

Between Caatinga and Atlantic Forest: Floristic Composition in a Transition Area in Northeast Brazil

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Abstract

The objective of this study was to carry out an inventory of the vascular plant species of Serra do Jatobá in the municipality of Milagres, Bahia. The survey included species of all habits and respective degrees of endemism, phytogeographic domains and threat categories, to contribute data about the flora of the Bahia semiarid region to enable management and preservation of species, to support the future creation of conservation units in Bahia inselbergs. We recorded 317 species, 208 genera and 71 families, with predominance of species belonging to the Bromeliaceae, Fabaceae, Euphorbiaceae and Asteraceae families. We identified 53 endemic species of the Caatinga, and 18 exclusive to the Atlantic Forest. Of these species, 24 are endemic to Bahia and five species are considered vulnerable. The floristic survey of Serra do Jatobá demonstrated high biodiversity, reinforcing the importance of ongoing research in the area for the implementation of a conservation unit.

Keywords: Caatinga, Endangered species, Endemism, Flora, Semiarid.

1. INTRODUCTION AND OBJECTIVES

Brazil is considered the country with one of the greatest biodiversities in the world, sheltering about 37 thousand species of vascular plants (Flora e Funga do Brasil, 2022). Floristic inventory efforts have increased in the last decade, resulting in the production of complete lists, making an important contribution to the conservation of the country's biodiversity (Forzza et al., 2012; Stehmann & Sobral, 2017; Fernandes et al., 2020; Flora e Funga do Brasil, 2022). Nevertheless, the existence of these lists does not eliminate the need for punctual and long-term floristic studies, investigations focused on specific areas, and ecological analyses to characterize the vegetation, because the recording of a plant species in a determined locale adds data on the distribution and patterns of occurrence, thus shedding light on the biogeography of biomes (Kendal & Snelson, 2009; Moro et al., 2011). The resulting datasets are important for delineation and conservation of the plant communities with different phytophysiognomies or habits (Kendal & Snelson, 2009; Moro et al., 2011; Chaves et al., 2013).

Transitional environments are common between the Caatinga phytogeographic domain (CPD), inserted in the Brazilian semiarid region and present in all states of the Northeast as well as the northern part of the state of Minas Gerais (Cardoso & Queiroz, 2008; Pereira et al., 2020; Ganem, 2022). The Atlantic Forest phytogeographic domain (AFPD), which covers around 15% of Brazil's territory and is distributed along the entire coastline from the northern state of Piauí to the southern state of Rio Grande do Sul, along with isolated areas in Goiás, Mato Grosso and Minas Gerais (SOS Atlantic Forest, 2018). Despite advances in floristic knowledge of Bahia, both in the Caatinga (Cardoso & Queiroz, 2007; Costa et al., 2015; Vitória et al., 2019) and Atlantic Forest phytogeographic domain (Mori et al., 1981; Carvalho-Sobrinho & Queiroz, 2005; Thomas et al., 2009; Alves et al., 2015; Moreira et al., 2020), efforts are still lacking to produce systematic floristic lists for these transitional areas between CPD and AFPD.

A gap also exists in floristic knowledge of the Caatinga phytogeographic domain in Bahia, 54% of whose area is composed of this phytogeographic domain. Many Caatinga

areas have undergone poor or no sampling (IBGE, 2004; Moro et al., 2014). Only a few studies have investigated all plant habits of Caatinga areas in Bahia, such as Ramalho et al. (2009), Fabricante et al. (2012), Costa et al. (2015) and Vitória et al. (2019). Knowledge about the Caatinga declines considerably in areas of transition to the Atlantic Forest, where studies focused on epiphytes have revealed high diversity in these areas, as found by Souza et al. (2021) and Carvalho et al. (2020) both performed at Serra do Jatobá, Milagres, Bahia.

