



An update on *Acalypha inselbergensis* Cardiel & I. Montero (Euphorbiaceae): a recently described species from Brazil

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Abstract

Acalypha inselbergensis Cardiel & I. Montero is newly recorded in 38 localities from the Brazilian states of Alagoas, Bahia, Pernambuco, and Sergipe. In addition, first photographs *in situ*, a distribution map, phenology data, conservation status, and a key to *A. inselbergensis* and related species from Northeastern Brazil are provided.

Keywords

Acalyphoideae, glandular trichomes, new records, taxonomy.

Academic editor: Marcelo Trovó | Received 6 April 2020 | Accepted 21 July 2020 | Published 31 July 2020

Citation: Maciel-Júnior L, Cardiel JM, Rossine Y, Athiê-Souza SM, de Melo AL (2020) An update on *Acalypha inselbergensis* Cardiel & I. Montero (Euphorbiaceae): a recently described species from Brazil. Check List 16 (4): 957–961. <https://doi.org/10.15560/16.4.957>

Introduction

Acalypha L. (Euphorbiaceae, Acalyphoideae) appears among the most numerous genera in Euphorbiaceae, with approximately 500 species (Cardiel and Muñoz-Rodríguez 2012). The genus is distributed mainly in the Pantropical region, with only a few species inhabiting in temperate zones, and the Neotropical region holding about 60% of the representatives (Martínez-Gordillo et al. 2002; Steinmann 2002; Cardiel et al. 2013). In Brazil, 53 species are known, 31 of them endemic (BFG 2015).

Despite being considered a natural and well-defined genus, it is still poorly known taxonomically (Cardiel and Muñoz-Rodríguez 2012). This lack of detailed information concerning *Acalypha* L. is longstanding, and largely linked to the absence of recent revisions of that group—resulting in difficulties on recognizing the

species, diversity, and geographic distribution data. The most comprehensive study of *Acalypha* in Brazil is the Flora Brasiliensis (Müller 1874), which recorded 36 species for this genus. Since then, new taxa have been added in isolated studies (e.g. Ridley 1890; Ule 1908; Pax and Hoffmann 1924; Allem and Irgang 1976; Allem and Waechter 1977; Cardiel et al. 2018; Sousa et al. 2019).

Acalypha inselbergensis Cardiel & I. Montero, a recently described species (Cardiel et al. 2018), can exemplify the consequences of the scarcity of taxonomic information, and the lack of experts working with the genus in Brazil. The species was described based only on the type collection from Pernambuco, in the Northeastern region of Brazil. However, during the taxonomic revision of the *Acalypha* species occurring in Northeastern

Brazil (Barros-Júnior 2018), a significant number of exsiccates have shown to have a set of compatible morphological characteristics with *A. inselbergensis*.

The present study brings numerous new records for *A. inselbergensis*, information on the habitat and conservation status, first photographs *in situ*, a distribution map, and phenology data. We also provide a key to identify *A. inselbergensis* and related species occurring in Northeastern Brazil.

Methods

The study was based on the analysis of field populations, and specimens from ALCB, HESBRA (not indexed), HRB, HST, HUEFS, HVASF, LZ, MAC, MOSS, PEUFR, RB, ROST, UB, and UFP herbaria [acronyms follow Thiers (2019)]. Vouchers were deposited in HESBRA (Unidade Acadêmica de Serra Talhada, Universidade Federal Rural de Pernambuco, Brazil). Relevant bibliography (e.g. Müller 1874; Cardiel et al. 2018) and images of types collections available on the JSTOR Global Plants (<https://plants.jstor.org/>) were used for identification, comparison, and confirmation of the taxa. The

terminologies of Lawrence (1973), Radford et al. (1974), and Simpson (2006) were used for standardization of the morphological terms in the description. Information of geographic distribution, habitat, and phenology is based in the fieldwork and data from exsiccate labels.

The conservation status is following the criteria proposed by the IUCN Red List, Version 3.1 (IUCN 2012) and implemented in the tool Geocat (<http://geocat.kew.org/>) according to Bachman et al. (2011). The distribution map was produced using the Quantum Geographic Information System (QGIS) version 2.18 (QGIS Development Team 2016).

Results

Acalypha inselbergensis Cardiel & I. Montero,
Phytotaxa 356 (2): 158–166. 2018.

