

The genus *Malanea* Aubl. (Rubiaceae) in the Atlantic Forest of Brazil

Rafaela Sales Pereira Roxo¹, Maria Regina de Vasconcellos Barbosa²

¹ Programa de Pós-Graduação em Biologia Vegetal, Federal University of Pernambuco, Recife, Brazil

² Federal University of Paraíba, João Pessoa, Brazil

Corresponding author: Rafaela Sales Pereira Roxo (rafaela.roxo95@gmail.com)

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Abstract

Background and aims – *Malanea* (Rubiaceae) is a Neotropical genus of ca 40 species, 15 of which occur in Brazil, with nine found in the Atlantic Forest domain. This study aims to present a taxonomic treatment of the species occurring in the Atlantic Forest domain.

Material and methods – We studied collections deposited in 15 Brazilian herbaria, ALCB, BHCN, BHCB, CEPEC, HUEFS, HUFU, IPA, JPB, MAC, OUPR, PEUFR, RFA, RB, UFP, and UFRN, and collections in NY were studied online. Specimens were identified using protologues and digital images of types available online.

Key results – Of the nine species of *Malanea* previously recognized in the Atlantic Forest domain, we accepted seven, six of which are endemic. *Malanea macrophylla* has a wide distribution also occurring in other Brazilian phytogeographic domains, and adjacent countries. We expanded the distribution of four species and identified Bahia as the possible centre of diversity for the group in the domain. In addition, an identification key to the species, detailed descriptions, taxonomic notes, typifications, illustrations, maps of geographic distribution, and assessments of conservation status are provided. The names *Malanea evenosa*, *M. forsteronioides*, *M. macrophylla*, *M. martiana*, and *M. spicata* are here typified. The calculated conservation status revealed three Endangered species, two Vulnerable ones, *M. forsteronioides* as Near Threatened, and *M. macrophylla* with a status of Least Concern.

Keywords

diversity, flora, Guettardeae, neotropics, taxonomy

INTRODUCTION

Malanea Aubl. includes ca 40 Neotropical species that occur from eastern Brazil to northern Bolivia (Taylor 2022). In Brazil, 15 species are currently recognized, present in the Amazon, Cerrado, and Atlantic Forest phytogeographic domains (Barbosa 2020). These species mainly occur in moist or seasonal forests, in areas close to bodies of water. In the Atlantic Forest, nine species are recognized, six of which are endemic to this domain, representing 40% of Brazilian species (Barbosa 2020).

According to molecular phylogenies (Bremer and Eriksson 2009; Pessoa 2016), *Malanea* is a genus in the

tribe Guettardeae whose monophyly is not confirmed. Its representatives are lianas or climbing shrubs with a conspicuous terminal pair of stipules on each branchlet, axillary, paniculate or spiciform inflorescences, sessile flowers, turbinate hypanthium, corolla pubescent in the mouth, and ellipsoid, fusiform or cylindrical drupaceous fruits (Barbosa 2020).

The taxonomic treatment of Müller (1881) is the most comprehensive one of *Malanea* species present in Brazil. In a previous paper, Müller (1875), based on inflorescence type, divided the genus into two sections: *Eumalanea* (= *Malanea*), with paniculate inflorescence (6 spp.), and *Pseudomalanea*, with cymose inflorescence (2 spp.). Later,

he transferred the species of section *Pseudomalanea* to *Chomelia* Jacq (Müller 1881).

In the 20th and 21st centuries, the Brazilian species of *Malanea* were treated only in parts, with focus on other South American countries (Hochreutiner 1910; Standley 1940; Steyermark 1965; Taylor and Steyermark 2004; Amaya 2008; Amaya and Delprete 2010), or in regional treatments in Brazil (Delprete et al. 2005; Barbosa 2007; Taylor et al. 2007; Delprete 2010). Worthy of mentioning are Kirkbride (1997) and Amaya and Popovkin (2012) for the description of new species for the Atlantic Forest in north-eastern Brazil, and Barbosa (2020) for the monograph of the genus for the online Flora of Brazil.

Despite the high number of *Malanea* species endemic to the Atlantic Forest domain, there is no detailed taxonomic treatment of the species that occur there. This paper presents a modern taxonomic treatment of *Malanea* in the Atlantic Forest, with an identification key to the species, detailed descriptions, taxonomic notes, typifications, illustrations, maps of geographic distribution, and conservation status assessments for each species.

MATERIAL AND METHODS

The Atlantic Forest domain extends more than 3,300 km along the Brazilian coast (Morellato and Haddad 2000), from the state of Rio Grande do Norte to the state of Rio Grande do Sul. It is home to native forest formations and associated ecosystems that vary with altitude, longitude, precipitation, and temperature (Moura 2006; Ribeiro et al. 2009; Stehmann 2009). Because of its latitudinal extension and climate variation the Atlantic Forest presents high richness and endemism (Morellato and Haddad 2000).

We define all types of naturally occurring forests of the coastal zone and all restinga and tabuleiro formations, according to Thomas and Barbosa (2008). The forest types were classified as Tropical Moist Forest, Mixed Moist Forest (a subtropical forest, also known as Araucaria Forest), and Seasonal Forest (IBGE 2012). We also included enclaves of submontane and montane forests in the north-east (Brasil 2006).

The present study is based on the analysis of 269 *Malanea* specimens collected in the Atlantic Forest and deposited in ALCB, BHCB, BHZB, CEPEC, HUFU, HUEFS, IPA, JPB, MAC, NY*, OUPR, PEUFR, RFA, RB, UFP, and UFRN (Thiers 2023). The collections at NY (marked with an asterisk) were consulted online. In addition, collecting expeditions took place between August 2021 and February 2022, in areas that had no records or were poorly collected. The material was processed following the usual herbarium techniques (Mori et al. 1985) and deposited in the JPB Herbarium.

The species were identified using the protologues, the analysis of photos of nomenclatural types, and regional taxonomic treatments for Brazil (Delprete et al. 2005; Barbosa 2007, 2020; Taylor et al. 2007; Delprete 2010).

Additional types and specimens were analysed virtually through JSTOR (<https://plants.jstor.org>), JACQ (<https://www.jacq.org>), Natural History Museum (<https://data.nhm.ac.uk>), REFLORA (<http://floradobrasil.jbrj.gov.br/reflora>), and SpeciesLink (<https://specieslink.net/search>).

The morphological terms used in the descriptions followed Radford et al. (1974) and Harris and Harris (2001). The specimens examined are listed in alphabetical order by state and location and, when necessary, were supplemented with additional relevant samples from locations outside the Atlantic Forest domain.

Geographical distribution and phenological data in the Atlantic Forest domain were obtained from specialized literature and from specimen labels. Georeferenced data were imported into GeoCat (Bachman et al. 2011) to estimate the Extent of Occurrence (EOO) and Area of Occupancy (AOO) for each species in order to generate an assessment of the risk of extinction following the Red List categories and criteria of the IUCN (2012, 2022). Distribution maps were created using QGIS v.3.14 (QGIS Development Team 2020). All the images were edited using Photofilter v.11.4.1 (<http://www.photofiltre.com>).

RESULTS

Seven species of *Malanea* are recognized in this study as occurring in the Atlantic Forest domain: *M. evenosa* Müll. Arg., *M. forsteronioides* Müll. Arg., *M. harleyi* J.H.Kirkbr., *M. macrophylla* Bartl. ex Griseb., *M. martiana* Müll. Arg., *M. revolutifolia* A. Amaya & Popovkin, and *M. spicata* Müll. Arg. They are found mainly along the edges of moist or seasonal forests, or in areas with more sunlight close to bodies of water.

Malanea sarmentosa Aubl. and *M. obovata* Hochr., also cited for the Atlantic Forest by Barbosa (2020), occur only in the Amazon. *Malanea sarmentosa* registered as occurring in Bahia, has no voucher collected in that state. The collection Thomas et al. 13443 (NY, CEPEC), from Bahia, identified as *M. sarmentosa* in 2005, had its identification corrected by us to *Malanea revolutifolia*, a species described in 2012. A similar misidentification occurred with *M. obovata*. The collection Belém 3117 (CEPEC) was misidentified and is actually *M. spicata*. The distinction between these two species is discussed in the comments under *M. spicata*.

The geographic distribution (Fig. 1) of four species is being extended in this treatment: *M. evenosa* also occurs in Minas Gerais, *M. martiana* in Pernambuco and Alagoas, *M. revolutifolia* in Minas Gerais, and *M. spicata* in Bahia. Except for *M. macrophylla*, the other six species studied are recognized as endemic to the Atlantic Forest. *Malanea macrophylla* has a wide distribution and occurs in other Brazilian phytogeographic domains and adjacent countries. Bahia is the state with the greatest richness, with six species of *Malanea*. It is the centre of diversity for the genus in the Atlantic Forest. At the extremes of the domain, a gradual decrease in richness was observed. In

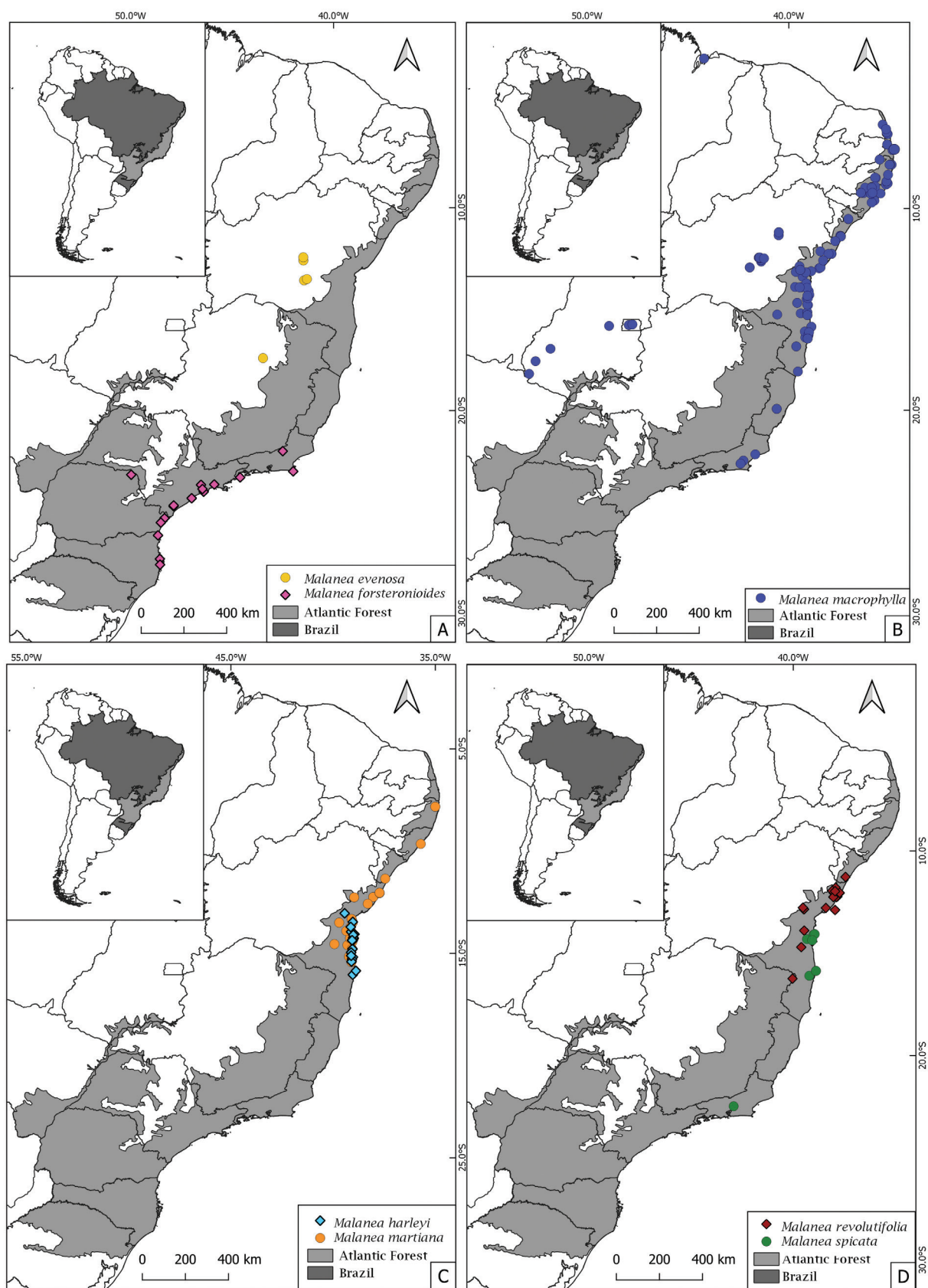


Figure 1. Geographical distribution of the species of *Malanea* in Atlantic Forest based on georeferenced localities of herbarium specimens. A. *M. evenosa* (yellow circles) and *M. forsteronioides* (pink diamonds). B. *M. macrophylla* (blue circles). C. *M. harleyi* (turquoise diamonds) and *M. martiana* (orange circles). D. *M. revolutifolia* (red diamonds) and *M. spicata* (green circles).

the northern portion, where the climate is seasonal and dry, only *Malanea macrophylla* and *M. martiana* were registered. In the southern part of the range, where the climate is subtropical, only *M. forsteronioides* occurs.

The calculated conservation status revealed three species that deserve Endangered status (*M. evenosa*, *M. harleyi*, and *M. spicata*), two that should be considered Vulnerable (*M. martiana* and *M. revolutifolia*), one that deserves to be Near Threatened (*M. forsteronioides*), and one that should be considered Least Concern (*M. macrophylla*). These results reflect the importance and need of floristic and taxonomic studies to support the development of conservation strategies in one of the world's biodiversity hotspots.

TAXONOMIC TREATMENT

Malanea Aubl. (Aublet 1775: 106, t. 41)

Cunninghamia Schreb. (Schreber 1791: 789) – Type species: *Cunninghamia sarmentosa* (Aubl.) Forsyth f.

Type species. *Malanea sarmentosa* Aubl.

Description. Lianas or scandent shrubs, unarmed; branchlets cylindrical, with lenticels or not, the young ones compressed or coplanar. Stipules entire,

interpetiolar, free, caducous after 1 to 2 distalmost nodes, membranaceous, apex round, acute or acuminate. Leaves simple, opposite, petiolate; blade oblong, ovate, obovate, or elliptical to narrow-elliptic, margin entire, flat or revolute, membranaceous to leathery, glabrous, sparsely pubescent to adpressed pubescent or tomentose to hirsute; venation brochidodromous, secondary veins impressed or sulcate above, prominent or impressed below, tertiary veins reticulate or inconspicuous, with or without axillary hairy domatia. Inflorescence axillary, pedunculate, paniculate or spiciform, bracts 2 at base. Flowers 4-merous, bisexual, heterostylous, sessile, actinomorphic; subtended by 3 bracteoles; hypanthium turbinate. Calyx lobed or dentate, or truncate to subtruncate, glabrous to glabrescent or tomentose. Corolla funnellform, valvate in bud, externally glabrous or sericeous, internally villous or lanate at mouth, white, cream or yellowish. Stamens free at base, exserted, inserted near the corolla mouth; anthers linear, dorsifixed, opening by introrse longitudinal splits. Style cylindrical, glabrous, 2-lobed; nectariferous disc present. Ovary 2-locular, ovule 1 per locule, apically attached, axile, pendulous. Fruits drupaceous, cylindrical, ellipsoid, fusiform or oblong, glabrous to glabrescent or hirsute to tomentose, reddish, purple or black when ripe, with persistent calyx lobes; pyrenes 1–2.

