




Faramea baturitensis (Rubiaceae: Coussareeae), a new species from “Serra de Baturité,” Northeast Brazil

Jomar Gomes Jardim^{1,2*} , Elnatan Bezerra de Souza³  and Maria Iracema Bezerra Loiola⁴ 

Received: June 20, 2020

Accepted: October 12, 2020

ABSTRACT

As part of an ongoing study of the taxonomy and systematics of Rubiaceae of the state of Ceará, Brazil, a new species, *Faramea baturitensis*, is here recognized, described, and illustrated. The new species occurs in “Serra de Baturité,” a relic of the Atlantic Forest. Detailed data on the distribution, habitat, phenology, and conservation status of the new species, as well as a key to species of *Faramea* in Ceará, are provided.

Keywords: Atlantic Forest, endemism, floristics, Rubioideae, taxonomy

Introduction

Faramea (Rubiaceae, tribe Coussareeae) is a neotropical genus with c. 150 species distributed from Mexico to northern Argentina (Taylor *et al.* 2004), with records of 90 species for Brazil, of which c. 59% (53 spp.) are endemic. There are records of 18 species for the Northeast Region of Brazil, but only four species are cited for the state of Ceará (BFG 2015; 2018).

Faramea is generally associated with the rainforest understory and is well represented in the Atlantic Forest of eastern Brazil (Jardim & Zappi 2008). Its representatives are characterized by the following: branches horizontal, stems flattened and often costate along the internodes; leaves opposite, distichous, generally vinaceous to lilac when young; stipules entire, generally aristate; flowers tetramerous, calyx tube often developed, corolla usually blue, violet, vinaceous or white, with valvate aestivation; fruits drupaceous, spherical, globose to reniform, pyrene with rigid to papery wall, a raphal pore, a single seed, and

lateral embryo inserted in a cartilaginous endosperm (Taylor & Jardim 2020).

As part of our study of Rubiaceae of the Northeast Region of Brazil, and the “Flora do Ceará: saber para conservar” project, a new species of *Faramea* is here proposed and illustrated.

Materials and methods

The study was based on field observations and a comparative analysis of morphological characters of specimens from the CEPEC, EAC, HUEFS, HUVA and UFRN herbaria (acronyms according to Thiers, continuously updated), literature, and photos of type collections.

Geographic distribution data were obtained from specimen labels. General descriptive terminology follows Radford *et al.* (1974). The illustrations were made from material deposited at EAC and photographs. The conservation status was informally evaluated based on IUCN Red List Categories and Criteria, Version 14 (IUCN 2019).

¹ Centro de Formação em Ciências Agroflorestais, Universidade Federal do Sul da Bahia, 45613-204, Itabuna, BA, Brazil

² Herbarium Centro de Pesquisas do Cacau – CEPEC/ CEPLAC, 45604-811, Itabuna, BA, Brazil

³ Curso de Ciências Biológicas, Universidade Estadual Vale do Acaraú, 62040-370, Sobral, CE, Brazil

⁴ Departamento de Biologia, Universidade Federal do Ceará, 60440-900, Fortaleza, CE, Brazil

* Corresponding author: j.jardim@yahoo.com.br



Characterization of “Serra de Baturité”

The study area is part of “Serra de Baturité,” a relic of the Atlantic Forest in the semiarid region in the state of Ceará, Brazil (Tabarelli & Santos 2004). The Baturité Massif covers 13 municipalities and is approximately 100 km from Fortaleza (PDITS 2014). It is formed by crystalline basement rocks from the Precambrian and is a mountainous region with an average annual rainfall ranging from 500 to 1,500 mm and humid tropical climate (Bastos *et al.* 2017).

Results and discussion

Taxonomic treatment

Faramea baturitensis J.G. Jardim, sp. nov. Type: BRAZIL. CEARÁ: Mun. Guaramiranga. Serra de Baturité. Sítio Sinimbú, 04°17'49.8" S – 38°55'59" W, 695 m, 11/II/2003, fl., A.P. Silveira 730 & R.F. Oliveira (Holotype: EAC!). (Figs. 1, 2).