Figures 1, 2

Type. Brazil. Pernambuco, Brejo da Madre de Deus municipality, rock outcrop at the north shore of the Sitio Oítis dam, 560 m; 08°05.306'S, 036°22.909'W; 16 Dec. 1999;



Figure 1. *Acalypha inselbergensis*. **A.** Habit. **B.** Detail of the leaf. **C.** Branch with solitary pistillate bract. **D.** Branch with bisexual inflorescence.

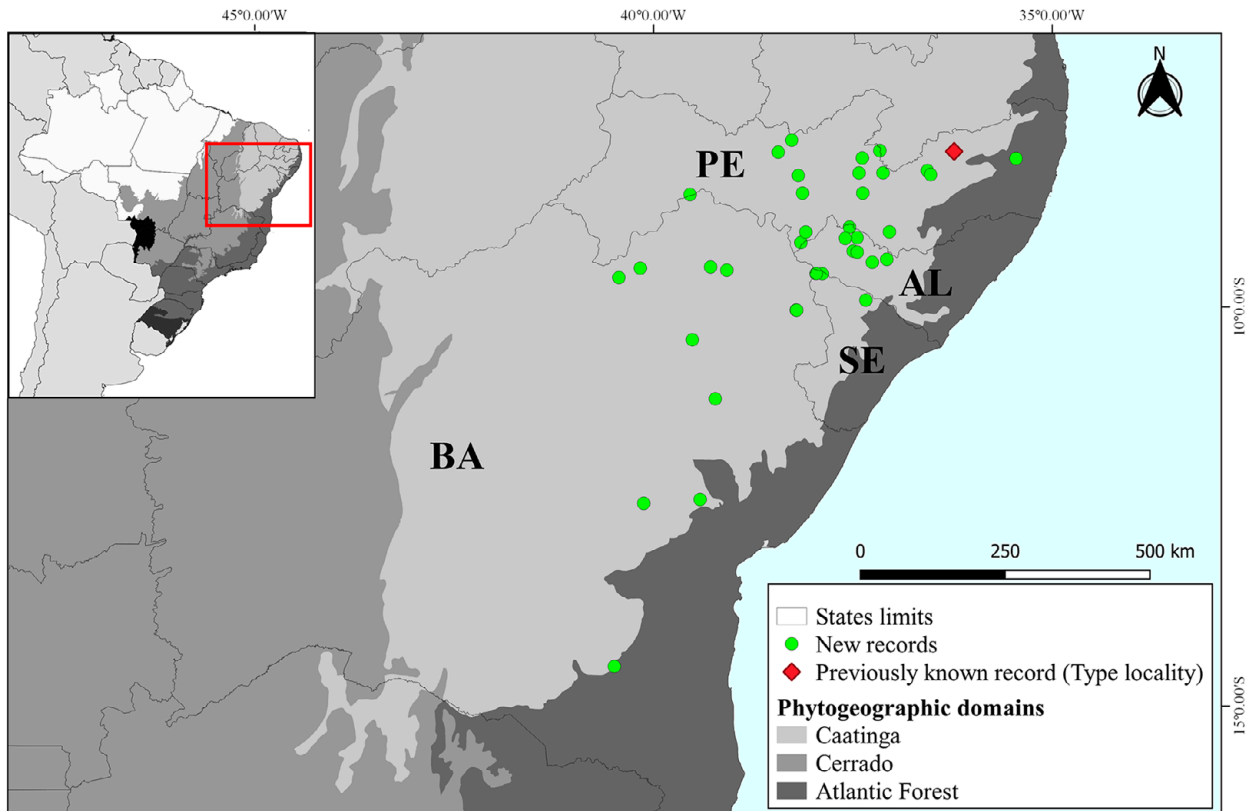


Figure 2. Distribution map of *Acalypha inselbergensis*. The green circles represent the new records, and the red rhombus represent the previously known record. State abbreviations: AL = Alagoas, BA = Bahia, PE = Pernambuco, and SE = Sergipe.

