in the northern (Pará and Tocantins), northeastern (Bahia, Ceará, Maranhão, Pernambuco, Piauí, and Sergipe), central-western (Goiás), and southeastern (Minas Gerais) regions, in the Amazon, Caatinga, Cerrado, and Atlantic Forest domains, as well as in disturbed areas (*Flora do Brasil* 2020, in progress).

Phenology: found flowering in May and July, and fruiting in July.

Additional specimens examined: BRAZIL. Paraíba state: Areia, 21 July 1994, *G. S. Baracho & A. J. Castro s.n.* (JPB [20340]); Guarabira, 21 May 2015, *S. Pordeus* 56 (ACAM); Lagoa Seca, 29 July 2001, *C. E. Lourenço* 228 (JPB).

Sida acuta is characterized, primarily, by having distichous branching and corollas clear-yellow or, when white, the center is deep yellow.

6. Sida castanocarpa Krapov., Bonplandia 16(3-4): 226. 2007. TYPE: BRAZIL. Tocantins, 40 Km NE of Wanderlandia, *A. Krapovickas, J.F.M. Valls & G.P. Silva* 37845 (Holotype: CEN). Fig. 2D.

Distribution and habitat: this species occurs in the northeastern (Bahia, Ceará, Maranhão, Piauí, and Rio Grande do Norte) and central-western (Goiás) regions, associated with the Caatinga and Cerrado domains (*Flora do Brasil* 2020, in progress).

Phenology: found flowering in April, July, October, and December, and fruiting in April.

Additional specimens examined: BRAZIL. Paraíba state: Boa Vista, 27/29 April 1994, *M. F. Agra et al.* 2944 (JPB); Campina Grande, 23 October 2014, *S. Pordeus* 40 (ACAM); Campina Grande, 16 July 2015, *S. Pordeus* 61 (ACAM); Pocinhos, 11 December 1958, *J. C. Moraes s.n.* (EAN 2005); Ceará state: Fortaleza, 31 December 1975, s.c. (RB 234039); Minas Gerais state: Januário, 04 November 1978, *L. Krieger* 16120 (RB); Rio Grande do Norte state: São João do Sabugi, 18 March 2011, *A. Roque* 943 (RB); São Paulo state: São Paulo, 11 April 1949, *F. Hoehne s.n.* (RB 333140); Sergipe state: Nossa Senhora da Glória, 16 June 2014, *E. S. Almeida* 404 (RB); Poço Redondo, 16 June 2014, (fl.), *A. S. Jesus* 10 (RB).

This species can be recognized especially by its leaf blade shape, and densely pubescent branches with long trichomes, these being most dense near the apex; its flowers are short-pedicellate.

7. Sida glaziovii K. Schum., Fl. Bras. (Martius) 12(3): 322. 1891. TYPE: BRAZIL. Environs de Rio Janeiro [Rio de Janeiro] et D'Ouro Preto, 1883, *K. M. Glaziov* 14510 (K [000528433], photograph).

Distribution and habitat: this species is distributed in Bolivia and Brazil (W³ Tropicos, 2018) and, in Brazil, occurs in the northeastern (Bahia), central-western (Federal District and Mato Grosso do Sul), southeastern (Espírito Santo, Minas Gerais, Rio de Janeiro, and São Paulo), and southern (Paraná) regions, associated with the Cerrado and Atlantic Forest domains, including anthropic areas (*Flora do Brasil* 2020, in progress).

Phenology: found flowering in April and May, and fruiting in May.

Additional specimens examined: BRAZIL. Paraíba state: Bananeiras, 30 April 2015, *S. Pordeus* 51 (ACAM); Guarabira, 21 May 2015, *S. Pordeus* 55 (ACAM).

Sida glaziovii has a dense indument covering the entire plant; it is morphologically similar to *S. rhombifolia* L., although the latter has dense trichomes exclusively on the inner surface of its leaf blade.

8. *Sida glomerata* Cav., Diss. 1: 18. 1785. TYPE: Without recorded locality, without recorded date, *A. L. Jussieu s.n.* (P-JU [12249], photograph).

Distribution and habitat: occurs in Central and South America, having also been recorded in the United States (Fuentes, 1993). In Brazil, this species is distributed in the northern (Amazonas, Pará, and Tocantins), northeastern (Bahia, Ceará, Maranhão, Pernambuco, Piauí, and Rio Grande do Norte), central-western (Goiás, Mato Grosso do Sul, and Mato Grosso), and southeastern (Minas Gerais and Rio de Janeiro) regions, associated with the Amazon, Caatinga, Cerrado, Atlantic Forest, and Pantanal domains, including disturbed areas (*Flora do Brasil 2020*, in progress).