Serra do Jatobá is a transitional area between the Caatinga and Atlantic Forest biomes located in the municipality of Milagres, Bahia. A few studies of the area's flora among those mentioned above have revealed high diversity. Carvalho et al. (2020) reported high diversity of epiphytes, while Souza et al. (2021) presented one of the most comprehensive investigations of Bromeliaceae in comparison with studies in the Caatinga and Atlantic Forest domains. Our objective was to investigate the floristic composition of the Serra do Jatobá region in Milagres, Bahia, covering species with all habits, with their respective degrees of endemism, phytogeographic domains and threat categories, to contribute data on the flora of the semiarid region of

Bahia for management and preservation of species and future creation of conservation units in Bahia inselbergs.

2. MATERIAL AND METHODS

2.1. Study area

The study was conducted in a Caatinga area located in the Serra do Jatobá region in the municipality of Milagres, Bahia, Brazil, with central coordinates 12°55'24"S and 39°46'43"W. The vegetation consists of five phytophysiognomies: anthropized Caatinga with pasture; conserved Caatinga; slope vegetation, semideciduous seasonal forest; and an inselberg, typified as "whaleback", with altitude of 392 m, length of 1,670 m and width of 1,417 m (Souza et al., 2021) (Figure 1). Its origin comes from outcrops of granitic rock arranged in groups (Ab'saber 1974). Its lithology originates from the Lower Precambrian, consisting of gneisses, magmatite and granite intrusions (Santos and Salgado 2010). The local landscape contains inselbergs, which are small monolithic mountains or groups of them with geographic formation consisting mainly of granitic or gneissic rocks (Porembski et al. 1998).

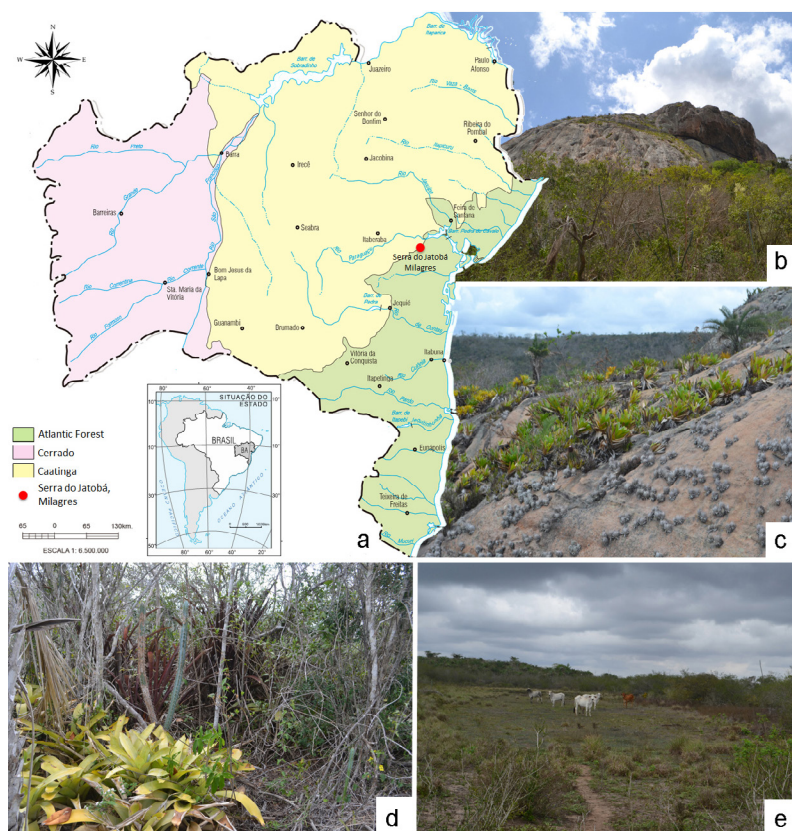


Figure 1. a) Map and location of the Jatobá community, Milagres, Bahia. Brazil. b) Front view of inselberg typified as "whaleback". c) Vegetation on the top of the inselberg. d) Conserved Caatinga area. e) Pasture area in the upper part of the inselberg.