L. Krause & A. Liebig 276 (holotype, RB 00752960S!; isotypes LZ; PEUFR 30024!; ROST; S 11-29219!).

New records/material examined. BRAZIL • state of Alagoas, Água Branca, Fazenda Cobras; 09°16'13"S, 037°54'13"W; 24 Mar. 2006; fl.; *R. P. Lyra-Lemos et al.* 9316 (MAC 24275). • Batalha, margens do Rio Traipu; 09°40'40"S, 037°07'29"W; 21 Feb. 2009; fl., fr.; *Chagas-Mota* 2091 (MAC 36721). • Inhapi, Serra do Grude; 09°13'25"S, 037°44'55"W; 23 Apr. 2009; fl., fr.; *Chagas-Mota & L. M. Leão* 3045 (MAC 38333). • Olho d'Água do Casado, Fazenda Capelinha; 09°30'08"S, 037°49'46"W; 27 Sep. 1999; fl.; *R. A. Silva & D. Moura* 1110 (PEUFR 38220). • Pão de Açúcar, Mata da Onça; 09°44'11"S, 37°25'58"W; 04 May 2002; fl.; *R. P. Lyra-Lemos* 6665 (MAC 16080). • Pariconha, Serra do Engenho, 09°14'17"S, 037°59'48"W; 27 May. 2007; fl., fr.; *R. P. Lyra-Lemos et al.* 10403 (MAC 30255). • Piranhas, Área de Canyon; 09°31'39"S, 037°44'36"W; 29 Jul. 1999; fl.; *R. A. Silva & D. Moura* 725 (PEUFR 38670). • state of Bahia, Canudos; 09°54'00"S, 39°08'00"W; 10 May 2003; fl.; *A. Rodarte* 129 (ALCB 66789). • Curaçá, Fazenda Tanquinho; 08°59'31"S, 039°54'15"W, 11 Aug. 1983; fl.; *S. B. da Silva & G. C. P. Pinto* 315 (HRB 13475). • Glória; 09°19'38"S, 038°15'05"W; 26 Apr. 2001; fl.; *L. P. Queiroz et al.* 6557 (HST 19682). • Iaçu, Fazenda Lapa; 12°46'04"S, 040°12'27"W; 26 Feb. 1983; fl., fr.; *G. C. P. Pinto* 150 (HRB 11664). • Itatim, Morro do Agenor; 12°41'28"S, 039°41'49"W; 26 Nov. 1995; fl., fr.; *F. França et al.* 1457 (UB 150376). • Itiúba, Fazenda Experimental da EPABA; 10°41'19"S, 039°51'24"W; 26 May 1983; fl.;

H. P. Bautista & G. C. P. Pinto 748 (HRB 11104). • Jeremoabo; 10°04'14"S, 038°20'41"W; 13 May 1981; fl.; *L. M. C. Gonçalves* 43 (HRB 2939). • Jeremoabo; 10°04'00"S, 038°21'00"W; 20 Jan. 2006; fl.; *G. C. Sessegolo et al.* 225 (ALCB 75227). • Juazeiro, entroncamento de Juazeiro-Caraíba; 09°63'33"S, 040°43'33"W; 08 Aug. 1985; fl., fr.; *G. Fotius* 4103 (HUEFS 168000). • Massaroca, próximo a localidade Flamengo; 09°51'51"S, 040°16'55"W; 18 Jan. 1980; fl.; *O. F. de Oliveira* 788 (MOSS 1328). • Santaluz; 11°15'06"S, 039°22'40"W; 27 Mar. 2010; fl.; *E. P. Queiroz* 4398 (HRB 58990). • Santa Brígida; 09°44'34"S, 038°04'58"W; 27 Nov. 2009; fl.; *E. Melo et al.* 7250 (HUEFS 157602). • Uauá, Serra do Jerônimo; 09°50'00"S, 039°28'42"W; 30 Mar. 2000; fl.; *M. R. Fonseca et al.* 1355 (HRB 42998). • Vitória da Conquista, Flamengo, Fazenda Flamengo; 14°50'33"S, 040°49'10"W, 27 Feb. 1968; fl., fr.; *I. Pontual* 775 (PEUFR 2297). • state of Pernambuco, Águas Belas, Mata da Serra do Comunaty; 09°06'05"S, 037°04'06"W; 20 Jul. 2007; fl., fr.; *G. T. Soldadi et al.* 113 (PEUFR 49496). • Bezerros, Parque Municipal de Serra Negra; 08°14'17"S, 035°45'25"W; 12 Apr. 1995; fl.; *M. Oliveira et al.* 28 (PEUFR 20043). • Buíque, Parque Nacional do Catimbau, 08°32'03"S, 037°12'05"W; 26 Jan 2011, fl.; *M. Oliveira & C. F. Fonseca* 5454 (HESBRA 177). • Custódia, área do PISF, próximo ao Reservatório Copoti; 08°13'54"S, 037°38'16"W; 15 Apr. 2009, fl., fr.; *M. Oliveira & J. G. Carvalho-Sobrinho* 2124 (HESBRA 337). • Floresta, Fazenda Jatobá; 08°35'39"S, 038°18'32"W; 16 Nov. 2011, fl.; *F. F. S. Silva et al.* 523 (HESBRA). • Ibitimir, Fazenda Mandacarú;