Key to identify the *Malanea* species present in the Atlantic Forest

1. Stipules round at the apex 2
- Stipules acute to acuminate at the apex 3
2. Stipules glabrous outside; leaves concolorous, glabrous, tertiary veins inconspicuous; calyx lobed; corolla externally glabrous *M. harleyi*
- Stipules pubescent on the central portion outside; leaves discolorous, glabrous to pubescent, tertiary veins reticulate and evident; calyx truncate or subtruncate; corolla externally strigose *M. macrophylla*
3. Stipules, petiole, and leaves glabrous; leaves membranaceous to chartaceous, concolorous; calyx subtruncate *M. spicata*
- Stipules, petiole, and leaves not glabrous; leaves chartaceous to leathery, discolorous; calyx dentate or lobed 4
4. Leaves strongly revolute, tomentose to hirsute below; secondary veins 7–11 on each side of the midrib, grooved adaxially; inflorescence tomentose; calyx deeply lobed *M. revolutifolia*
- Leaves slightly revolute or flat, sparsely pubescent or tomentose below, secondary veins 4–6 on each side of the midrib, impressed or inconspicuous adaxially; inflorescence hirsute, sericeous, or strigose; calyx dentate or slightly lobed 5
5. Petiole glabrescent; leaf blades cuneate to attenuate at the base, lustrous above; inflorescence paniculate, longer than 5 cm; inflorescence bracts triangular; calyx dentate; corolla yellow, lobes villous *M. martiana*
- Petiole pubescent to sericeous or hirsute-hispid; leaf blades obtuse to rounded at the base, not lustrous above; inflorescence spiciform, up to 5 cm long; inflorescence bracts lanceolate to narrow-elliptic; calyx slightly lobed; corolla white to cream, lobes lanate 6
6. Stipules sericeous outside; petiole pubescent to sericeous; leaves chartaceous to leathery, margin slightly revolute, secondary veins inconspicuous above and impressed below; calyx lobes equal; corolla tube up to 2 mm long; fruits oblong *M. evenosa*
- Stipules tomentose outside; petiole hirsute-hispid; leaves chartaceous, margin flat, secondary veins impressed above and prominent below; calyx lobes unequal; corolla tube longer than 2 mm; fruits fusiform *M. forsteronioides*

Malanea evenosa Müll.Arg. (Müller 1875: 453, 457)

Fig. 2A–B

Type. BRAZIL – Bahia • “partie méridionale de la prov.”; 1840; *Blanchet* 3201a; lectotype (**designated here**): G [G00237735]; isoelectotypes: F [F0069701F], LD [LD1817538], W [W0028441].

Description. Scandent shrub, 2–4 m tall; branchlets greyish brown, striated, glabrous to pubescent when young. Stipules narrow-triangular to triangular, 3.5–6 × 0.8 mm, acute, sericeous outside. Leaves with petioles 2–6(–9) mm long, pubescent to sericeous when young; blades elliptic, (2–)4–6.5 × 2–3.8 cm, obtuse to round at base, acute to acuminate at apex, margin slightly revolute, chartaceous

to leathery, discoloured, glabrous above, pubescent with short golden trichomes adpressed below; secondary veins 5–6 on each side of the midrib, inconspicuous above, impressed below; tertiary veins inconspicuous on both sides; domatia hairy below. Inflorescence spiciform, 1.4–3 cm long, 1 per axil, glomerules 2–3 with 5–7 flowers each, peduncle 0.6–1.5 cm long, strigose; bracts lanceolate to narrow-elliptic, 2–2.9 mm long, externally pubescent to strigose, internally glabrous; bracteoles triangular, 0.7–0.9 mm long, pubescent. Flower buds sericeous. Calyx shallowly lobed, lobes ca 1×1 mm, externally puberulent. Corolla white to cream, tube 2 mm long, externally glabrous to sparse sericeous, internally lanate near the mouth; lobes acute 1.1×0.3 – 1.1 mm, externally sparsely sericeous, internally lanate. Stamens with inconspicuous filaments; anthers ca 0.6 mm long. Style ca 3 mm long. Fruits oblong, $7\text{--}8 \times 4\text{--}5$ mm, purple, glabrous; persistent calyx lobes glabrescent.

Distribution. Endemic to Brazil, it occurs in Bahia, mostly in forest remnants in the Chapada Diamantina National Park and in the mountains of Minas Gerais (Fig. 1A).

Phenology. Flowers in May and November; fruits in March.

Etymology. The epithet *evenosa* refers to the inconspicuous tertiary veins (Müller 1875, 1881).

Preliminary IUCN conservation assessment. Endangered (EN) B1ab(iii)+2ab(iii). The extent of occurrence (EOO) of this species was calculated as 990 km², qualifying it for the category Endangered (EN). Its area of occupancy (AOO) was estimated as 16 km², falling into the category Endangered (EN) (Bachman et al. 2011; IUCN 2012, 2022). *Malanea evenosa* is known by six collections in only two locations in the Chapada Diamantina National Park, in the central portion of the state of Bahia where the Atlantic Forest domain mixed with other domains, such as Cerrado and Caatinga, and a single location in the state of Minas Gerais. Since 1701, the economy of Chapada Diamantina region was largely dominated by mining of gold and diamonds that was responsible for the economic development and urban expansion in the area (Giudice and Souza 2009; Giudice 2022). Only in 1985, the Brazilian government created the Chapada Diamantina National Park, aiming to preserve the natural resources and promote the tourism. Due to this, approval for all mining activities needs previous studies to measure the impacts on flora and fauna. However, currently the permitted mining exceeds the limits established by law, destroying the surrounding vegetation in the area. Therefore, we considered this species as Endangered (EN) according to IUCN criteria (IUCN 2012, 2022).

Notes. Müller (1875: 457) described *Malanea evenosa* in a brief diagnosis and cited the gatherings Blanchet 3201 and Blanchet 3201a. Five specimens of the two collections were found in F, G, LD, and W. One of them, Blanchet 3201a at G, with barcode G00237735, is designated here as the lectotype. It has handwritten notes by the author

of the species, as well as leaves, buds, and fruits in good condition, which allows a correct application of the name.

Comment. Although often misidentified as *Malanea revolutifolia*, *M. evenosa* is easily distinguished from the former by its glabrous to pubescent indumentum on young branches (vs hispid to ferruginous-tomentose), the pubescent to sericeous petiole when young (vs strigose), leaves that are acute to acuminate at the apex (vs acute, in young leaves, to rounded), margins slightly revolute (vs strongly revolute), pubescent with short golden trichomes adpressed beneath (vs tomentose to hirsute), hairy domatia in the axils of secondary veins (vs domatia absent), 5–6 secondary veins on each side of the midrib (vs 7–11), inconspicuous on the upper side (vs grooved), and calyx slightly lobed (vs deeply lobed). Few specimens of *M. evenosa* have been collected so far. Most of the specimens identified as *M. evenosa* in herbaria are, in fact, *M. revolutifolia*. These identifications, however, were made before the publication of *M. revolutifolia*.

Material examined. BRAZIL – Bahia • Ibiquera; $13^{\circ}31'09''\text{S}$, $41^{\circ}18'33''\text{W}$; 22 Jun. 1978; fr.; Vaillant 61; RB • Palmeiras, Parque Nacional da Chapada Diamantina; $12^{\circ}27'\text{S}$, $41^{\circ}28''\text{W}$; 1100 m; 18 Nov. 2006; fb., fl.; Cardoso 1417; HUEFS • Serra dos Lençóis, ca 2 km NE de Caeté-Açu (Capão Grande); $12^{\circ}36'\text{S}$, $41^{\circ}29''\text{W}$; 25 May 1980; infl.; Harley 22644; HUEFS, CEPEC • Serra do Sincorá, Barra da Estiva on the Capão da Volta road; $13^{\circ}35'\text{S}$, $41^{\circ}27''\text{W}$; 1300 m; 22 Mar. 1980; fr.; Harley 20710; CEPEC, K [K00015533] • s.l.; s.d.; Blanchet 3201; F [F0069701F], LD [LD1817538], W [W0028441]. – Minas Gerais • Serra do Espinhaço, $17^{\circ}41'37''\text{S}$, $43^{\circ}47'35''\text{W}$; 950–1150 m; 15 Feb. 1972; fr.; Anderson 36045; H, NY [NY00950457], US [US02506579].

Malanea forsteronioides Müll.Arg. (Müller 1875: 453, 458)

Fig. 2C–F

Malanea forsteronioides var. *pilosa* Standl. (Standley 1931: 365) – Type: BRAZIL – Paraná • Paraty, “ad rivulum scandens”; 30 Dec. 1911; Dusen 13769; holotype: S [S16-54156].

Type. BRAZIL – São Paulo • s.l.; s.d.; Burchell 3770; lectotype (**designated here**): BR [BR0000005314782]; islectotypes: G frag. [G00237736], K [K000432743].

Description. Scandent shrub 2–3 m tall; branchlets greyish brown, glabrous to hirsute when young. Stipules triangular-lanceolate, $4\text{--}8 \times 1.5\text{--}2$ mm, acute to acuminate, tomentose outside, trichomes long, stiff. Leaves with petioles 5–8 mm long, densely hirsute-hispid; blades oblong-lanceolate, narrow lanceolate to narrow elliptic, $4.5\text{--}7 \times 2.2\text{--}3$ cm, obtuse at base, acuminate at apex, margin flat, chartaceous, discolour, glabrous or with hirsute trichomes on primary vein above, tomentose below; secondary veins 4–6 on each side of the midrib, impressed above, prominent below, tertiary veins inconspicuous. Inflorescence spiciform, 2.5–3 cm long, 1 per axil, glomerules 4–5(–7) with 3–4 flowers each,

peduncle 0.5–1 mm long, hirsute; bracts lanceolate, ca 2 mm long, externally hairy, ciliated; bracteoles narrowly triangular, 0.2–0.27(–4) mm long, sericeous. Flower buds sericeous. Calyx lobed, lobes unequal, the two larger 2–3 mm long, the two smaller 1–2.5 mm, externally hirsute. Corolla white, tube 2.6–3.5 mm long, externally glabrescent, internally lanate; lobes rounded to acute, 2.1–3.1 mm long, externally tomentose, internally puberulent or lanate close to the mouth. Stamens with filaments 1.8–2 mm long; anthers 1–1.2 mm long. Style 2–2.3 mm long. Fruits fusiform, 8.6–9.5 × 3.8–5.2 mm long, reddish to purple, glabrous; persistent calyx lobes hirsute.

Distribution. Endemic to Brazil, it occurs from Espírito Santo to Santa Catarina, along the eastern coast of Brazil (Fig. 1A).

Habitat and ecology. Known only from submontane moist forests in the Brazilian Atlantic Forest.

Phenology. Flowers from October to December; fruits in January, April, and from July to September.

Etymology. The epithet *forsteronioides* refers to the similarity of this species with species of *Forsteronia* G.Mey. (Apocynaceae).

Preliminary IUCN conservation assessment. Near Threatened (NT). The extent of occurrence (EOO) was calculated as 135,845 km² qualifying the species as Least Concern (LC). The area of occupancy (AOO) was evaluated as 68 km², falling into the Endangered (EN) category (Bachman et al. 2011; IUCN 2012, 2022). *Malanea forsteronioides* occurs mainly on the coast of the Southeast portion of the Atlantic Forest. Although this area had an increase in tourism and an expansion of private houses for occasional use (Sabino 2012), with impacts on the surrounding biodiversity, the species occupies more than ten locations. For this reason, we consider it as Near Threatened (NT).

Notes. Müller (1875: 453) described *Malanea forsteronioides* and cited the gathering Burchell 3770. Three specimens of this gathering were found in BR, G, K. The lectotype here designated is the specimen in BR, with barcode BR0000005314782, because it has an annotation handwritten by Müller, as well as leaves, buds, and flowers in good condition, which allows a precise application of the name.

Comment. Barbosa (2007) indicated heterostyly in *Malanea forsteronioides*, which was corroborated here. However, we emphasize that long-styled individuals are more abundant than short-styled individuals in the specimens analysed. However, the size of the corolla, androecium, and style do not show great variation between the two flower forms. Only the size of the bracteoles and calyx lobes vary, being slightly larger in long-styled individuals.

Material examined. BRAZIL – **Paraná** • Antiga estrada para Superaqui-Guaqueçaba; 23 Mar. 1989; fr.; *Caetano Filho s.n.*; RB • Jacarezinho, Jacarehy; 2 Sep. 1914; fb., fl.; *Standley s.n.*; NY • Paranaguá, Caiobá, Morro do Bio; 25°31'13"S, 48°30'33"W; 100 m; 1 Nov. 1965; fb.; *Hatschbach* 13070; NY. – **Rio de Janeiro** • Arraial do

Cabo, Ilha do Farol; 30 Oct. 2013; fb.; *Uller s.n.*; RB • Paraty, Pico do Cairuçu - acesso pela praia negra; 25 Nov. 1990; fl.; *Farney* 2548; RB • Rio de Janeiro, Serra da Tijuca; Jan. 1932; fb.; *Brade* 11319; NY. – **Santa Catarina** • Florianópolis, Ilha de Santa Catarina, Jurerê; 23 Feb. 1970; fr.; *Klein* 8606; NY • Itapoá, Reserva Volta Velha; 26°15'S, 48°65'W; 9 Jan. 1998; fb.; *Canha s.n.*; NY • Vargem do Macário, Governador Celso Ramos; 18 Nov. 1971; fb.; *Klein* 9955; NY. – **São Paulo** • Alto da Serra, Estação Ecológica; 8 Dec. 1919; fb., fl.; *Hoehne* 3547; SP • Antiga São Paulo – Santos, Alto da Serra; 14 Oct. 1961; fb., fl.; *Pereira* 5932; RB • Biritiba Mirim, Estação Ecológica de Boracéia; 23°38'S, 45°53'W; 950 m; 14 Nov. 1983; fb.; *Custodio-Filho* 1839; NY, SP • Parelheiros, Sítio à esquerda na Estrada Eng. Marsilac; 23°53'46"S, 46°43'40"W; 14 Feb. 1995; fb.; *Godoy* 373; SP [SP300813] • Pariquera-Açu, Propriedade de Antônio Povinski; 29 Sep. 1995; fb.; *Ivanauskas* 419; RB • Pariquera-Açu, Rodovia para Cananeia, Fazenda Esteiro do Morro de F. Capobianco; 12 Jan. 1995; fr.; *Bernacci* 1137; IAC • Peruibe; 23 Oct. 1990; fl.; *Furlan* 1238; HRCB • Peruibe, Estação Ecológica da Juréia; Oct. 1990; fb.; *Sobral* 6868; HRCB • Praia Grande; 26 Oct. 1998; fl.; *Loefgren* 4146; SP.