The area has human interference, because part is used for farming and livestock grazing by the local community, had been submitted to burning on various occasions in the past 50 years (Carvalho et al., 2020). The municipality has a dryness index of 58.1, average yearly rainfall of 480.5 mm and average annual temperature of 23.0 °C (SEI, 1999). The climate is classified as BSh (hot semiarid climate) according to the scale of Köppen & Geiger (1928).

2.2. Floristic inventory

Specimens were collected between July 2018 and February 2022. Collections were made by random walks in the area. Collections were periodic, covering the dry and rainy seasons. All vascular plants occurring in the area were collected. We collected plants belonging to all the habits. The specimens collected were herborized and vouchers were deposited in the collection of the Recôncavo da Bahia Herbarium (HURB). The plants were identified by consulting the specialized literature, comparison with previously identified material in online herbaria databases

(SpeciesLink, 2022; Re flora, 2022) and/or consultation with specialists of each taxonomic group. All data associated with species, such as geographic distribution, habits, domains of occurrence, and origin were checked in the Flora and Funga from Brazil (<http://floradobrasil.jbrj.gov.br>).

The list of species indicates the scientific names, families and habits of the plants collected during this study along with the same information about specimens previously collected in the area (Carvalho et al., 2020; Souza et al., 2021). The classification followed the APG IV system (2016) for angiosperms and PPG I (2016) for ferns.

3. RESULTS

We recorded 317 species, distributed in 208 genera and 71 families, with predominance of Bromeliaceae (37 spp.), Fabaceae (36 spp.), Euphorbiaceae (22 spp.), Asteraceae (15 spp.), Malvaceae and Myrtaceae (11 spp.) (Table 1, Figure 2 and 3). The richest genera were *Tillandsia* L. (Bromeliaceae, 13 spp.), *Aechmea* Ruiz & Pav. (Bromeliaceae), *Croton* L. (Euphorbiaceae) and *Eugenia* L. (Myrtaceae) with five spp.