Faramea baturitensis is similar to *Faramea hyacinthina* but can be distinguished from it by the generally tree habit with a trunk 5–10 cm diam. (*vs.* shrubby habit with trunk up to

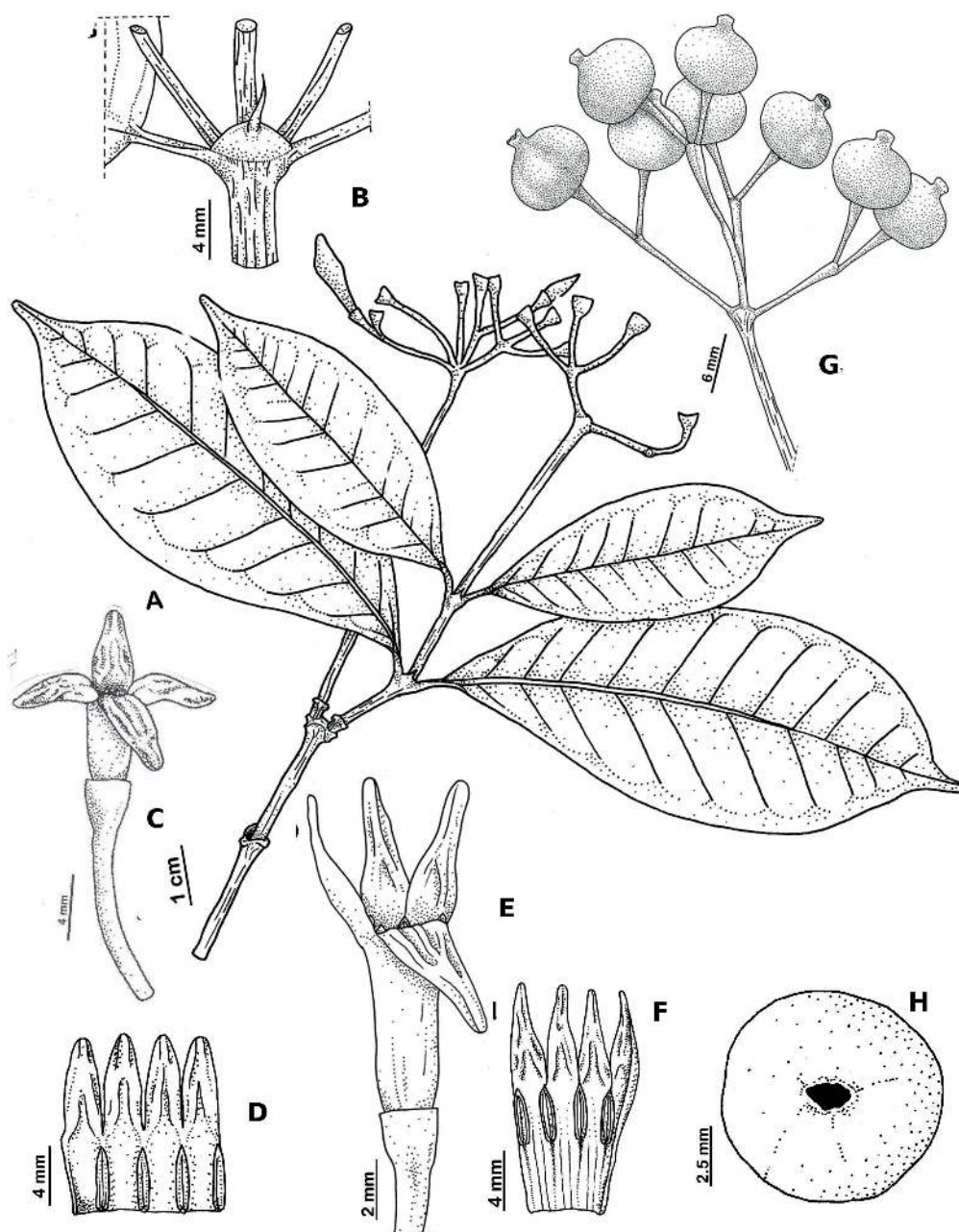


Figure 1. A-I. *Faramea baturitensis* (Silveira 730). **A.** Flowering branch; **B.** Stipule; **C-D.** Short-styled flower, **C.** Flower at anthesis, **D.** Open corolla; **E-F.** Long-styled flower, **E.** Flower at anthesis, **F.** Open corolla; **G.** Infructescence; **H.** Pyrene, ventral view. (Drawn by Guilherme Rodrigues.)