Malanea harleyi J.H.Kirkbr. (Kirkbride 1997: 366)

Fig. 2G–K

Type. BRAZIL – **Bahia** • Ca 26 km SW of Belmonte along road to Itapebi, and 4 km alongside road towards the sea; 16°03'S, 39°02'W; 25 Mar. 1974; fr.; *Harley, Renvoize, Eskine, Brighton & Pinheiro* 17413; holotype: CEPEC [11800]; isotypes: K [K000015545, K000015546, K000852369, K000852370], MO [MO 100477410], RB [RB00344453], US [US02367811, US00512890], VEN [VEN176883].

Description. Liana or scandent shrub 2–3 m tall; branchlets dark brown with sparse subcircular lenticels, glabrous. Stipules elliptic to ovate, (5–)7–15 × 3–9 mm, round at apex, glabrous. Leaves with petioles 0.4–1.8(–2.3) cm long, glabrous; blades elliptic to ovate, (6.4–)8–14.5(–16) × (3–)4–7(–8.1) cm, obtuse to round at base, acuminate at apex, margin slightly revolute, subcoriaceous to leathery, lustrous, glabrous, concolorous; secondary veins (5–)6–7(–8) on each side of the midrib, impressed or slightly sulcate above, prominent below; tertiary veins inconspicuous. Inflorescence spiciform, 4–11 cm long, 1–2 per axil, glomerules 7–8, with 5–7 flowers each, the basal pair of glomerules with branches 0.4–1.4 cm long, the others sessile; peduncle 0.5–3.1 cm long, sparse strigose; bracts triangular, 0.14–0.2(–3.3) mm long, pubescent; bracteoles two smaller and one larger, triangular to deltoid, 0.1–0.5 × 0.1–0.3 mm, glabrescent. Flower buds pubescent. Calyx lobed, lobes 0.7–1.3 mm long, glabrous. Corolla cream-yellow, tube 1.4–2.5(–3.0) mm long, externally glabrous, internally lanate; lobes rounded, 1.2–1.8 mm long, externally glabrous, internally lanate. Stamens with filaments 0.6 mm long; anthers 0.5–0.8 mm long. Style 1.2–3 mm long. Fruits oblong,

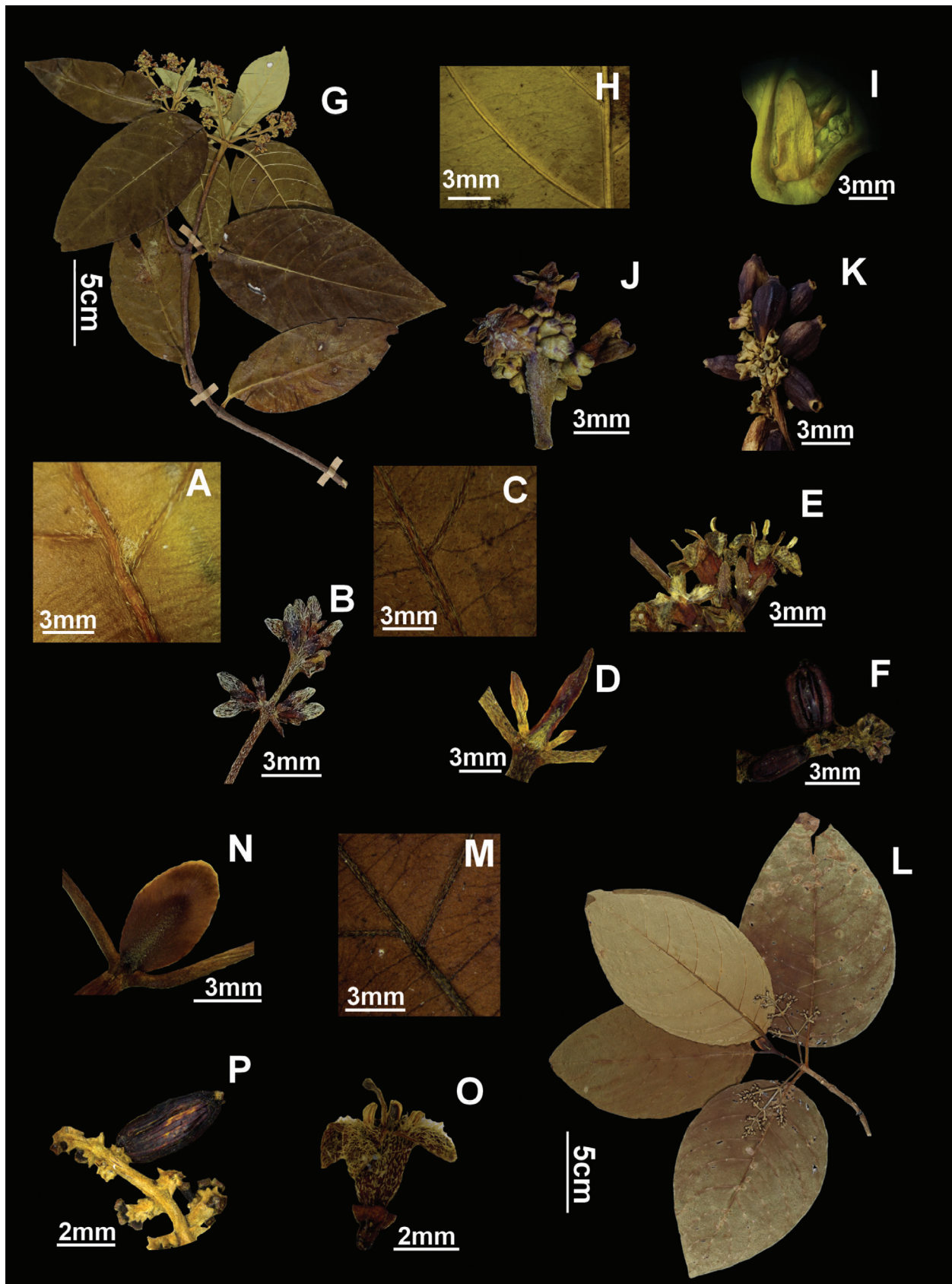


Figure 2. Species of *Malanea* from the Atlantic Forest. A–B. *M. evenosa* (Cardoso 1417). A. Lower surface of leaf with domatia. B. Inflorescence. C–F. *M. forsteronioides*. C. Lower surface of leaf (Hoehne 3547). D. Stipule (Furlan 1238). E. Inflorescence (Furlan 1238). F. Fruits (Bernacci 1137). G–K. *M. harleyi*. G. Habit (Carvalho 1364). H. Lower surface of leaf (Thomas 10378). I. Stipule (Mattos-Silva 3929). J. Inflorescence (Thomas 9494). K. Fruits (Thomas 10378). L–P. *M. macrophylla*. L. Habit (Silva 218). M. Lower surface of leaf (Kollmann 2109). N. Stipule (Bayman 211). O. Flower (Cardoso 1591). P. Fruits (Viana 408).

7–12 × 3–6.5 mm, purple, glabrous; persistent calyx lobes glabrous.

Distribution. Endemic to the state of Bahia (Fig. 1C).

Habitat and ecology. Known only from forests on the coastal white sands (restinga forests) or from vegetation bordering grassy open areas on damp white sand at sea level.

Phenology. Flowers from January to March, and in November; fruits from February to April, and from September to November.

Vernacular name. Cravo-do-campo (Bahia, *Mattos-Silva* 3929).

Etymology. The epithet *harleyi* honours Raymond Mervyn Harley, a botanist and honorary researcher at the Royal Botanic Gardens (Kew), and a specialist in neotropical biodiversity and one of the greatest scholars of the flora of Bahia, where he continues to collect and study the flora.

Preliminary IUCN conservation assessment. Endangered (EN) B1ab(ii,iii)+2ab(ii,iii). The extent of occurrence (EOO) of this species was calculated as 4,394 km², qualifying it as Endangered (EN). The area of occupancy (AOO) was estimated as 88 km², also falling into the Endangered (EN) category (Bachman et al. 2011; IUCN 2012, 2022). *Malanea harleyi* is an endemic species found in only five locations of Restinga forests in southern Bahia. That forest was severely degraded due to human activities such as housing construction, agriculture, and selective logging that threaten the local diversity (Delprete and Jardim 2019).

Notes. In the protologue of the species, Kirkbride (1997) comments that the flowers have fallen off after anthesis and he did not describe their characters. In this treatment, we present the first information about the floral structures of *M. harleyi*. However, this species is clearly distinct from the others due to its yellowish stipules, leaves, peduncle, and calyx when dried, subcoriaceous to leathery leaves, and glabrous vegetative structures.

Material examined. BRAZIL – Bahia • Belmonte, ca 26 km SW de Belmonte ao longo da Rod. para Itapebí, e 4 km ao longo da Rod. para o mar; 16°05'S, 39°03'W; 25 Mar. 1974; fr.; *Harley* 17413; CEPEC, RB • Belmonte; 6 Jul. 1966; fr.; *Belém* 2498; CEPEC, RB • Camamu, povoado de Barcelos do Sul; 16 Jul. 2005; fr.; *Miranda* 5083; HUEFS, ALCB • Camamu, povoado de Barcelos do Sul; 16 Jul. 2005; fr.; *Miranda* 5186; UFRN • Ilhéus, 19.8 km W de Olivença na rodovia para Vila Brasil; 14°57'51"S, 39°06'48"W; 14 Feb. 1994; fr.; *Thomas* 10378; JPB, CEPEC • Ilhéus, 8.9 Km ao SW de Olivença, Rod. Maruim/Vila Brasil; 14°59'36"S, 39°3'W; 21 May 1995; fb., fl., fr.; *Thomas* 10956; CEPEC, NY • Ilhéus, ca 5 km, estrada que liga Olivença ao povoado do Maruim; 14°47'20"S, 39°04'57"W; 20 May 2002; fl.; *Paixão* 185; CEPEC • Ilhéus, Fazenda Barra do Manguinho. Ramal com entrada no Km 10 Rod. Pontal/Olivença, lado direito. 3 km a W da Rod.; 14°47'20"S, 39°04'57"W; 5 Feb. 1982; fr.; *Mattos-Silva* 1431; CEPEC • Ilhéus, Faz. Barra do Manguinho. Ramal c/ entr. km 10 Rod. Pontal/Olivença. Coletas 3.5 km ao W da praia;

14°47'20"S, 39°04'57"W; 11 Feb. 1993; fr.; *Mattos-Silva* 2911; CEPEC • Ilhéus, Faz. Guanabara. Ramal c/ entrada no km 10 a direita da Rod. Pontal/Olivença, 3 km ao W da entrada; 14°47'20"S, 39°04'57"W; 16 Oct. 1980; fr.; *Mattos-Silva* 1161; CEPEC • Ilhéus, Fazenda Guanabara (junto a Fazenda Barra do Manguinho). Ramal com entrada no km 10 da Rod. Ilhéus/Olivença, á direita, 4 km a Oeste da Rodovia; 14°47'20"S, 39°04'57"W; 9 Mar. 1997; fr.; *Mattos-Silva* 1851; CEPEC • Ilhéus, road from Olivença to Maruim, 6–8 km W of Olivença; 50 m; 10 May 1981; infl.; *Mori* 13935; CEPEC, RB • Itacaré, Fazenda Campo Cheiroso; 14°27'S, 38°99'W; 150 m; 31 Mar. 1993; fr.; *Mattos-Silva* 3929; HUEFS, ALCB, CEPEC • Itacaré, Campo Cheiroso; 14°22'50"S, 39°02'23"W; 125 m; 9 Feb. 2011; fr.; *Lacerda* 47; CEPEC • Itacaré, Campo Cheiroso; 14°22'50"S, 39°02'23"W; 100 m; 5 Apr. 2011; st.; *Lacerda* 127; CEPEC • Itacaré, Campo Cheiroso; 14°22'50"S, 39°02'23"W; 100 m; 22 Sep. 2011; st.; *Lacerda* 211; CEPEC • Itacaré, Campo Cheiroso, 14 km N da Serra Grande; 14°22'S, 39°04'W; 15 Nov. 1992; fl., fr.; *Thomas* 9494; ALCB, CEPEC, HUEFS, NY • Itacaré, Estr. liga Serra Grande ramal 13 que leva ao Campinho Cheiroso. Coletas entre Km 15–16 a partir de Serra Grande; 14°16'39"S, 38°59'47"W; 26 Aug. 1992; fr.; *Amorim* 730; CEPEC • Ituberá, região da praia do Pratigi; 13°42'47"S, 39°09'64"W; 20 m; 27 Mar. 2003; fl.; *Paixão* 220; CEPEC • Maraú, a 3.9 km da balsa Itacaré/Maraú; 14°14'41"S, 39°00'59"W; 19 m; 22 May 2008; fr.; *Vignoli-Silva* 284; CEPEC • Maraú, beira da estrada, mata aberta, pouco antes de chegar à BR030; 14°14'39"S, 39°00'56"W; 28 Feb. 2007; fr.; *Souza* 148; CEPEC, NY • Maraú, ca 3 km a E de Maraú, na Rod. para Saquairá; 14°06'20"S, 39°0'24"W; 2 Mar. 1971; fl.; *Jardim* 2648; CEPEC, NY • Maraú, Rod. BR-030, a 24 km trecho Maraú/Porto de Campinhos. 19 km a E do entroncamento; 14°04'S, 38°57'W; 13 Jun. 1979; fb., fr.; *Mattos-Silva* 451; CEPEC, IPA, RB • Una, ca 3 km SW da sede do município; 15°29'32"S, 39°07'52"W; 22 Feb. 1992; fr.; *Carvalho* 3821; CEPEC, HUEFS, NY • Una, Fazenda Bolandeira, ramal com entrada no km 10 da rodovia Una/Canaveiras; 15°24'35"S, 39°05'49"W; 14 Apr. 2000; fr.; *Mattos-Silva* 4058; HUEFS, ALCB, CEPEC • Una, próximo a Reserva Biológica de Una, beira de estrada; 15°11'16"S, 39°01'36"W; 434 m; 7 Jan. 2002; fl.; *Nunes* 732; HUEFS • Una, ramal a 5 km da estrada Una/Canavieiras, 15°29'32"S, 39°07'52"W; 8 Jan. 1983; fr.; *Carvalho* 1364; CEPEC.