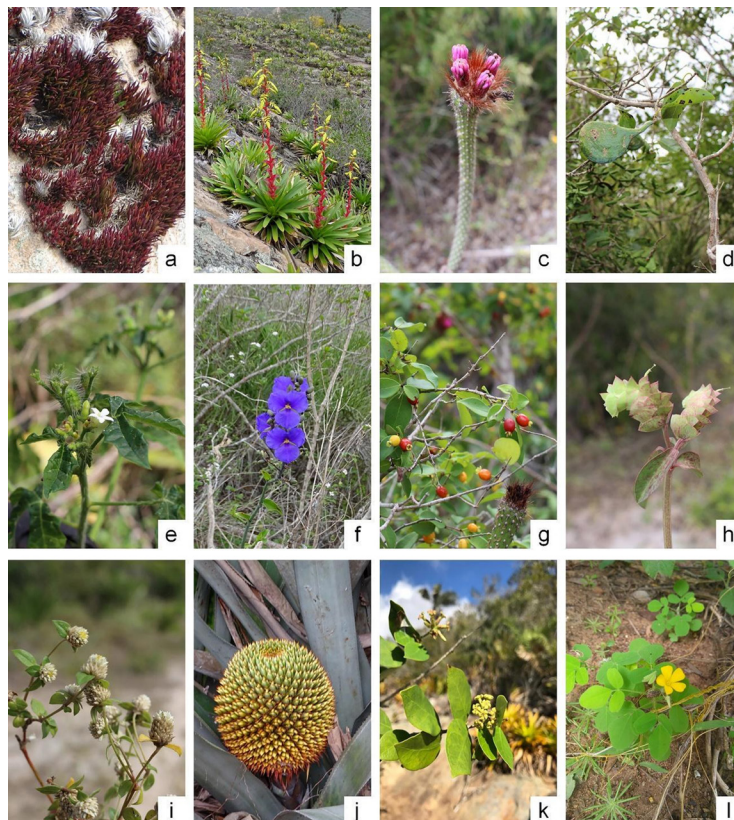


Figure 2. Species occurring in Serra do Jatobá - Bahia. (a) *Acianthera ochreatea* (Orchidaceae). (b) *Alcantarea nahoumii* (Bromeliaceae). (c) *Arrojadoa penicillata* (Cactaceae). (d) *Aspidosperma pyriformium* (Apocynaceae). (e) *Cnidoscolus urens* (Euphorbiaceae). (f) *Dichorisandra saxatilis* (Commelinaceae). (g) *Eugenia puniceifolia* (Myrtaceae). (h) *Euphorbia heterodoxa* (Euphorbiaceae). (i) *Gomphrena celosioides* (Amaranthaceae). (j) *Karawata multiflora* (Bromeliaceae). (k) *Marsdenia caatingae* (Apocynaceae) (l) *Oxalis frutescens* (Oxalidaceae).