4 cm diam.), occurrence in ombrophilous forest (*vs.* occurrence in semideciduous forest), usually larger petioles (0.3–1.2 *vs.* 0.2–0.6 cm long) and leaf blades ([5–]8.5–15[–22] *vs.* [–5]8–10[–12] cm long), absence of marginal venation (*vs.* presence of marginal venation that is scarios margin when dry), and calyx with hyaline papillae at the apex (*vs.* calyx without papillae), respectively.

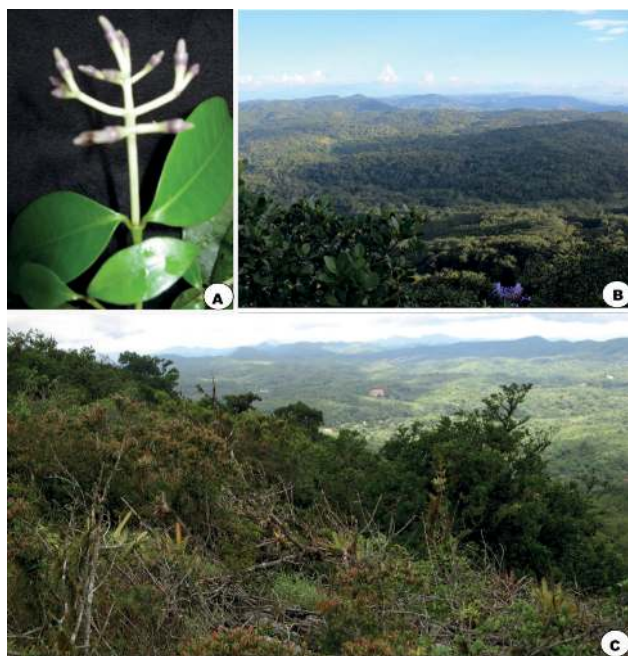


Figure 2. A–C. Habitat and field photo of *Faramaea baturitensis*, Guaramiranga, Ceará State, Brazil. A. Branch with bud; B. Partial view of habitat: fragments of the ombrophilous forest; C. Habitat degradation due to cutting vegetation. (A. by J. Jardim; B. by V.S. Sampaio; C. by E.B. Souza.)

Treelets to trees, (3–)5–10 m tall, trunk 5–10 cm diam., lateral branches \pm parallel, distally flattened at the apex to second internode, glabrous. Stipules mostly deciduous from the third node, limb triangular, 3–5 mm long, scarios, colleters inserted internally, sheath connate at the base, terminal arista (2–)4–6 mm long, decurrent. Leaves: petioles 3–12 mm long; leaf blades (5–)8.5–15(–22) \times (3–)4–5.5(–10) cm, obovate to oblanceolate, coriaceous, base attenuate, apex cuspidate, margin entire; secondary veins 7–12 on each side, visible abaxially and adaxially. Inflorescences terminal, thyrsoïd, 4–5-radiate, peduncles (1–)3–7.5 cm long, bracts foliaceous, 4–6 \times 1.2–3.5 cm, bracteoles inconspicuous. Flowers heterostylous, anthesis diurnal, calyx tube 1.3–2 mm long, truncate to shortly toothed, without colleters internally, externally with hyaline papillae at apex; corolla 12–20 mm long, blue, hypocrateriform, lobes reflexed, carnos; long-styled flowers: corolla tube 7–9(–13) mm long, lobes 5–6 mm long; short-styled flowers: corolla tube 8–10(–11) mm long, lobes 5–7 mm long; stamens inserted in the upper 1/3 of the tube, filaments 4–5 mm long, anthers 2.5–3 mm long; style 9–10 mm long in long-styled flowers,