Malanea macrophylla Bartl. ex Griseb. (Grisebach 1861: 337)

Figs 2L–P, 3A–D

Malanea bahiensis Müll.Arg. (Müller 1875: 453, 457) – Type: BRAZIL – Bahia • “Brasilia intratropica circa Bahia”; 1831; *Blanchet* 586; lectotype (designated by Steyermark 1965: 250); P n.v.; isolectotypes: G [G00237733], MO [MO 3152039], NY [132139].

Malanea megalantha Wernham (Wernham 1913: 221) – Type: TOBAGO • s.l.; 21 Oct. 1910; *Broadway*

4024; holotype: BM [001008922]; isotypes: MO [MO 2532742], NY [132153], K [K000975676], GH [00096445], US [00138485].

Malanea macrophylla f. *bahiensis* (Müll.Arg.) Steyermark. (Steyermark 1965: 250) – Type: same as for *Malanea bahiensis*.

Malanea macrophylla f. *cuneata* Steyermark. (Steyermark 1965: 250) – Type: GUYANA [as British Guiana] • basin of Kuyuwini river (Essequibo tributary), about 150 miles from mouth; 21–26 Nov. 1937; *Smith* 2618; holotype: NY [132151]; isotypes: MO [MO 3150990], US [US00138484].

Malanea macrophylla var. *megalantha* (Wernham) Steyermark. (Steyermark 1965: 250) – Type: same as for *Malanea megalantha*.

Type. GUYANA • Guiana, “Gujana Anglica ad fl. Morocco”; Sep. 1843; *Schomburgk* 1484; first-step lectotype (designated by Steyermark 1965: 250), second-step lectotype (**designated here**): GOET [GOET008943]; isolectotype: F [V0296275F].

Description. Liana or scandent shrub 2–15 m tall; branchlets reddish-brown with circular lenticels, glabrous or glabrescent to pubescent when young, occasionally with adventitious roots. Stipules oblong to ovate or obovate, 7–20 × 3–10 mm, round at apex, pubescent in central portion, glabrous near margins outside. Leaves with petioles 0.7–2.0 cm long, glabrescent; blades ovate, oblong-ovate or broadly elliptic, 6.2–18.1 × (3.3–)4.2–10 cm, acute to obtuse at base, acute to round at apex, margin flat, chartaceous to leathery, discolorous, glabrous above, occasionally lustrous, glabrous to pubescent below, trichomes adpressed; secondary veins 6–8 on each side of the midrib, impressed above, prominent below; tertiary veins reticulate. Inflorescence paniculate, 2.8–7 cm long, 1–2 per axil, glomerules 3–7, with (3–)5–9(–18) flowers each; peduncle (0.4–)0.5–1.7(–2.3) cm long, sericeous; bracts ovate-triangular or elliptic, 2–5 mm long, sericeous; bracteoles inconspicuous, sericeous. Flower buds sericeous. Calyx truncate or subtruncate, ca 2 mm long, glabrous or glabrescent. Corolla white, cream or yellowish, tube 2–4 mm long, externally strigose, internally lanate; lobes rounded to acute, 1.5–2 mm long, externally sericeous, internally villous. Stamens with filaments 0.8–1 mm long; anthers 0.8–1 mm long. Style 2.5–4.3 mm long. Fruits oblong-ellipsoid or cylindrical, 5–12 × 2–5 mm, purple, glabrous; persistent calyx lobes glabrescent.

Distribution. *Malanea macrophylla* is the most widely distributed species of *Malanea*, ranging from Venezuela and the Guianas into the Brazilian Amazon, and along the coast to the Atlantic Forest, where it occurs from Rio Grande do Norte to Rio de Janeiro (Fig. 1B).

Habitat and ecology. It is usually found on the edge of lowland seasonal or moist forests, or in montane or submontane forests.

Phenology. Flowers in January to April, June, October to December; fruits from December to May.

Vernacular name. Cipó-de-brejo (Alagoas, *Rodrigues* 1443), Arco-de-barri (Bahia, *Cardoso* 1591).

Etymology. The epithet *macrophylla* refers to the large size of the leaves.

Preliminary IUCN conservation assessment. Least Concern (LC). The extent of occurrence (EOO) of this species in the Atlantic Forest domain was calculated as 586,645 km², qualifying it for the category Least Concern (LC). The area of occupancy (AOO) was estimated as 336 km², falling into the category Endangered (EN) (Bachman et al. 2011; IUCN 2012, 2022), however, no data for material outside Brazil was included. Due to its wide distribution in the Atlantic Forest, and its occurrence in several other vegetation types and different phytogeographic domains and countries, we consider this species as Least Concern.

Notes. Schomburgk (1848: 947) accepted *Malanea macrophylla* as a new species recognized by Bartling in mss (manuscript). However, the only information in Schomburgk’s Flora about the species is “An den ufern des Morocco. Blüht im September. Strauch” (On the banks of the Morocco. Flowers in September. Shrub) and it is a nomen nudum. Grisebach (1861: 337) validly published the name and cited the collections by Guilding (St. Vincent), Crueger (Trinidad), and Schomburgk (Guyana), without citing the herbaria. Steyermark (1965) cited the Schomburgk collection from Guyana as the type, but did not mention the herbarium where it is deposited, providing a first-step lectotypification. The second-step lectotype designated here, *Schomburgk* 1484 at GOET (GOET008943), has well-preserved leaves, inflorescences, and flowers and has handwritten annotations similar to those in the original publication.

Comment. *Malanea macrophylla* is widely distributed and has leaf blades with variable shape, apex, base, and indument. Individuals collected under tall trees have much larger leaf blades, with a more acuminate apex and denser indumentum. Individuals collected at the edge of forests or in more open areas have smaller leaves, with a rounded apex and sparse indumentum. Steyermark (1965) recognized two varieties. *Malanea macrophylla* var. *macrophylla* and *M. macrophylla* var. *megalantha*, distinguished by leaf blade type and indumentum, flower size, and distribution. In the typical variety, which occurs in Brazil, he considered three forms, distinguished by the density of the indumentum and the shape of the leaves. However, these three forms overlap and, in our opinion, may reflect different stages of vegetative development and/or specific environmental conditions. Taylor and Steyermark (2004) considered these differences not taxonomically informative. Delprete (2010) also treats the three forms as synonyms. We agree and did not consider as distinct the different forms proposed by Steyermark (1965). *Malanea macrophylla* is distinguished from other species of the genus in the Atlantic Forest by the pubescent stipules round at apex, sericeous peduncle, and truncate or sub-truncate calyx.

Material examined. BRAZIL – **Alagoas** • Colônia Leopoldina, Serra do Livramento; 7 Sep. 2010; fb., fr.; *Chagas-Mota* 8293; MAC • Flexeiras, Estação Ecológica de Murici; 24 Mar. 2011; fb.; *Chagas-Mota* 10504; MAC • Ibateguara, Petrópolis; 11 Dec. 2010; fb.; *Chagas-Mota* 9726; MAC • Ibateguara, Usina Grande; 14 Mar. 2010; fb., fr.; *Cavalcante* 418; MAC • Ibateguara, Usina Grande; 8°58'32"S, 35°55'48"W; 24 Jan. 2010; fr.; *Lyra-Lemos* 12837; MAC • Ibateguara, Usina Grande, Mata de Coimbra; 8°58'32"S, 35°55'46"W; 23 Jan. 2010; fr.; *Lyra-Lemos* 12811; MAC • Marechal Deodoro; 23 Feb. 1999; fr.; *Bayman & Barros* 211; JPB, MAC • Murici, Serra da Bananeira; 20 Jan. 2005; fr.; *Mendonça* 409; MAC • Murici, Serra do Ouro; 7 Sep. 2003; fb.; *Falcão* 42; MAC • Passo de Camaragibe, Fazenda Santa Justina; 9°12'05"S, 30°08'03"W; fb.; *Lyra-Lemos* 8186; MAC • Penedo, Fazenda Gameleira; 10°04'00"S, 36°29'17"W; 26 Dec. 1998; fb., fl.; *Rodrigues* 1443; JPB, MAC • Quebrangulo, REBIO Pedra Talhada; 9°23'S, 36°44'W; 770 m; 14 May 2014; fb., fr.; *Nusbaumer & Ammann* 4054; JPB, UFP • Quebrangulo, REBIO Pedra Talhada; 9°24'S, 36°44'W; 740 m; 2 Dec. 2014; fb.; *Nusbaumer & Cailliau* 4475; MAC, JPB, UFP • Quebrangulo, REBIO Pedra Talhada; 9°23'S, 36°44'W; 770 m; 14 May 2014; fb., fr.; *Nusbaumer & Ammann* 4050; MAC, JPB, UFP • São José da Lage, BR 104; 11 Nov. 2010; fb.; *Chagas-Mota* 9282; MAC • Sem município; 28 Oct. 1980; fb., fl.; *Andrade-Lima* 80-9762; IPA • União dos Palmares, Fazenda Santo Antônio; 26 Nov. 1966; fb.; *Andrade-Lima* 66-4751; IPA. – **Bahia** • Almadina, Serra do Corcovado/São Domingos, trilha que dá acesso a Área do Carvoeira; 14°41'S, 39°35'W; 25 Jan. 2014; fb.; *Marinho* 601; HUEFS, CEPEC • Amargosa, Serra do Timbó, Fazendo Mucuri, Riacho do Meio; 13°10'20"S, 39°09'34"W; 531 m; 25 Jan. 2007; fb.; *Cardoso* 1591; HUEFS, CEPEC • Amargosa, Serra do Timbó; 13°10'20"S, 39°09'34"W; 531 m; 26 Jan. 2007; fr.; *Cardoso* 1631; HUEFS, CEPEC • Amargosa, Serra do Timbó; 13°10'S, 39°09'W; 531 m; 17 Mar. 2007; fr.; *Paixão* 1093; HUEFS • Amargosa, Serra do Timbó; 13°10'S, 39°09'W; 28 Apr. 2007; fr.; *Paixão* 1160; HUEFS • Andaraí, Cachoeira dos Funis; 2 Jan. 2017; fl.; *Oliveira* 126; HUEFS • Andaraí, Chapada Diamantina; 12°48'S, 41°23'W; 2 Nov. 1999; fb.; *Guedes* 6969; ALCB • Apuarema, Concessão da Rio Tinto; 13°53'46"S, 39°41'10"W; 680 m; 20 Nov. 2013; fb.; *Aona* 3276; RB • Belmonte, a 25km SW da cidade; 6 Jan. 1981; fb.; *Carvalho* 441; CEPEC • Belmonte, a 30 km SW da cidade; 8 Jan. 1981; fb.; *Carvalho* 484; CEPEC • Cabralia, Reserva Biológica Pau-Brasil; 5 Jan. 1972; fb., fl.; *Eupunino* 159; CEPEC • Camamu, Estrada para Cajaíba; 14°00'49"S, 39°00'43"W; 30 Nov. 2015; fb.; *Marinho* 1209; CEPEC • Elísio Medrado, ca 1 km do povoado de Monte Cruzeiro; 12°52'10"S, 39°28'18"W; 600 m; 2 Dec. 2004; fb.; *Jardim* 4283; HUEFS • Elísio Medrado, Serra da Jibóia; 12°51'10"S, 39°28'18"W; 650 m; 2 Dec. 2004; fb., fl.; *Jardim* 4283; HUEFS • Entre Rios, Areial; 12°15'S, 37°53'W; 7 Nov. 2012; fb.; *Popovkin* 1269; HUEFS • Entre Rios, Areial; 12°15'S, 37°53'W; 20 Jun. 2012; st.; *Popovkin* 1130; HUEFS • Entre Rios, Areial; 12°15'S, 37°53'W; 31 Jul. 2012; st.; *Popovkin* 1196; HUEFS • Eunápolis, trecho de Mata Atlântica entre Eunápolis e Porto Seguro; 16°26'S, 39°03'W; 29 Mar. 1995; fr.; *Ferreira* 83; ALCB • Igrapiúna, assentamento mirante; 13°54'20"S, 39°20'59"W; 18 Dec. 2001; fb., fr.; *Loureiro* 393; ALCB, CEPEC • Ibirapitanga, Serra do Papua, APA do Pratigi, descida da parcela 3 antes do córrego 1; 13°54'58"S, 39°27'57"W; 13 Mar. 2013; fb.; *Aona* 2400; RB • Ilhéus, Parque Municipal Mata da Esperança, acesso pelo Banco da Vitória; 14°46'S, 39°05'W; 8 Jan. 2003; fb., fl.; *Jardim* 4098; HUEFS, CEPEC • Itacaré, Fazenda Capitão, 7.9 km a partir da junção entre BA 001 e a rodovia Itacaré-Ubaitaba; 31 Mar. 2004; fr.; *Fiaschi* 2187; NY, RB • Itacaré, próximo a boca do Rio de Contas; 14°17'S, 38°59'W; 28 Jan. 1977; fb.; *Harley* 18317; CEPEC, IPA, NY, RB • Itamaraju, Assentamento Pedra Bonita, aproximadamente 20 km da rodovia vicinal de Itamaraju sentido Jucuruçu; 16°50'19"S, 39°37'53"W; 500 m; 13 Feb. 2000; fl.; *Borges* 785; CEPEC, NY • Itamaraju, Assentamento Pedra Bonita, aproximadamente 20 km da rodovia vicinal de Itamaraju sentido Jucuruçu; 16°50'19"S, 39°37'53"W; 500 m; 13 Feb. 2000; fb.; *Borges* 808; CEPEC, NY, RB • Itanagra, Fazenda Brejo Verde; 9 Aug. 1975; fb.; *Gusmão* 145; ALCB • Ituberá, 11 km da estrada Ituberá/Valença; 5 Feb. 1983; fr.; *Carvalho* 1459; HUEFS, CEPEC • Ituberá, km 11 da estrada Ituberá/Valença; 5 Feb. 1983; fb.; *Carvalho* 1459; CEPEC • Jacobina, Cachoeira Itaitu; 11°20'04"S, 40°30'11"W; 610 m; 30 Mar. 1996; fb., fl.; *Guedes* 2647; HUEFS, ALCB • Jacobina, Piemonte da Diamantina, Barro Bananeira; 11°10'49"S, 40°29'53"W; 23 Nov. 2011; fb.; *Loureiro* 457; ALCB, CEPEC • Jaguaripe; 28 Feb. 2011; fr.; *Ferreira* 57; ALCB • Lençóis; 12°34'S, 41°23'W; 30 Jul. 2006; 600 m; fr.; *Couto* 201; HUEFS • Lençóis, Serra da Chapadinha; 12°27'03"S, 41°25'07"W; 600 m; 6 Feb. 1995; fr.; *Guilietti* 1614; ALCB, CEPEC • Lençóis, Chapada Diamantina, Foz da Capivara; 9 Mar. 2000; fb.; *Stradmann* 0706; ALCB • Lençóis, Chapada Diamantina; 26 Jan. 2000; fr.; *Jardim* 2526; CEPEC, NY • Lençóis de Una, próximo à ponte sob rio Acuípe; 21 Feb. 2022; fr.; *Roxo* 43; JPB • Maraú, Estrada que liga Ponta de Mutá a Maraú; 6 Feb. 1979; fr.; *Mori* 11435; CEPEC, RB • Mucuri, Km 4 na estrada Mucuri/BR101; 3 Jan. 1991; fr.; *Farney* 2639; CEPEC, RB • Palmeiras, Morro do Pai Inácio; 12°28'S, 41°27'W; 1000 m; 12 Mar. 1997; fr.; *Gasson* 6193; HUEFS, ALCB, CEPEC • Palmeiras, Pai Inácio; 12°26'37"S, 41°29'16"W; 690 m; 1 Jul. 1995; fr.; *Guedes* 2116; ALCB, CEPEC • Palmeiras, Morro do Pai Inácio; 12°27'20"S, 41°28'15"W; 1080 m; 4 Feb. 1995; fr.; *Guilietti* 1531; ALCB, CEPEC, HUEFS • Palmeiras, Morro do Pai Inácio; 12°27'16"S, 41°28'17"W; 1040 m; 30 Dec. 1994; fb., fl.; *Guilietti* 1506; CEPEC • Pirai do Norte; 13°46'12"S, 39°19'52"W; 6 Nov. 2014; fb.; *Braga* 41; JPB • Pontal dos Ilhéus, saída para Buererema; 17 May 1986; fr.; *Belém* 3571; CEPEC • Presidente Tancredo Neves, ponto 63; 13°23'24"S, 39°18'57"W; 1 Feb. 2011; fr.; *Ferreira* 45; ALCB • Porto Seguro, Parque Nacional Monte Pascoal, along trail leading to summit of Monte Pascoal; 15°40'15"S, 40°34'29"W; 25 Mar. 1996; fr.; *Thomas*