Phenology: found flowering in February to June, and fruiting in February, April, May, and July.

Additional specimens examined: BRAZIL. Paraíba state: Araruna, 02 August 2005, *M. F. Agra et al.* 6500 (JPB); Areia, 15 May 1953, *J. C. Moraes s.n.* (EAN 695); *Ibidem*, 28 July 1986, *G. V. Dornelas* 250 (EAN); *Ibidem*, 17 February 2011, *L. L. Barreto* 84 (EAN); Campina Grande, 23 June 1995, *M. F. Agra et al.* 3330 (JPB); Ingá, 28 April 1994, *M. F. Agra et al.* 2871 (JPB).

Sida glomerata can be characterized as having flowers united in glomerules, these generally being congested and axillary, and having fruits with 5 mericarps.

9. *Sida jussiaeana* DC., Prodr. 1: 463. 1824. TYPE: Pérou, *s.l.*, *s.d.*, *A. L. Jussieu* 12267-A (Holotype: P [00680410]). Fig. 2E.

Distribution and habitat: this species presents a Neotropical distribution, occurring mainly in Central and South America. It is registered in the northeastern (Bahia, Ceará, Maranhão, and Piauí), central-western (Goiás), and southeastern (Minas Gerais) regions, associated with the Caatinga and Cerrado domains (*Flora do Brasil 2020*, in progress). In the studied area was recorded in the shrub-tree stratum in an area of Caatinga vegetation, occurring at the base of the mountain range.

Phenology: found flowering and fruiting in May.

Additional specimens examined: BRAZIL. Paraíba state: Cajazeiras, Engenheiros Ávidos Ecological Park (PECEA), 454 m, 06°59'35"S, 38°28'41.0"W, 23 May 2015, *F. M. Sobreira* 52 (HUNEB); *Ibidem*, 454 m, 06°59'35.7"S, 38°28'41.0"W, 23 May 2015, *F. M. Sobreira* 53 (ACAM).

This species can be recognized especially by prostrate habit, asymmetric leaf blade, accrescent calyx, and truncate sepals.

10. *Sida urens* L., Syst. Nat. (ed. 10) 2: 1145. 1759. TYPE: Jamaica, without locality noted, *s.d.*, *P. Browne s.n.* (Holotype: LINN-866.20).

Distribution and habitat: this species is widely distributed in the tropical regions of the Americas and Africa and has been reported for Madagascar and temperate regions of the United States (Fuentes, 1993; W³Tropicos, 2017). In Brazil, it occurs in the northern (Amazonas, Rondônia), northeastern (Alagoas, Bahia, and Pernambuco), central-western (Federal District, Goiás, and Mato Grosso do Sul), southeastern (Minas Gerais, Rio de Janeiro, and São Paulo), and southern (Paraná, Rio Grande do Sul, and Santa Catarina) regions, associated with the Amazonian, Cerrado, Atlantic Forest, Pampa, and Pantanal domains, including anthropic areas (*Flora do Brasil 2020*, in progress.).

Phenology: found flowering and fruiting in July.

Additional specimens examined: BRAZIL. Paraíba state: Areia, 31 July 2006, *M. F. Mata s.n.* (EAN [12112]).

According to Fuentes (1993), this species is characterized by having smooth mericarps and obtrulate sepals.

11. *Sidastrum micranthum* (A. St.-Hil.) Fryxell, Brittonia 30(4): 452. 1978.

Basionym: *Sida micrantha* A. St.-Hil. (1827: 190). TYPE: CUBA. Without locality noted 1860–1864, *C. Wright* 2048 (Isotype: MO, photograph). Fig. 2F.

Distribution and habitat: this species occurs in South America, being encountered in Venezuela, Bolivia, and Brazil. In Brazil, it was encountered in the northeastern (Alagoas, Bahia, Ceará, Piauí, and Sergipe), central-western (Goiás), southeastern (Minas Gerais, Rio de Janeiro, and São Paulo), and southern (Paraná) regions, associated with the Caatinga, Cerrado, Atlantic Forest, and Pantanal domains, including anthropic areas (*Flora do Brasil 2020*, in progress).

Phenology: found flowering in April, June, and July, and fruiting in June.

Additional specimens examined: BRAZIL. Paraíba state: Alagoa Grande, 26 April 1959, *J. C. Moraes s.n.* (EAN 2052); Araruna, 27 June 2014, *S. Pordeus* 20 (ACAM); Areia, 18 July 1986, *G. V. Dornelas* 241 (EAN).

This species has diminutive flowers united in panicles of glomerules, thus differing from the other species of Malvoideae (Amorim et al., 2009). It differs from the other species of *Sidastrum* encountered in the study area by having a light-yellow to salmon corolla, and yellow staminate tube.

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