08°32'22"S, 037°42'18"W; 16 Feb. 1996; fl., fr.; *M. Oliveira et al.* 184 (PEUFR 22162). • Manari, Povoado Aguardinho; 08°57'51"S, 037°37'48"W; 22 Aug. 2012; fl., fr.; *A. C. P. Oliveira et al.* 1497 (HVASF 16932). • Mirandiba, Serra das Amburanas; 08°06'17"S, 038°43'47"W; 10 Feb. 2007; fl., fr.; *M. F. A. Lucena et al.* 1685 (UFP 46967). • Pedra; 08°29'25"S, 036°56'49"W; 09 Mar. 2007; fl.; *L. Lima & J. S. Silva* 9 (PEUFR 49896). • Petrolândia, Tacaicó, 08°57'51"S, 038°13'11"W; 29 Jan 2009, fl.; *V. D. Silva et al.* 95 (HESBRA 336). • Serra Talhada, povoado de serrinha; 07°91'15"S, 038°26'60"W; 17 Aug. 2012; fl.; *N. M. Almeida & R. A. Cavalcante* 85 (HVASF 16531). • Sertânia, Ramal Agreste; 008°04'28"S, 37°16'04"W; 31 Jan. 2014; fl.; *A. C. P. Oliveira et al.* 3115 (HVASF 22034). • Tacaratu, estrada para Tacaicó; 09°06'20"S, 038°09'00"W; 15 Jan. 2009; fl., fr.; *J. G. Carvalho-Sobrinho et al.* 1823 (HVASF 2937). • Venturosa, Parque Municipal Pedra Furada; 08°34'29"S, 036°52'26"W; 16 Apr. 2010; fl.; *P. Gomes et al.* 402 (UFP 55235). • state of Sergipe, Canindé do São Francisco, Fazenda Brejo; 09°58'52"S, 037°88'26"W; 2 Jun. 1999; fl., fr.; *D. Moura* 312 (PEUFR 38674). • Curitiba, Fazenda Cana Brava; 09°58'37"S, 037°96'04"W; 3 Dec. 1999; fl., fr.; *R. A. Silva & D. C. Moura* 1008 (UFP 28447). • Porto da Folha, Fazenda São Pedro; 09°91'59"S, 037°33'70"W; 20 Jul. 2006; fl.; *M. F. A. Lucena et al.* 1523 (UFP 46971).

The present study shows new records of this species for 38 localities in the states of Alagoas, Bahia, Pernambuco, and Sergipe, restricted to the Seasonally Dry Tropical Forests and Woodlands (SDTFW; Caatinga domain) of these four states (Fig. 2). Especially in Pernambuco state, this species occurs in conservation areas namely, Serra Negra Municipal Park, Catimbau National Park, and Pedra do Cachorro Private Reserve of National Heritage. The taxon was recorded from sandy or clayey soils, of shrub-tree vegetation, on rocky outcrops, and in disturbed areas. The significant number of specimens of *Acalypha inselbergensis* found during our study allowed us to evaluate for the first time its conservation status and provide information about their flowering and fruiting (Cardiel et al. 2018). According to the criteria established by the IUCN (2012), *A. inselbergensis* is in the low risk category, Least Concern, because the species has an extent of occurrence of 157,850,931 km² and occurs in 39 localities belonging to four states of Brazil, including the protected areas mentioned above. The species was recorded with flowers and fruits throughout of the year.

Identification. Shrubs 0.5–4 m high; monoecious. Branches green or dark brown; young branches with glandular sessile trichomes, rarely interspersed with simple trichomes, puberulent; mature branches glabrous, lenticelate. Stipules 2–3 mm long, triangular, with glandular sessile trichomes. Petioles 6–26 (–45) mm long, angular, with sessile glandular trichomes, rarely interspersed with simple trichomes, puberulent. Leaf blades 20–65 × 10–35 mm, ovate-lanceolate to triangular-lanceolate, thin-membranaceous; base obtuse to subcordate;