11155; CEPEC, NY • Porto Seguro, Parque Nacional do Pau-Brasil, trilha do Muçununga, área aberta próximo à mata; 16°26'06"S, 39°19'30"W; 91 m; 19 Feb. 2022; fr.; *Roxo* 36; JPB • Porto Seguro, Parque Nacional do Pau-Brasil, trilha do Muçununga, próximo à margem de rio; 16°26'06"S, 39°19'30"W; 91 m; 19 Feb. 2022; fr.; *Roxo* 34; JPB • Porto Seguro, RPPN Manona; 20 Dec. 2005; fr.; *Alves* 102; ALCB, CEPEC • Porto Seguro, Reserva Biológica do Pau-Brasil, 17 km ao W da cidade, Rodovia para Eunápolis; 16°04'00"S, 39°18'33"W; 20 Jan. 1997; fb.; *Harley* 18110; CEPEC, RB • Porto Seguro, Reserva Florestal de Porto Seguro – CVRD; 16°26'58"S, 39°03'51"W; 11 Jan. 90; st.; *Folli* 1044; NY • Salvador, Biribeira-Paralela; 8 Nov. 1994; fb.; *Bandeira s.n.*; ALCB • Salvador, Jardim Botânico de Salvador; 12°55'37"S, 12°56'15"W; 6 Feb. 2004; fr.; *Queiroz* 353; HUEFS, ALCB • Salvador, região metropolitana, barragem do Cobre; 12°58'S, 38°30'W; 16 Apr. 2012; fr.; *Queiroz* 5312; ALCB • Santa Cruz Cabralia, Santo André, próximo ao estuário do Rio Acuba; 16°14'S, 39°02'W; 2 Nov. 2003; fb.; *Guedes* 10624; ALCB • São Miguel das Matas, Fazenda Engenho da Lama, ca 4,5 km ao S da cidade; 13°02'49"S, 39°25'56"W; 400 m; 24 Feb. 2000; fb., fr.; *Jardim* 2884; ALCB, CEPEC, HUEFS, NY • Serra das Lontras, ca de 7 km no ramal que liga o distrito de Itatingui à Serra; 15°12'09"S, 39°24'28"W; 31 Mar. 2006; fb.; *Paixão* 927; CEPEC, NY • Ubaira, arredores de Três Braços; Jan. 1991; fb., fl.; *Sobral* 6702; SP • Una, Mata litorânea; 19 May 1965; fb.; *Belém* 1062; CEPEC • Una, próximo à Reserva Biológica Una; 16°28'10"S, 39°16'46"W; 21 Feb. 2022; fr.; *Roxo* 41; JPB • Una, Reserva Biológica do Mico-leão (IBAMA); 8–12 Mar. 1993; fb.; *Amorim* 1130; CEPEC, NY • Una, Reserva Biológica do Mico-leão (IBAMA); 26 Apr. 1994; fl.; *Carvalho* 4515; CEPEC, NY • Una, Reserva Biológica do Mico-leão (IBAMA); 3 Mar. 1998; fr.; *Sant'Ana* 640; CEPEC • Una, Reserva Biológica do Mico-leão (IBAMA), 15°06'58"S, 39°02'11"W; 20 Mar. 1999; fr.; *Jardim* 2068; CEPEC • Uruçuca, estrada de Itacaré para Ubaitaba; 14°29'59"S, 39°06'54"W; 380 m; Apr. 2004; st.; *Martini sn.*; CEPEC • Uruçuca, Parque Estadual Serra do Conduru ca 11.5 km de Serra Grande em direção a Uruçuca, com 1km do ramal a esquerda; 18 May 2000; fr.; *Sant'Ana* 855; CEPEC. – **Espírito Santo** • Linhares, Reserva Natural Vale do Rio Doce (Particular). Reserva de Linhares; 31 Jan. 1972; *Sucre* 8338; RB • Santa Teresa; 19°58'S, 40°32'W; 600–900 m; 18 Nov. 1991; fr.; *Pizziolo* 363; JPB • Santa Teresa; 4 Mar. 1997; fb., fl.; *Boudet Fernandes* 3195; JPB • Santa Teresa; 10 Mar. 1999; fl.; *Kollmann* 2109; JPB • Santa Teresa; 30 Mar. 1999; fr.; *Kollmann* 2320; JPB. – **Minas Gerais** • Uberlândia, Parque do Sabiá; 22 Jun. 1995; fr.; *Nakagima* 1644; HUFU • Uberlândia, Tangará Country Club; 18°55'07"S, 48°16'37"W; 28 Nov. 1995; fl.; *Schiavini* 410; HUFU. – **Paraíba** • Bananeiras, Reserva Estadual Goiამunduba; 6°44'28"S, 35°36'22"W; 800 m; 30 Jun 2021; st.; *Roxo* 03; JPB • Conde, APA Tambaba, Loteamento Enseada de Jacumã; 7°19'24"S, 34°48'47"W; 4 Dec. 2009; fr.; *Araújo* 219; JPB • Espírito Santo, Engenho São Paulo; 25 Nov. 1968; fl.; *Andrade-Lima* 68-5475; IPA •

João Pessoa, Praia da Penha, Rio Aratú; 8 Nov. 1992; fb., fl., fr.; *Moura* 892; JPB • Mamanguape; 6°07'22"S, 35°18'20"W; 10 Feb. 2012; fb., fr.; *Thomas* 15655; JPB • Mamanguape, Estação Ecológica Mamanguape; 17 Aug. 1989; fb.; *Felix* 30; JPB. – **Pernambuco** • Barreiros, Mata do Porto; 4 Jan. 2000; fb., fl.; *Lucena* 784; PEUFR • Bonito; s.d.; fb., fr.; *Silva* 444; PEUFR • Bonito, Reserva Municipal de Bonito; 80°29'40"S, 35°41'45"W; 444 m; 6 Mar. 1996; fr.; *Campelo* 92; PEUFR • Bonito, Reserva Municipal de Bonito; 80°29'40"S, 35°41'45"W; 444 m; 6 Mar. 1996; fr.; *Marcon* 127; PEUFR, IPA, UFP • Bonito, Reserva Municipal de Bonito; 15 Mar. 1995; fr.; *Sales de Melo* 29; PEUFR, IPA, UFP • Escada, Engenho Conceição; 22 Nov. 1967; fb.; *Costa* 143-67; IPA • Gravatá, Fazenda Harmonia; 10 Oct. 1970; fb., fl.; *Andrade-Lima* 70-6022; IPA • Igarassu, Mata de Piedade; 7°50'11"S, 35°00'28"W; 17 Dec. 2009; fb.; *García-González* 1374; CEPEC, JPB, HUEFS, NY UFP • Igarassu, Mata de Piedade; 7°49'48"S, 35°59'55"W; 2 Mar. 2010; fr.; *García-González* 1445; JPB, IPA; CEPEC, UFP • Igarassu, Mata de Piedade, área protegida propriedade da Usina São José; 7°49'38.5"S, 35°0'16.1"W; 91 m; 12 Aug. 2009; fr.; *García-González* 1070; UFP • Lagoa dos Gatos, RPPN Pedra D'Anta; 7 Jun. 2011; fb.; *Pessoa* 647; JPB • Maraial, Serra do Urubu; 20 Apr. 1994; fr.; *Miranda* 1609; IPA • Recife, Jardim Botânica do Curado; 13 Sep. 1994; fb.; *Rita Pereira s.n.*; IPA • Rio Formoso, Mata do Ribeira; 6 Mar. 2002; fr.; *Lira* 314; PEUFR • Rio Formoso, Mata do Ribeira; 6 Mar. 2002; fb.; *Lira* 306; PEUFR • Rio Formoso, Mata do Ribeira; 7 Mar. 2002; fb.; *Lira* 458; PEUFR • São Vicente Ferrer, Mata do Estado; 7°35'S, 35°30'W; 600 m; 12 Nov. 1995; fb., fl.; *Laurêncio* 237; NY, PEUFR • São Vicente Ferrer, Mata do Estado; 70°35'S, 35°30'W; 600 m 13 Jan. 2000; fb.; *Ferraz* 810; PEUFR • Serinhaém, Usina Trapiche; 8°33'14"S, 35°08'48"W; 110 m; 21 Dec. 2010; fb.; *Melo* 713; JPB, UFP • Tamandaré, Mata do conde, Fazenda estivas; 21 Jan. 2000; fb., fr.; *Oliveira* 541; PEUFR. – **Rio de Janeiro** • Carapebus, Fazenda Lázaro; 23 Jun. 1994; fb.; *Bovini* 367; JPB, RB • Carapebus, Restinga de Carapebus. Fazenda São Lázaro; 23 Apr. 1994; fb.; *Bovini* 367; RB • Rio das Ostras, Mar do Norte, no final da Rua Ivan Lins; 19 May 2005; st.; *Marquete* 3632; RB • Nova Friburgo, Serra de Friburgo; 22°28'19"S, 42°53'11"W; 15 Jul. 1975; fr.; *Occhioni* 7620; RFA • Silva Jardim, Reserva Biológica de Poço das Antas, trilha do Morro do Calcário; 22°30'S, 42°15'W; 5 Mar. 1993; fr.; *Barreto* 29; CEPEC, RB • Silva Jardim, Reserva Biológica de Poço das Antas, trilha do Morro do Calcário, ponto 1000; 22°00'S, 42°00'W; 9 Jan. 1993; fb.; *Lima* 4585; NY, RB • Silva Jardim, Reserva Biológica Poço das Antas, Trilha do Morro do Calcário; 22°30'S, 42°15'W; 8 Jan. 1993; fb.; *Sylvestre* 828; RB. – **Rio Grande do Norte** • Canguaretama; 6°31'52"S, 35°10'33"W; 69 m; 20 Sep. 2014; inf.; *Jardim* 6728; UFRN • Macaíba, Escola Agrícola de Jundiá; 5°53'35"S, 35°21'01"W; 54 m; 10 Feb. 2012; fr.; *Costa-Lima* 628; UFRN, UFP • Porto Velho, Área de Proteção Ambiental Piquiri-Una; 6°23'36"S, 35°15'22"W; 26 Feb. 2019; fr.; *Roque* 2576; CEPEC. – **Sergipe** • Campo do Brito, Povoado Tapera da Serra; 14 Apr. 1982; fr.; *Viana*

408; IPA • Campo do Brito, Tapera da Serra; 11 Nov. 1981; fb., fl.; *Carneiro 158*; IPA • Capela, RVS Mata do Junco; 10°31'10"S, 37°03'05"W; 20 Apr. 2012; fr.; *Gomes 440*; JPB • Capela, RVS Mata do Junco; 10°32'S, 37°03'W; 15 Feb. 2012; fr.; *Chagas 154*; JPB • Capela, RVS Mata do Junco, bica do estreito Mata Atlântica; 18 Oct. 2012; fb.; *Costa-Silva 60*; UFP • Santa Luzia de Itanhy; 11°22'31"S, 37°25'24"W; 9 Sep. 2011; fb., fl.; *Gomes 192*; JPB, HUEFS, RB • Santa Luiza do Itanhy, ca 2.5 km do Distrito do Crato, na estrada para Santa Luiza do Itanhy; 27 Nov. 1993; fb.; *Amorim 1473*; CEPEC • Santa Luzia do Itanhy, RPPN Mata do Crasto; 11°23'36"S, 37°25'15"W; 3 Mar. 2011; fr.; *Gomes 67*; JPB • Santa Luzia do Itanhy, RPPN Mata do Crasto; 11°22'01"S, 37°25'01"W; 2–20 m; 2 Mar. 2011; fb., fr.; *Thomas 15276*; JPB • Santa Luzia do Itanhy, RPPN Mata do Crasto; 11°23'33"S, 37°25'07"W; 26 Jan. 2011; fr.; *Prata 2576*; JPB, NY.