4–5 mm long in short-styled flowers; stigmas 1–2 mm long, internally papillose; nectar disk cylindrical. Fruits 5–7(–9) \times 6–7(–11) mm, oblate, pedicel 0.4–12 mm long, thickening towards the apex, calyx tube 1.2–2 mm long, persistent, pericarp blue to blackish when ripe, smooth; pyrene 10–12 \times 8–9 mm, oblate, smooth to rugose, pre-germination orifice 2 \times 3 mm; seed c. 8 \times 10 mm, oblate, testa slightly rugose.

Phenology: Flowering specimens have been collected in January, March, April, and May, and fruiting specimens have been collected in February, May, and October.

Distribution and habitat: The species is known only from “Serra de Baturité” (Figs. 2B, 3) and is generally a small tree in the understory of ombrophilous forest fragments at 600–1000 m elevation. In contrast, the similar species *Faramaea hyacinthina* is widely distributed in the Atlantic Forest (from Sergipe State to Paraná State) and usually associated with semideciduous forest (BFG 2018).

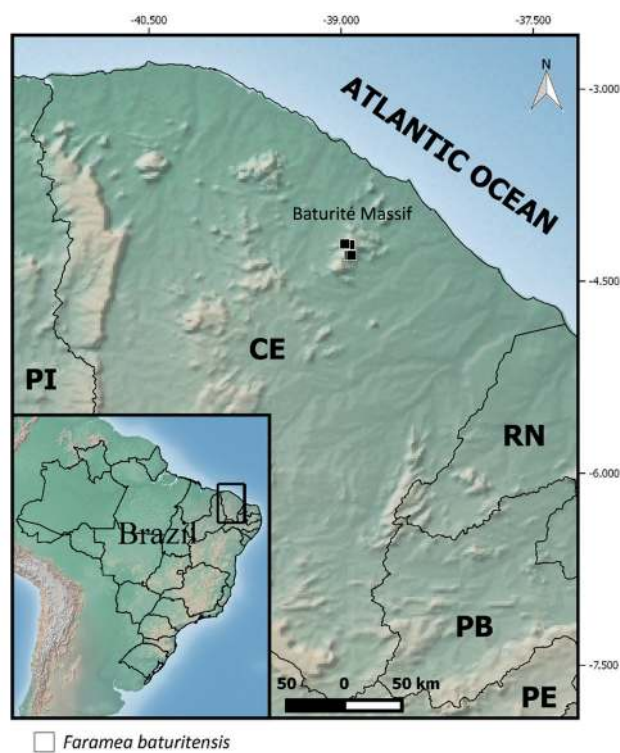


Figure 3. Distribution of *Faramaea baturitensis*, Ceará State (Baturité Massif), Brazil. Legend: states of PI=Piauí, CE=Ceará, RN=Rio Grande do Norte, PB=Paraíba and PE=Pernambuco.

Etymology: The specific epithet refers to the occurrence of the species in “Serra de Baturité,” Ceará State, Brazil.

Remarks: The new species resembles *Faramaea hyacinthina*, due to its terminal inflorescences and flowers with a blue corolla and a relatively long calyx tube, but can be distinguished from it by the following set of characteristics: tree habit within ombrophilous forest (*vs.* shrubby habit within semideciduous forest), usually larger leaf blades (8.5–15[–20] *vs.* [–5]8–10[–12] cm long) without marginal venation (*vs.* with marginal venation that scarios

margin when dry), thyrsoid inflorescence (4–5-radiate) (*vs.* dichasial), usually reduced pedicels (0.4–12 mm long) thickened towards the apex when in fruit (*vs.* long pedicels [10–20 cm long] with a similar diameter throughout when in fruit), and calyx shorter in fruit (1.2–2 mm long), with hyaline papillae at apex (*vs.* calyx longer in fruit [2–4 mm long], without papillae), respectively.