apex acuminate; margin crenate; both surfaces with sessile glandular trichomes, rarely simple, puberulent on veins; palmately veined, primary veins 5. Inflorescences axillary, bisexual, 1–3 pistillate bracts, and solitary staminate bracts. Bisexual inflorescences 20–55 mm long, with staminate flowers in upper position; peduncle 0.5–1 mm long; staminate portion 16–50 mm long, bracts 1 mm long, elliptical, base and apex obtuse, with glandular sessile trichomes; pistillate portion 5–8 mm long, bracts 1–3, reniform, 4–5 mm long, margin entire, base cordate, with sessile glandular trichomes, 1–3 flowered. Solitary pistillate bract with peduncle c. 0.5 mm long. Staminate flowers pedicellate, sepals 4, ovate, puberulent, with simple trichomes. Pistillate flowers sessile; sepals 3, ovate, ciliated, with sessile glandular trichomes; ovary 1–1.5 × 1–2 mm, muricate, puberulent, with glandular stipitate trichomes, and rarely simple trichomes; styles 5 mm long, lacinated into 27–30 segments. Fruit capsular, trilobate, 1–2 × 2–2.5 mm, muricated, with stipitate glandular trichomes, rarely simple trichomes, and puberulent. Seeds ovoid, ca 1 × 1 mm, carunculate, foveolate, dark brown.

Discussion

Acalypha inselbergensis was described only from the type location in the northeast of Pernambuco, on a granitic rock outcrops (inselbergs) at 560 m (Cardiel et al. 2018). The present study shows that this species has a much wider distribution in the Caatinga Domain (SDTFW) and that it is recorded in different substrates, such as in sandy or clayey soils, and also in disturbed areas.

Acalypha inselbergensis can be confused with *A. amblyodonta* (Müll. Arg.) Müll. Arg., although this species differs by the lack of exudate, leaves and branches with simple trichomes, opaque, and dentate pistillate bract (vs. with exudate, leaves and branches with glandular trichomes, shiny and entire pistillate bract in *A. inselbergensis*) (Cardiel et al. 2018). *Acalypha inselbergensis* is also morphologically close to *A. brasiliensis* Müll. Arg., since both have oval-lanceolate leaf blades, palmately veined, bisexual inflorescence, and pistillate flowers 1–3 per bract. However, they are mainly differentiated by the simple and/or stellate trichomes in the branches and leaves, and trichomes with stipitate glands in the bracts, in *A. brasiliensis*, while *A. inselbergensis* has sessile glandular trichomes, which expel secretes a large amount of viscous substance on the surface of almost all structures vegetative and floral.

Although glandular trichomes are relatively common in *Acalypha*, the morphological type found in *A. inselbergensis* seems outstanding, because it is sessile, generally globose, and viscous. The presence of a viscous substance covering the entire plant also occurs in *Acalypha gummifera* Lundell, which is a Central American species with lanceolate leaf blades, and pistillate flowers pedicellate, with 5 sepals. Although not yet recorded in

the literature for *Acalypha* (Baillon 1858; Müller 1874; Pax and Hoffmann 1924), sessile glandular trichomes are found in Malvaceae (e.g. *Herissantia crispa* (L.) Brizicky and *Hibiscus tiliaceus* L.), being also considered as a taxonomic characteristic (Fahn 1979). Usually glandular trichomes have the function of protecting against herbivory, reflecting light, protecting structures or organs in development, reducing transpiration and water retention (Fahn 1979). It is possible that in *A. inselbergensis* this type of trichome has also some of the functions aforementioned, since it occurs in Caatinga domain.

Identification key for *Acalypha inselbergensis* and similar Northeast Brazil species

1. Leaves glabrous or subglabrous; staminate bract triangular; some staminate inflorescences terminal
..... *A. multicaulis* Müll. Arg.
- 1'. Leaves with simple, stellate or glandular sessile trichomes; staminate bracts elliptical or lanceolate; all staminate inflorescences axillary 2
2. Leaves and fruits with stellate trichomes
..... *A. brasiliensis* Müll. Arg.
- 2'. Leaves and fruits with simple or glandular trichomes 3
3. Leaves and branches with simple trichomes, opaque; pistillate bracts with dentate margin
..... *A. amblyodonta* (Müll. Arg.) Müll. Arg.
- 3'. Leaves and branches with glandular trichomes, shiny; pistillate bracts with entire margins
..... *A. inselbergensis* Cardiel & I. Montero

Acknowledgements

We thank the curators of the herbaria who lent specimens or supported the visitation of their collections. We are grateful to the National Council for Scientific and Technological Development for granting the master's scholarship of the first and third authors.

Authors' Contributions

LMJ and ALM designed the study and collected data. All authors examined the data and discussed the results. YR, JMC, and SMAS wrote the manuscript. All authors reviewed the manuscript.

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