Additional material examined from outside the Atlantic Forest domain. BRAZIL – **Amapá** • Calçoene, BR156 entre Calçoene e Rio Amapá Grande, ca 5 km S de Calçoene; 2°12'N, 50°55'W; 12 Dec. 1984; fb.; *Rabelo 3005*; NY • Rio Araguari, at mouth of Anicahy, above Camp 14; 8 Oct. 1961; fb.; *Pires 51555*; NY. – **Amazonas** • Santa Isabel do Rio Negro; 0°25'S, 64°40'W; 9 Oct. 1987; fb.; *Cid Ferreira 9314*; RB, NY. – **Distrito Federal** • Brasília, ca 10 km of Brasília, próximo de Sobradinho; 15°43'09"S, 47°51'25"W; 1 Oct. 1965; fb.; *Irwin 8854*; NY • s.l.; 5 Oct. 1965; fl.; *Irwin 8970*; RB. – **Goiás** • Mineiros, Nascente do Ribeirão Gloria, 200–300 m afora da cerca do Parque Nacional das Emas; 17°54'S, 52°55'W; 2 Oct. 1998; fr.; *Delprete 6809*; NY • Mineiros, Parque Nacional das Emas, córrego Cabecerão; 18°2'S, 52°52'12"W; 1 Oct. 1998; fb.; *Delprete 6780*; NY • Pirenópolis, Cachoeira Santa Maria-RPPM; 15°49'23"S, 48°54'25"W; 1150 m; 23 Jun. 2001; fr.; *Marquete 3157*; RB • Pirenópolis, Chapada dos Veadeiros. Fazenda Pai José; 27 Oct. 1994; fb.; *Mendonça 2229*; RB • Planaltina; 20 Jul. 1966; fb.; *Irwin 18296*; RB • Serra do Caiapó, 40 km South of Caiaponia; 26 Oct. 1964; fr.; *Prance 59673*; NY. – **Maranhão** • São Luiz, Ilha de São Luiz; 2°57'S, 44°20'W; Feb.–Mar. 1939; fb.; *Lemos Fróes 11737*; NY. – **Mato Grosso** • North ca 2 km. E. of base camp; 19 Oct. 1968; fr.; *Harley 10728*; NY, RB • Sinop, Rd. to Fazenda Atlântica, 10–14 km W of BR 163 and 8 km N of rd to Pôrto dos Gaúchos; 11°06'S, 55°57'W; 25 Sep. 1985; fr.; *Thomas 4061*; NY. – **Pará** • Belém; 24 Aug. 1922; fb.; *Ducke s.n.*; RB • Ilha do Marajó, Rio Anajás; 0°59'S, 49°55'W; 2 Nov. 1987; fr.; *Prance 30227*; NY • Rio Mocoões, 1 km above Anajás; 0°58'S, 49°56'W; 7 Nov. 1987; fr.; *Beck 366*; NY. – **Roraima** • Caracará, PARNA do Viruá, Grade do PPBio, trilha L01, segment 1400–1450; 1°29'12"N, 61°0'15"W; 19 Sep. 2012; fb.; *Perdiz 1600*; RB.

Malanea martiana Müll.Arg. (Müller 1875: 453)

Figs 3E–F, 4A–E

Type. BRAZIL • Bahia, Ilhéus; s.d.; *Martius 394*; lectotype (**designated here**): M [M0198135]; isolectotypes: BR [BR0000005314775, BR0000005315109,

BR0000005315437], F [F0BN000418], F frag. [V0069707F], G [G00237739, G00237740], GH [GH00096449], K [K000015350], L [L0057647], NY [NY00132152], W [W 0028443, W 1889-0287298].

Description. Liana or scandent shrub up to 15 m tall; branchlets greyish with elliptical to circular lenticels, glabrous. Stipules triangular-lanceolate, 6–8.5(–10) × 1–3 mm, acute, strigose. Leaves with petioles (0.2–)0.3–0.5 cm long, glabrescent at base; blades obovate to elliptic, 5.5–13 × 3.4–5.5 cm, cuneate to attenuate at base, acute to cuspidate at apex, margin flat, chartaceous, discolorous, glabrous above, lustrous, sparse pubescent below, trichomes adpressed; secondary veins 4–5 on each side of the midrib, impressed above, prominent below; tertiary veins inconspicuous. Inflorescence paniculate, 5–12.5 cm long, 1 per axil, glomerules 3–5(–7), with 13–18 flowers each; peduncle 2.5–6.5 cm long, sericeous; bracts triangular, 2–2.9 mm long, glabrescent; bracteoles inconspicuous, triangular, puberulent. Flower buds strigose. Calyx dentate, teeth triangular, 0.4–0.8 mm long, glabrescent. Corolla yellowish, tube 1.4–4 mm long, externally glabrescent to strigose, internally lanate; lobes rounded, 1.5–2.9(–3.5) mm long, externally strigose, internally villous. Stamens with filaments 1–1.5 mm long; anthers 0.7–1(–2) mm long, curved. Style 2.5–3.3(–4) mm long. Fruits fusiform, 8–14 × 2–3 mm, purple or black, glabrous; persistent calyx lobes glabrescent.

Distribution. It occurs in the states of Alagoas, Bahia, Pernambuco, and Sergipe (Fig. 1C).

Habitat and ecology. It is found in moist forests or forests bordering restinga areas.

Phenology. Flowers in June, and from September to October; fruits in July to August, and from December to April.

Etymology. The epithet *martiana* honours Carl Friedrich Philipp von Martius (1794–1868), the collector of the type material.

Preliminary IUCN conservation assessment. Vulnerable (VU) B2ab(iii). The extent of occurrence (EOO) of this species was calculated as 104,959 km², qualifying it for the category Least Concern (LC). The area of occupancy (AOO) was estimated as 100 km², falling into the category Endangered (EN) (Bachman et al. 2011; IUCN 2012, 2022). *Malanea martiana* is known from eight locations that occupy a considerable area, however only few populations were sampled in the northern portion of the Atlantic Forest domain (states of Alagoas, Pernambuco, and Sergipe), where forests were largely replaced by plantations of sugarcane (Targino et al. 2010), leaving only small forest fragments located in areas unsuitable for cultivation (Barbosa and Rios 2006). However, considering that extraction of wood persists in the area (Machado 2008), threatening the local biodiversity, we categorize it as Vulnerable (VU) according to the IUCN criteria (IUCN 2012, 2022).

Notes. Müller (1875) described *Malanea martiana* referring to *Malanea sarmentosa* Mart. in Herbarium Florae Brasiliensis as a synonym. Consulting Martius (1839), we

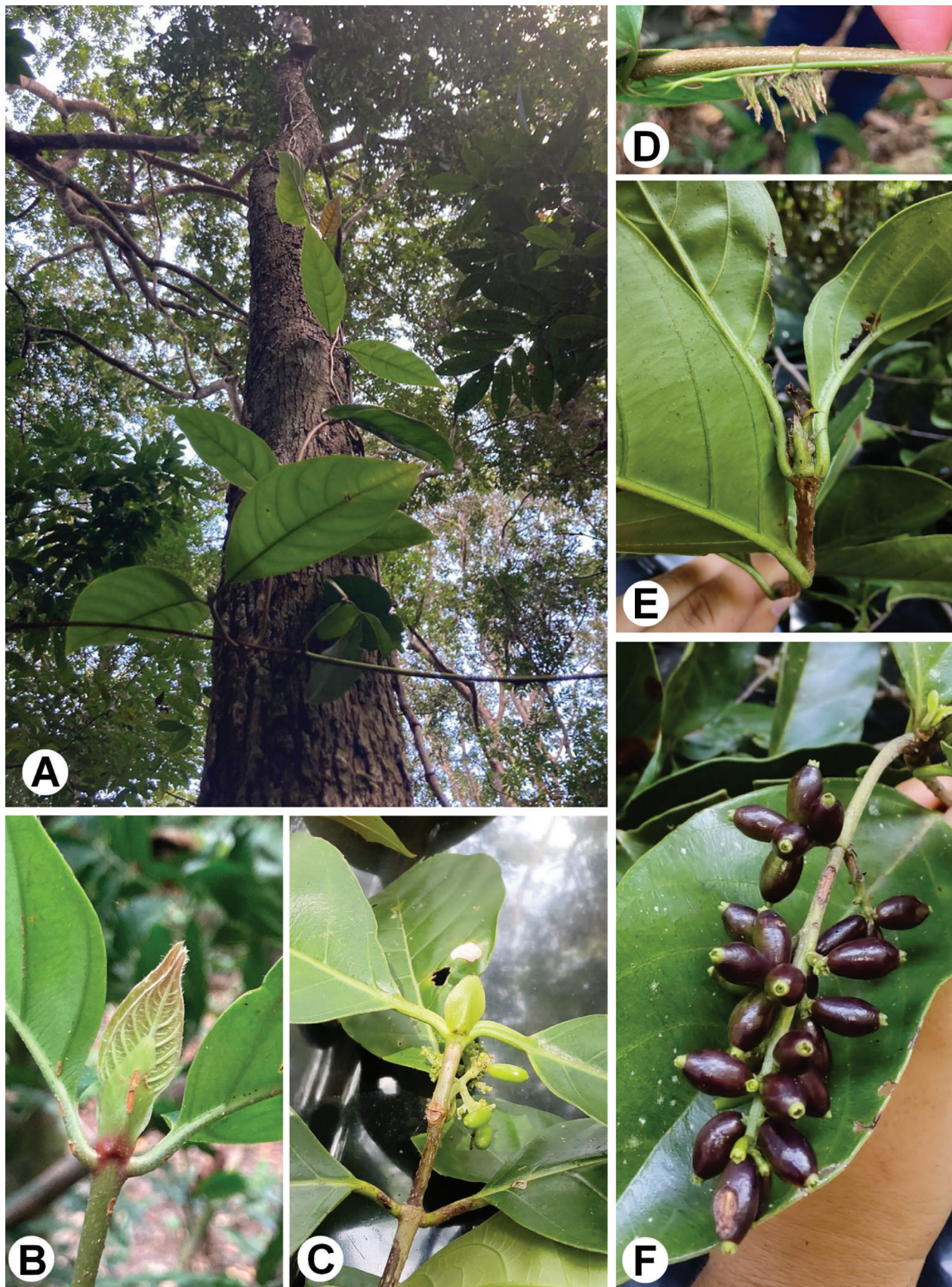


Figure 3. A–D. *Malanea macrophylla*. A. Habit. B–C. Stipule. D. Adventitious roots. E–F. *Malanea martiana*. E. Stipule. F. Fruit. Photos by Rafaela Roxo, 2022.

found that he had identified his collection 394 as *Malanea sarmentosa* Aubl., not intending to describe a new species. We found specimens of *Martius* 394 in several herbaria. We designate here M0198135 at M as the lectotype because it shows Müller's determination handwritten by him and is the best preserved and complete specimen.

Comment. *Malanea martiana* is heterostylous, but the size of the calyx, corolla, and androecium do not vary between the two forms in the analysed specimens. Only the style length varies. *Malanea martiana* is distinguished from the other studied species by its acute stipules, the paniculate inflorescence larger than 5 cm, and the dentate calyx.

Material examined. BRAZIL – **Alagoas** • Maceió, Serra da Saudinha; 18 Sep. 2009; fb.; *Chagas-Mota* 5529; MAC. – **Bahia** • Cairu, Litoral Sul; 13°29'S, 39°2'W; 28 Sep. 2001; fl.; *Guedes* 9229; ALCB • Conde, Mata da Maré; 12°02'27"S, 37°43'30"W; 14 Dec. 1995; fr.; *Bautista* 1748; ALCB, CEPEC, IPA, HUEFS, RB • Cravolândia, povoado Três Braços, Ilha Formosa; 13°30'S, 39°42'W; 15 Jan. 1994; fr.; *França* 913; HUEFS • Feira de Santana, BR 234, km 35; 5 Jan. 1981; fr.; *Gusmão* 504; ALCB • Feira de Santana, BR 234, km 35; 17 Sep. 1980; *Gusmão* 471; ALCB, UB [111794] • Igrapiúna, Reserva Ecológica da Michelin: Cachoeira da Pancada Grande; 13°46'57"S, 39°10'00"W; 4 Dec. 2015; fb., fl.; *Silva* 668; JPB • Ilhéus, Mata da Esperança. 3 km da Rodoviária, mata ao N do reservatório; 14°46'54"S, 39°04'08"W; 17 Jan. 1995; fr.; *Thomas* 10799; CEPEC, NY • Ilhéus, Rodovia Uma, próximo à Olivença; 14°33'S, 39°56'W; 17 Jan. 1999; *Argôlo* 02; ALCB • Itacaré, ao SW da Rod. Itacaré/Ubaitaba, ao S da foz do Rio de Contas; 14°11'24"S, 39°00'59"W; 29 Jan. 1977; fr.; *Harley* 18383; CEPEC, RB • Itacaré, trilha em direção a Faz. Prainha; 19 Aug. 2010; st.; *García-González* 1496; RB • Itacaré, Serra Grande, trilha dentro da Fazenda Miranda; 22 Jan. 2022; fr.; *Roxo* 44; JPB • Itanagra, Fazenda Brejo Verde; 9 Aug. 1975; fr.; *Gusmão* 145; ALCB • Ituberá/Grapiúna, Michelin, Faz. Biriba, na margem da estrada; 13°43'S, 39°8'W; 23 Sep. 2006; fb.; *Guedes* 12602; ALCB • Maraú; 14°14'42"S, 39°00'56"W; 27 Jul. 2000; fr.; *Mattos-Silva* 4376; HUEFS • Olivença, Mata do Balneário Tararomba; 15°26'S, 39°06'W; Sep. 2016; fl.; *Guedes* 24971; ALCB • Porto Seguro, Parque Nacional do Pau-Brasil, trilha do Muçununga, próximo à margem de rio; 16°26'06"S, 39°19'30"W; 91 m; 19 Jan. 2022; st.; *Roxo* 35; JPB • Porto Seguro, Parque Nacional do Pau-Brasil, trilha do Muçununga; 16°26'06"S, 39°19'30"W; 91 m; 19 Jan. 2022; fr.; *Roxo* 37; JPB • Porto Seguro, Trancoso, 16°23'S, 39°08'W; 2 Oct. 1997; fb., fl.; *Guedes* 5333; ALCB, IPA • Salvador, Região Metropolitana de Salvador; 12°58'S, 38°30'W; 19 Apr. 2011; fr.; *Guedes* 18773; ALCB, PEUFR • Taperoá, Ramal da Faz. São Braz, c/ entrada no km 6 Rod; 13°32'17"S, 39°05'54"W; 21 Sep. 1988; fb.; *Mattos-Silva* 2566; CEPEC • Una, Reserva Biológica do Mico-leão (IBAMA), entrada no km 46 da Rod. BA-001 Ilhéus/Una; 15°09'S, 39°05'W; 8–12 Mar. 1993; fr.; *Amorim* 1095; CEPEC, NY • Una, rodovia Una-Comandatuba, fazenda de Antônio Pimenta; 26 Oct. 1971; fl.; *Pinheiro*

1658; CEPEC • Uruçuca; 14°35'54"S, 39°17'44"W; 12 Feb. 2004; fr.; *Amorim* 3919; CEPEC, RB • Uruçuca, 7.4 km N de Serra Grande Rod. P/ Itacaré. Faz. Lagoa do Conj. Sta. Cruz. Inventário; 14°42'33"S, 39°06'05"W; 8 May 1995; infl.; *Thomas* 10823; CEPEC, NY • Uruçuca, ca 5 km de Serra Grande; 14°47'22"S, 39°02'17"W; 135 m; 1 Oct. 2008; fl.; *Queiroz* 13848; CEPEC, HUEFS • Uruçuca, distrito de Serra Grande, 7.3 km na estrada Serra Grande/Itacaré, Fazenda Lagoa do Conjunto Fazenda Santa Cruz; 14°25'S, 39°01'W; 7 Sep. 1991; fb., fl.; *Carvalho* 3644; CEPEC • Uruçuca, Serra Grande, caminho do mirante II; 14°17'S, 39°03'W; 2 Mar. 2018; fr.; *Guedes* 30341; ALCB • Valença, RPPN Água Branca, estrada de Valença para Guaibim, ca 2 km; 13°19'44"S, 39°05'25"W; 26 Jun. 2004; fl.; *Fiaschi* 2345; CEPEC, NY. – **Pernambuco** • Igarassu, Mata de Piedade; 7°49'48"S, 34°59'55"W; 2 Mar. 2010; fr.; *García-González* 1448; JPB, UFP • Igarassu, Usina São José; 7°42'12"S, 34°58'11"W; 22 Dec. 2007; fr.; *Araújo* 556; IPA, UFP. – **Sergipe** • Santa Luzia do Itanhi, Entrada a 1 km a esquerda da estrada Sta. Luzia/Crasto, ca 1 km adentro; 11°35'07"S, 37°44'82"W; 29 Nov. 1993; fr.; *Sant'Ana* 439; CEPEC, NY.