Conservation status: *Faramea baturitensis* is known only from collections made in “Serra de Barurité,” Ceará. The Baturité Massif is known for its small farms and extensive tourism on private properties, which are used as leisure areas. Due to real estate development, at higher elevations its natural vegetation is reduced to small forest fragments. The area includes eight municipalities and is part of the “Área de Proteção Ambiental - APA Serra de Baturité,” an open conservation unit that allows the sustainable use of land for agriculture and construction. In the short to medium term, habitat destruction (Fig. 2C) and a restricted area of occurrence may lead to a decrease in the populations of this species. The extent of occurrence (EOO) of the species was estimated to be 26,442 km², which qualifies it for the Critically Endangered (CR) category, while the area of occupancy (AOO) was estimated to be 20,000 km², which qualifies it for the Endangered (EN) category (Bachman *et al.* 2011; IUCN 2019). According to this data, the above

information and IUCN (2019) criteria, *F. baturitensis* would be classified as Endangered (EN): B2 a, i, ii, iii in an official IUCN Red List assessment.

Representative specimens examined (paratypes): **BRAZIL. Ceará:** Baturité, Sítio Taveira, 04°17'54.3" S – 38°55'10.4" W, 600 m, 10/III/2009, fl., *Gomes et al.* 1003-5 (EAC, UFRN); Guaramiranga, Remanso, 26/III/2008, fl., *Silveira & Lima s.n.* (EAC 42796; HUVA 12926); 2/V/1998, fr., *Castro* 567 (EAC); Pico Alto, 14/III/2014, fl., buds, *Jardim* 6584 (UFRN, HUEFS, HUVA); 15/VI/1997, sterile, *Figueiredo* 915 (EAC); Sítio Arvoredo, 04°13'05" S – 38°55'54.5" W, 935 m, 10/VII/2002, sterile, *Silveira & Oliveira* 106 (EAC); 12/II/2003, fr., *Silveira & Oliveira* 773 (EAC); Sítio Cana Brava, Morro das Pedrinhas, 960 m, 15/V/1993, fl., buds, *Oliveira & Araújo* 96 (EAC); 6/I/1994, sterile, *Oliveira* 258 (EAC); 17/IV/1994, fl., *Figueiredo s.n.* (EAC 21735); 21/V/1994, fr., *Oliveira* 511 (EAC); 6/I/1993, sterile, *Oliveira* 293 (EAC); Sítio Lagoa, 13/IV/2004, fl., *Gomes & Xavier* 1304-2 (EAC, UFRN); Sítio Mucunã, 7/I/1989, fl., *Figueiredo s.n.* (EAC 17017); 12/V/2004, sterile, *Gomes et al.* 943-3 (EAC); 12/V/2004, fr., *Gomes et al.* 1205-3 (EAC, UFRN); 12/V/2004, fl., *Gomes et al.* 621-3 (EAC); Pacoti, Sítio Santa Madalena, 9/X/1980, fr., *Martins & Nunes s.n.* (EAC 8966); 04°13' S – 38°54' W, 800-900 m, 20.II.2016, buds, *Figueiredo* 2482 (CEPEC, HUVA).

Key to *Faramea* species in Ceará State

1. Stipule sheath fully fused, forming a tube around the stem, edges short (1–2 mm long); corolla infundibuliform..... ***F. multiflora***
- 1'. Stipule sheath free or fused only at the base, not forming a tube around the stem, aristas generally > 2 mm long; corolla hypocrateriform.
2. Inflorescence thyrsoid, multiflorous (+ 40 flowers), corolla lilac..... ***F. stipulacea***
- 2'. Inflorescence a dichasium (up to 20 flowers), corolla blue or white.
3. Leaf blades generally large ([5–] 8.5–15[–22] cm long); corolla blue; fruits large (10–12 × 8–9 mm)..... ***F. baturitensis***
- 3'. Leaf blades reduced (5–7 cm long); corolla white; fruits reduced (6–8 × 4–5 mm).
4. Leaves sessile to subsessile (0.5–2 mm long), margin revolute, marginal venation present; calyx tube short (1–2 mm long). ***F. nitida***
- 4'. Leaves petiolate (4–8 mm long), margin flat, marginal venation absent; calyx tube long (≥ 3 mm). ***F. truncata***