Malanea revolutifolia A. Amaya & Popovkin (Amaya and Popovkin 2012: 930)

Fig. 4F–J

Type. BRAZIL • Bahia, Entre Rios, Fazenda Rio do Negro; 12°01'S, 38°02'W; 150 m; 14 Aug. 2008; fl.; *Popovkin* 349; holotype: HUEFS [143271]; isotype NY [02714491].

Description. *Liana* ca 2 m tall; branchlets greyish with elliptic lenticels, glabrous, hispid to ferruginous-tomentose and without lenticels when young. *Stipules* deltate to triangular, 4–6 × 2–4 mm, acute, externally tomentose to sericeous. *Leaves* with petioles 0.5–1 cm long, strigose; blades elliptic, 2.8–10.1 × 2–6.7 cm, obtuse to round at base, acute at apex (round in young leaves), strongly revolute, leathery, discolorous, glabrous above, tomentose to hirsute below; secondary veins 7–11 on each side of the midrib, impressed to sulcate, tomentose up to 3rd pair above, prominent below; tertiary veins inconspicuous. *Inflorescence* spiciform, 4.5–6 cm long, 1 per axil, glomerules 2–3 with 4–7 flowers each; peduncle 2.2–3.3 cm long, densely tomentose; bracts ovate-triangular, 0.26–0.6 mm long, tomentose; bracteoles triangular, 2–3.5 × 0.9 mm, externally tomentose, revolute. *Flower buds* tomentose. *Calyx* deeply lobed, lobes 1.1–3 × 0.6–2 mm long, tomentose. *Corolla* white or cream, tube 1.5–3 mm long, externally glabrescent, internally lanate; lobes rounded, 1.3–2 mm long, externally tomentose, internally lanate. *Stamens* with filaments ca 0.3 mm long; anthers 0.4–0.9 mm long. *Style* 1.6–2 mm long in short-styled flowers; 2–3 mm long in long-styled flowers. *Fruits* fusiform to elliptical, 7 × 4 mm, purple, glabrous; persistent calyx lobes tomentose.

Distribution. Previously known only from open moist forests in Bahia and Sergipe, it is being registered here as occurring in the state of Minas Gerais, in the municipality

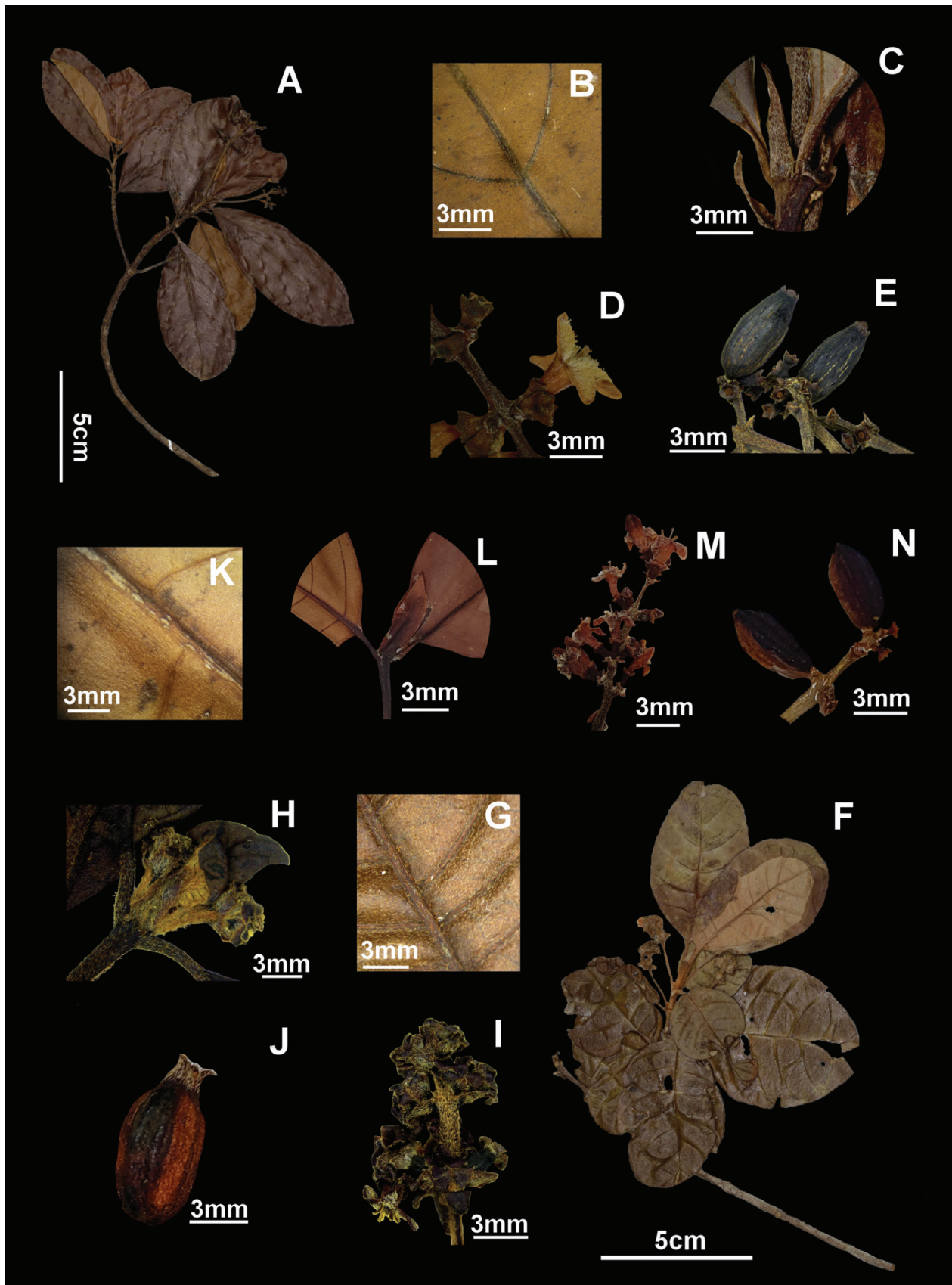


Figure 4. Species of *Malanea* from the Atlantic Forest. **A–E.** *M. martiana*. **A.** Habit (Guedes 24971). **B.** Lower surface of leaf (Sant’Ana 439). **C.** Stipule (Guedes 24971). **D.** Flower (Guedes 24971). **E.** Fruits (Bautista 1748). **F–J.** *M. revolutifolia*. **F.** Habit (Popovkin 25). **G.** Lower surface of leaf (Ferreira 721). **H.** Stipule (Ferreira 721). **I.** Inflorescence (Ferreira 721). **J.** Fruits (Gusmão 469). **K–N.** *M. spicata*. **K.** Lower surface of leaf (Nunes 751). **L.** Stipule (Thomas 9885). **M.** Flower (Carvalho 214). **N.** Fruits (Fiaschi 1106).

of Santa Maria do Salto, close to the border with Bahia (Fig. 1D).

Habitat and ecology. Known only from open moist forests.

Phenology. Flowers from March to October; fruits in January, April, and July to September.

Vernacular name. Cipó-prego (Bahia, Ferreira 721).

Etymology. The epithet *revolutifolia* refers to the strongly revolute leaf margins.

Preliminary IUCN conservation assessment. Vulnerable (VU) B2ab(iii). The extent of occurrence (EOO) of this species was calculated as 136,339 km², qualifying it as Least Concern (LC). The area of occupancy (AOO) was estimated as 80 km², falling into the category Endangered (EN) (Bachman et al. 2011; IUCN 2012, 2022). *Malanea revolutifolia* is known from 27 collections from only ten locations. The locality of Entre Rios and adjacent municipalities have 14 collections, including the type. This specific area is protected by law (Governo do Estado da Bahia, Decreto 1046) since 1992. However, the extraction of the piaçava palm (*Attalea funifera* Mart.) destroys the surrounding forest. The other collections are all from isolated remaining forest patches in the states of Bahia, Minas Gerais, and Sergipe. Therefore, we consider this species as Vulnerable according to IUCN criteria (IUCN 2012, 2022).

Comment. Although often misidentified as *Malanea evenosa*, *M. revolutifolia* is distinguished from it by the hispid to ferruginous-tomentose indumentum in the young branchlets (vs glabrous to pubescent in *M. evenosa*), leaves with strigose petiole (vs pubescent to sericeous), acute, when young, to rounded apex (vs acute to acuminate), strongly revolute margins (vs slightly revolute), tomentose to hirsute below (vs pubescent with short golden trichomes adpressed), hairy domatia absent (vs present), 7–11 pairs of secondary veins (vs 5–6), secondary veins conspicuous above (vs inconspicuous), and deeply lobed calyx (vs slightly). Before the description of *M. revolutifolia* (Amaya and Popovkin 2012), specimens with strongly revolute leathery leaves from Bahia were mostly identified as *M. sarmentosa*, a species restricted to the Amazon. However, *M. revolutifolia* can be distinguished from that by its flat to inconspicuous tertiary veins on the upper side of the leaves, inflorescences 4.5–6 cm long, deeply lobed calyx, and fusiform to elliptical fruits. *Malanea sarmentosa* presents reticulate tertiary veins, inflorescences 1.5–2.5 cm long, dentate calyx, and cylindrical fruits (Taylor et al. 2007).

Material examined. BRAZIL – Bahia • Almadina, Serra do Corcovado, acesso pela vertente oposta à de Seu Francisco; 14°42'06"S, 39°36'12"W; 8 Jun. 2012; fr.; Coelho 830; CEPEC • Cardeal da Silva, próximo a BA-400; 16 Feb. 1978; fb.; Orlandi s.n.; RB • Conde, Fazenda do Bu; 12°01'33"S, 37°42'14"W; 1 Jun. 1995; fb., fl.; Ferreira & Silva 721; CEPEC, HUEFS, IPA, JPB • Entre Rios, Areial; 12°15'S, 37°53'W; 60 m; 9 Jan. 2012; fl.; Popovkin 1027; HUEFS • Entre Rios, Areial; 12°15'S, 37°53'W; 60 m; 13 Apr. 2012; fl.; Popovkin 1102; HUEFS • Entre Rios,

Areial; 12°15'S, 37°53'W; 60 m; 13 Apr. 2012; fr.; Popovkin 1103; HUEFS • Entre Rios, Areial; 12°01'S, 38°02'W; 153 m; 13 Feb. 2012; st.; Popovkin 1060; HUEFS • Entre Rios, Fazenda Experimental da Escola de Medicina Veterinária (UFBA); 11°56'30"S, 38°05'03"W; 24 Oct. 2009; fb.; Roque 2244; ALCB • Entre Rios, Fazenda Rio do Negro; 12°01'S, 38°02'W; 150 m; 14 Aug. 2008; fl.; Popovkin 349; HUEFS • Entre Rios, Fazenda Rio do Negro; 12°01'S, 38°02'W; 150 m; 30 Apr. 2011; fl.; Popovkin 877; HUEFS • Entre Rios, Fazenda Rio do Negro; 12°01'S, 38°02'W; 150 m; 11 Jul. 2011; fl., fr.; Popovkin 899; HUEFS • Entre Rios, Fazenda Rio do Negro; 12°53'S, 37°57'W; 153 m; 26 May 2007; fl.; Popovkin 25; HUEFS • Entre Rios, Imbé; 12°04'S, 38°00'W; 15 Mar. 2012; fl.; Popovkin 1075; HUEFS • Entre Rios, rodovia BA 099, km 98 à direita; 12°13'34"S, 37°50'13"W; 50 m; 14 Nov. 2000; fl.; Alves 2030, CEPEC, RB • Ibirapitanga, 22 km N of Itamarati on BR 101, then 6.8 km E on the road to Embratel Tower, Reserva Municipal Cachoeira do Pau; 13°53'27"S, 39°27'33"W; 690 m; 19 May 2003; fl.; Thomas 13443; CEPEC, NY • Itanagra; 12°26'30"S, 38°04'16"W; 14 Sep. 1980; fr.; Gusmão 469; ALCB, PEUFR • Itanagra, Fazenda Brejo Verde; 12°25'S, 38°03'W; 18 Apr. 1976; fl.; Gusmão 397; ALCB, RB • Santa Teresinha, Serra da Jibóia ca 4 km de Pedra Branca; 12°51'10"S, 39°28'32"W; 27 Sep. 2000; fr.; Queiroz 6388; HUEFS • Santa Teresinha, Serra da Jibóia; 12°51'17"S, 41°48'53"W; 15 Apr. 2000; fr.; Silva 55; HUEFS • Santa Teresinha, Serra da Jibóia; 800 m; 12°51'S, 39°28'W, 8 Jul. 1999; fr.; França 3198; HUEFS • Santa Teresinha, Vila da Pedra Branca, Serra da Jibóia, entrada para a torre de tv; 850 m; 11 Nov. 2000; fr.; Alves 2001; CEPEC, RB • Simões Filho; 12°47'04"S, 38°24'14"W; 10 Nov. 1980; fl.; Gusmão 501; ALCB • Uruçuca, estrada de Serra Grande para Uruçuca, área do inventário do plano de manejo do Parque Estadual da Serra do Conduru; 14°29'59"S, 39°06'54"W; 380 m; 2 Apr. 2004; fb., fl.; Fiaschi 2208; CEPEC. – Minas Gerais • Santa Maria do Salto, Povoado de Talismã, Fazenda Duas Barras, Reserva Alto Cariri, trilha do sul que sai em Santa Maria do Salto; 16°24'13"S, 40°03'16"W; 950 m; 22 Apr. 2006; fl.; Amorim 5853; CEPEC. – Sergipe • Linha Verde, km 74 ca 5 km da divisa com o estado da Bahia; 11°47'23"S, 37°55'25"W; 12 Oct. 2000; fr.; Silva 55; HUEFS • Santa Luzia do Itanhi, entrada 2 km à esquerda na estrada Santa Luzia/Crasto; 11°16'06"S, 37°26'19"W; 14 Jun. 1994; fb.; Jardim 449; CEPEC, NY.