Acknowledgements

We are grateful to the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) for funding the fieldwork through its PPBio-Semiarid Project (457427/2012-4) and the curators and staff of the CEPEC, EAC, HUEFS, HUVA and UFRN herbaria for access and facilities. Thanks to Pedro Eisenlohr (editor-in-chief) and the anonymous reviewers for substantially improving the quality of the manuscript. EBS thanks the FUNCAP for the financial support (BP3-0139-00252.01.00/18) and JGJ (312739/2019-2) and MIBL (304099/2017-1) thank CNPq for the research grants.

References

- Bachman S, Moat J, Hill AW, Torre J, Scott B. 2011. Supporting Red List threat assessments with GeoCAT: geospatial conservation assessment tool. *ZooKeys* 150: 117-126.
- Bastos FH, Cordeiro AMN, Silva EV. 2017. Aspectos geoambientais e contribuições para estratégias de planejamento ambiental da Serra de Baturité/CE. *Revista da Associação Nacional de Pós-graduação e Pesquisa em Geografia (Anpege)* 13: 163-198.
- BFG – Brazil Flora Group. 2015. Growing knowledge: An overview of seed plant diversity in Brazil. *Rodriguésia* 66: 1085-1113.
- BFG – Brazil Flora Group. 2018. Brazilian Flora 2020: Innovation and collaboration to meet Target 1 of the Global Strategy for Plant Conservation (GSPC). *Rodriguésia* 69: 1513-1527.
- IUCN – Standards and Petitions Subcommittee. 2019. Guidelines for Using the IUCN Red List Categories and Criteria. Version 14. Prepared by the standards and Petitions subcommittee. <https://www.iucnredlist.org/documents/RedListGuidelines.pdf>



- Jardim JG, Zappi DC. 2008. Two new species of *Faramea* (Rubiaceae, Coussareae) from Eastern Brazil. *Novon: A Journal for Botanical Nomenclature* 18: 67-71.
- PDITS - Plano de Desenvolvimento Integrado do Turismo Sustentável. 2014. Polo Maciço de Baturité, Fortaleza – CE. <https://www.setur.ce.gov.br/wp-content/uploads/sites/59/2018/09/PDITS-macico-baturite-tomo-II.pdf>.
- Radford AE, Dickinson WC, Massey JR, Bell CR. 1974. *Vascular plant systematics*. New York, Harper & Row Publishers.
- Tabarelli M, Santos MMA. 2004. Uma breve descrição sobre a história natural dos brejos nordestinos. In: Porto KC, Cabral JJP, Tabarelli M. (eds.) *Brejos de altitude em Pernambuco e Paraíba: história natural, ecologia e conservação*. Brasília, Ministério do Meio Ambiente. p. 111-122.
- Taylor CM, Jardim JG. 2020. Rubiacearum Americanarum Magna Hama Pars XLVI: New Species and Taxonomic Changes in *Faramea* of Central and South America (Rubiaceae, Coussareae). *Novon: A Journal for Botanical Nomenclature* 28: 108-142.
- Taylor CM, Steyermark JA, Delprete PG, *et al.* 2004. Rubiaceae. In: Steyermark JA, Berry PE, Yatskievych K, Holst BK. (eds.) *Flora of the Venezuelan Guayana*. Vol. 8. St. Louis, Missouri Botanical Garden Press. p. 497-848.
- Thiers B. 2020 (Continuously updated). *Index herbariorum: a global directory of public herbaria and associated staff*. New York Garden's Virtual Herbarium. <http://sweetgum.nybg.org/ih/herbarium.php?irm=174420>. 04 Nov. 2020.