Malanea spicata Müll.Arg. (Müller 1881: 457)

Fig. 4K–N

Type. BRAZIL • Rio de Janeiro, Mauá; 8 Apr. 1875; fl., fr.; Glaziou 8166; lectotype (**designated here**): P [P00507166]; islectotype: G frag. [G00074054].

Description. Scandent shrub ca 6 m tall; branchlets greyish brown, glabrous. Stipules obovate, 5–7 × 2.5–3 mm, acute, glabrous. Leaves with petioles 0.4–0.84 cm long, glabrous; blades elliptic-lanceolate to obovate, 8–10.4 × 3.1–4.15 cm, acute to cuneate at base, acute to cuneate at apex,

margin flat, membranaceous to chartaceous, concolorous, glabrous on both sides; secondary veins 5–7 on each side of the midrib, impressed above, prominent below; tertiary veins inconspicuous. Inflorescence paniculate, 4.5–7 cm long, 1–2 per axil, glomerules (4–)5–7(–8) with 7–10 flowers each; peduncle 1.2–2.1 cm long, strigose; bracts ovate to triangular, 2.2–6.6 mm long, pubescent; bracteoles triangular, 0.1 × 0.2 mm, externally tomentose. Flower buds glabrous to glabrescent. Calyx subtruncate, ca 0.7 mm long, glabrous. Corolla white or cream, tube 1.2–1.5 mm long, externally glabrescent, internally villous; lobes rounded, 1.1–1.5 × 0.5–0.9 mm, externally glabrous to glabrescent, internally villous. Stamens with filaments ca 0.3 mm long; anthers ca 0.5 mm long. Style on short-styled flowers ca 2 mm beneath the mouth of the corolla, on long-styled flowers 3–3.5 mm long above. Fruits fusiform to ellipsoid, 5.2–6 × 3.5 mm, purple, glabrous; persistent calyx lobes tiny.

Distribution. Previously known only from Rio de Janeiro. It is registered here for the first time in Bahia (Fig. 1D).

Phenology. Flowers from December to February; fruits in January, May, and August.

Etymology. The epithet *spicata* refers to the spiciform inflorescence.

Preliminary IUCN conservation assessment. Endangered (EN) B2ab(iii). The extent of occurrence (EOO) of this species was calculated as 57,711 km², qualifying it for the category Least Concern (LC). The area of occupancy (AOO) was estimated as 28 km², falling into the category Endangered (EN) (Bachman et al. 2011; IUCN 2012, 2022). The species has only the type specimen collected in the state of Rio de Janeiro, in 1875. All the other eight collections are from Bahia, from only three locations in a very restricted and fragmented area in southern Bahia (Delprete and Jardim 2019). For this reason, we consider this species as Endangered (EN).

Notes. Müller (1881) described *Malanea spicata* and cited the gathering Glaziou 8166. One complete specimen of Glaziou 8166 was found in P, a fragment in G, and a photo of the destroyed specimen from B in F. Only the fragment at G has a label handwritten by Müller. Despite that, the specimen at P (P00507166) is being chosen as the lectotype because it is the only one with leaves, flower buds, and flowers in anthesis in good condition, which well characterize this species.

Comment. *Malanea spicata* is frequently misidentified as *M. obovata* Hochr. (Hochreutiner 1910). However, it can be distinguished by its membranaceous to chartaceous leaves that are acute to cuneate at the base (vs leathery, attenuate at the base in *M. obovata*), 5–7 secondary veins on each side (vs 7–9), and the externally glabrous corolla (vs hairy). Furthermore, *M. obovata* occurs only in the Amazon domain, while *M. spicata* is endemic to the Atlantic Forest.

Material examined. BRAZIL – Bahia • Belmonte, Estação Ecológica Gregório Bondar; 16°06'11"S, 39°12'26"W; 120 m; 8 Jan. 2002; fr.; Nunes 791; HUEFS • Belmonte, Estação Ecológica Gregório Bondar; 12 Aug. 1981; fr.; Brito 57;

CEPEC • Belmonte; 16°08'S, 39°15'W; 12 May 1993; fr.; Thomas 9885; CEPEC, NY [416392] • Itacaré, estrada de Itacaré para Maraú, pouco após a desembocadura do Rio de Contas; 14°15'S, 39°00'W; 12 Dec. 2002; fr.; Fiaschi 1106; CEPEC, NY • Maraú, Rod. BR-030, trecho Porto de Campinhos-Maraú, km 11; 26 Feb. 1980; fb., fl.; Carvalho 214; HUEFS, CEPEC • Maraú, mata costeira; 13 Jan. 1967; fl.; Belém 3117; CEPEC, RB • Ubaitaba-Maraú; 13 Dec. 1967; fb.; Vinha 31; CEPEC. – Rio de Janeiro • Rio de Janeiro, Mauá; 8 Apr. 1875; fr.; Glaziou 8166; RB.

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REFERENCES

- Amaya A (2008) The genus *Malanea* (Guettardeae, Rubiaceae) in Venezuela. In: Ochoterena H et al. (Eds) IV International Rubiaceae (Gentianales) Conference. Programme & Abstracts. Scripta Botanica Belgica vol. 44. National Botanic Garden of Belgium, Meise, 20.
- Amaya A, Delprete PG (2010) The genus *Malanea* Aubl. (Guettardeae, Rubiaceae) in the Guianas (Guyana, Suriname and French Guiana). In: Fifth International Rubiaceae and Gentianales Conference – Biodiversity in the light of Historical Information. The Royal Swedish Academy of Sciences, Stockholm, 21.
- Amaya A, Popovkin A (2012) *Malanea revolutifolia* (Guettardeae: Rubiaceae), una nueva especie del noreste de Brasil. Rodriguésia 63(4): 929–932. <https://doi.org/10.1590/S2175-78602012000400011>
- Aublet JBCF (1775) *Malanea* In: Aublet JBCF (Ed.) Histoire des Plantes de la Guyane Française, vol. 1. P. F. Didot jeune, Paris, 106–108.
- Bachman S, Moat J, Hill AW, de la Torre J, Scott B (2011) Supporting Red List threat assessments with GeoCat: geospatial conservation assessment tool. ZooKeys 150: 117–126. <https://doi.org/10.3897/zookeys.150.2109>
- Barbosa MRV (2007) *Malanea*. In: Wanderley MGL, Shepherd GJ, Melhem TS, Guiliatti AM (Eds) Flora fanerogâmica do Estado de São Paulo, vol. 5. Instituto de Botânica, São Paulo, 362–363.
- Barbosa MRV (2020) *Malanea* In: Flora do Brasil 2020, Jardim Botânico do Rio de Janeiro, Rio de Janeiro. <http://floradobrasil.jbrj.gov.br/reflora/floradobrasil/FB14088> [accessed 13.10.2020]

- Barbosa ER, Rios PAF (2006) Cobertura original, cobertura atual e unidades de conservação da Mata Atlântica alagoana. In: Prado FB (Org.) A Mata Atlântica em Alagoas. Maceió, EDUFAL, 29–34.
- Brasil (2006) Lei nº 11.428, de 22 de dez. de 2006: Das definições, objetivos e princípios do regime jurídico do bioma Mata Atlântica. Distrito Federal, Brasília.
- Bremer B, Eriksson O (2009) Time tree of Rubiaceae: phylogeny and dating the family, subfamily, and tribes. *International Journal of Plant Science* 170(6): 766–793. <https://doi.org/10.1086/599077>
- Delprete PG (2010) *Malanea* In: Rizzo JA (Ed.) Flora dos Estados de Goiás e Tocantins. Universidade Federal de Goiás, Goiânia, 640–644.
- Delprete PG, Jardim, JG (2019) *Amaioua longipedicellata* (Rubiaceae, Gardenieae), a new species from the Brazilian Atlantic coast. *Plant Ecology and Evolution* 152(1): 84–92. <https://doi.org/10.5091/plecevo.2019.1529>
- Delprete PG, Smith LB, Klein RB (2005) *Malanea*. In: Reis A (Ed.) Flora Ilustrada Catarinense. Herbário Barbosa Rodrigues, Itajaí, 430–433.
- Giudice DS (2022) Geodiversity and occupation of space-physical geography, human geography interface: the example of the Chapada Diamantina, Bahia, Brazil. *Revista Geográfica de América Central* 69(2): 155–174. <https://doi.org/10.15359/rgac.69-2.5>
- Giudice DS, Souza RM (2009) As cidades da mineração na Chapada Diamantina – Bahia. *Revista Geonordeste* 1: 199–206.
- Grisebach A (1861) *Malanea*. In: Grisebach A (Ed.) Flora of the British West Indian Islands, vol. 1. L. Reeve, London, 337.
- Harris J, Harris M (2001) Plant Identification Terminology: an Illustrated Glossary. Spring Lake Publishing, Utah, 1–216.
- Hochreutiner BPG (1910) Critical notes on new or little known species in the Herbarium of the New York Botanical Garden. *Bulletin of the New York Botanical Garden* 6: 289.
- IBGE (2012) Manual Técnico da Vegetação Brasileira. IBGE, Rio de Janeiro, 1–271.
- IUCN (2012) IUCN Red List Categories and Criteria. Version 3.1. 2nd Edition. Prepared by the IUCN Species Survival Commission. Gland & Cambridge, IUCN. <https://www.iucnredlist.org/resources/categories-and-criteria> [accessed 08.07.2022]
- IUCN (2022) Guidelines for Using the IUCN Red List Categories and Criteria. Version 15. <https://www.iucnredlist.org/resources/redlistguidelines> [accessed 05.05.2023]
- Kirkbride JH (1997) Manipulus rubiacearum—VI. *Brittonia* 49(3): 354–379. <https://doi.org/10.2307/2807836>
- Machado MR (2008) O processo histórico do desmatamento do Nordeste Brasileiro: impactos ambientais e atividades econômicas. *Revista de Geografia* 23(2): 123–134.
- Martius CFP (1839) 394 *Malanea sarmentosa*. In: Martius CFP (Ed.) Herbarium florae brasiliensis. Flora 22(1), Beiblatt 1: 56.
- Morellato LPC, Haddad CFB (2000) Introduction: the Brazilian Atlantic Forest. *Biotropica* 32(4b): 786–792. <https://doi.org/10.1111/j.1744-7429.2000.tb00618.x>
- Mori SA, Mattos-Silva LA, Lisboa G, Coradin (1985) Manual de Manejo do Herbário Fanerogâmico. Centro de Pesquisas do Cacau, Ilhéus, 1–104.
- Moura FBP (2006) Introdução: conceito, abrangência e principais ameaças à Mata Atlântica brasileira. In: Moura FBP (Ed.) Conversando Sobre Ciências: a Mata Atlântica em Alagoas. Edfal, Maceió, 7–18.
- Müller J (1875) *Malanea*. Flora, oder Allgemeine Botanische Zeitung, Regensburg, 58: 453, 457–458.
- Müller J (1881) *Malanea*. In: von Martius CFP (Ed.) Flora Brasiliensis, vol. 6(5). Fleischer, Leipzig & Munich, 43–48.
- Pessoa MCR (2016) Filogenia do gênero *Chomelia* Jacq. (Rubiaceae) e revisão taxonômica das espécies brasileiras. PhD Thesis, Universidade Federal de Pernambuco, Recife, Brazil.
- QGIS Development Team (2020) QGIS Geographic Information System. Version 3.14. Open Source Geospatial Foundation. <https://qgis.org> [accessed 01.01.2023]
- Radford AE, Dickison WC, Massey JR, Bell CR (1974) Vascular Plant Systematics. Harper and Row, New York, 1–89.
- Ribeiro MC, Metzger JP, Martensen AC, Ponzoni FJ, Hirota MM (2009) The Brazilian Atlantic Forest: how much is left, and how is the remaining forest distributed? Implications for conservation. *Biological Conservation* 142: 1141–1153. <https://doi.org/10.1016/j.biocon.2009.02.021>
- Sabino AL (2012) Turismo e expansão de domicílios particulares para uso ocasional no litoral do sudeste do Brasil. PhD Thesis, Universidade de São Paulo, São Paulo, Brazil.
- Schomburgk MR (1848) *Malanea macrophylla* In: Schomburgk R (Ed.) Reisen in Britisch-Guiana in den Jahren 1840–1844, vol. 2. J.J. Weber, Leipzig, 947.
- Schreber JCD von (1791) *Cunninghamia*. In: Linnaeus C (Ed.) Genera Plantarum, Edition Octavia, vol. 2. Frankfurt am Main, Suntu Varrentrappii et Wenneri, 789.
- Standley PC (1931) Studies of the American Plants – V. Publications of the Field Museum of Natural History, Botanical series 8(5): 365.
- Standley PC (1940) Studies of American Plants - X. Publications of the Field Museum of Natural History. Botanical series 22(2): 117–118.
- Stehmann JR (2009) Diversidade taxonômica na Floresta Atlântica. In: Stehmann JR (Ed.) Plantas da Floresta Atlântica. Jardim Botânico do Rio de Janeiro, Rio de Janeiro, 3–27.
- Steyermark JA (1965) *Malanea*. In: Maguire B and collaborators (Eds) The Botany of the Guayana Highland—part VI. Memoirs of the New York Botanical Garden 12: 244–263.
- Targino I, Maia-Filho ACE, Moreira E (2010) Transformações recentes da organização do espaço canavieiro paraibano. *Economia e Desenvolvimento* 9(1): 104–136.
- Taylor CM (2022) *Malanea* Aubl. In: Taylor CM and collaborators, Rubiaceae Project. Tropicos.org. Missouri Botanical Garden. <http://legacy.tropicos.org/Name/40012623?projectid=34> [accessed 21.06.2023]
- Taylor CM, Steyermark JA (2004) *Malanea*. In: Steyermark JA, Berry PE, Yatskievych K, Holst BK (Eds) Flora of the Venezuelan Guayana, vol. 8. Missouri Botanical Garden Press, St. Louis, 547–550.

- Taylor CM, Campos MTVA, Zappi D (2007) Flora da Reserva Ducke, Amazonas, Brasil: Rubiaceae. *Rodriguésia* 58(3): 549–616. <https://doi.org/10.1590/2175-7860200758306>
- Thiers B (2023) Index Herbariorum: a global directory of public herbaria and associated staff. New York Botanical Garden's Virtual Herbarium. <https://sweetgum.nybg.org/science/ih/> [accessed 11.05.2022]
- Thomas WW, Barbosa MRV (2008) Natural Vegetation Types in the Atlantic Coastal Forest of Northeastern Brazil. In: Thomas WW (Ed.) *The Atlantic Coastal Forest of Northeastern Brazil*. Botanical Garden Press, New York, 6–20.
- Wernham HF (1913) *Malanea megalantha*. *Journal of Botany, British and Foreign*. London 51: 221.