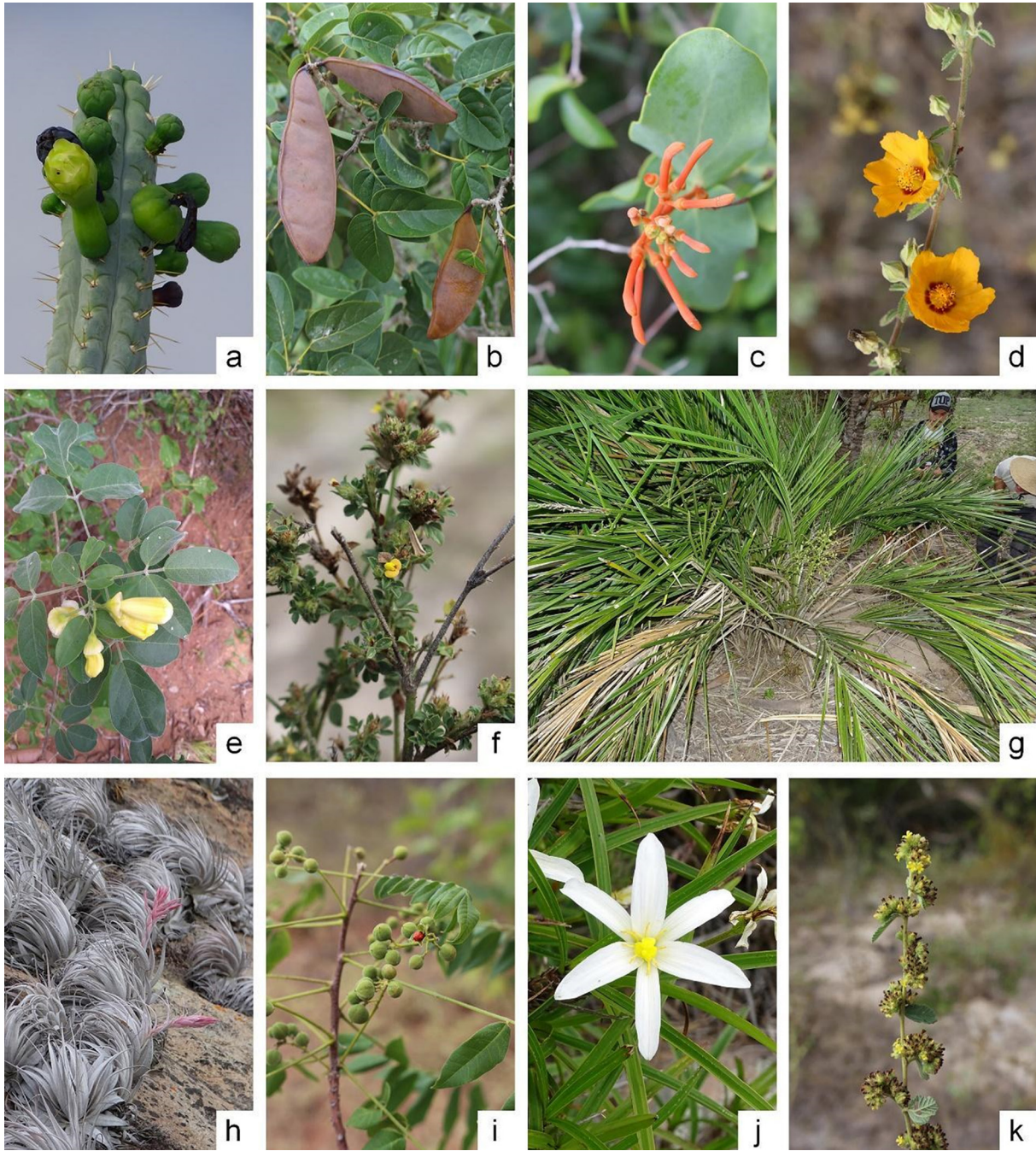


Figure 3. Species occurring in Serra do Jatobá - Bahia. (a) *Pilosocereus pentaedrophorus* (Cactaceae). (b) *Poecilanthe ulei* (Fabaceae). (c) *Psittacanthus cordatus* (Loranthaceae). (d) *Sida galheirensis* (Malvaceae). (e) *Stizophyllum perforatum* (Bignoniaceae). (f) *Stylosanthes viscosa* (Fabaceae). (g) *Syagrus vagans* (Arecaceae). (h) *Tillandsia chapeuensis* (Bromeliaceae) (i) *Trichilia hirta* (Meliaceae). (j) *Vellozia candida* (Velloziaceae) (k) *Waltheria indica* (Malvaceae).

Table 1. List of vascular species in Serra do Jatobá, Milagres, Bahia, Brazil with their respective habits, endemism, phytogeographic domains and conservation status (CS). H – Habit; Sub – subshrub; Vin – Vine; Hrb – Herb; Tree – Tree; Shrub – Shrub; SB – Substrate; T – Terrestrial; R – Rupicolous; E – Epiphyte; P – Parasite; HE – Hemiepiphyte; HP – Hemiparasite; * - Naturalized; LE – Local endemism; BA – Bahia; NE – Northeast; PD – Phytogeographic domain; AM – Amazon Forest; CA – Caatinga; CE – Cerrado; PN – Pantanal; AF – Atlantic Forest; PM – Pampa; LC – ‘Least Concern’; VU – ‘Vulnerable’; DD – ‘Deficient Data’; EN – ‘Endangered’.

Species	H	SB	LE	PD	CS	Voucher (HURB)
ACANTHACEAE						
<i>Ruellia asperula</i> (Mart. ex Nees) Lindau	Sub	T		CA		25686
<i>Ruellia bahiensis</i> (Nees) Morong	Sub	T		CA		25520
ALSTROEMERIACEAE						
<i>Bomarea edulis</i> (Tussac) Herb.	Vin	T		AM/CA/CE/AF/PN		22298
AMARANTHACEAE						
<i>Alternanthera brasiliana</i> (L.) Kuntze	Sub	T		AM/CA/CE/AF/PM/PN		25738
<i>Alternanthera multicaulis</i> Kuntze	Sub	T	BA	CA	VU	24486
<i>Gomphrena celosioides</i> Mart.	Sub	T		AM/CA/CE/AF/PM/PN		24473
<i>Gomphrena demissa</i> Mart.	Sub	T		AM/CA/CE/AF		26316
<i>Gomphrena vaga</i> Mart.	Hrb	T		AM/CA/CE/AF/PM/PN		18367
AMARYLLIDACEAE						
<i>Hippeastrum stylosum</i> Herb.	Hrb	R	NE	CA		22296
ANACARDIACEAE						
<i>Astronium urundeuva</i> (M.Allemão) Engl.	Tree	T		CA/CE/AF/PM/PN		25537
<i>Spondias bahiensis</i> P. Carvalho et al.	Tree	T	NE	CA	LC	25744
ANNONACEAE						
<i>Annona vepretorum</i> Mart.	Shrub	T	NE	CA		25690
APOCYNACEAE						
<i>Aspidosperma pyrifolium</i> Mart. & Zucc.	Tree	T		CA/CE		25713
<i>Ditassa capillaris</i> E.Fourn.	Vin	R/T		CA/CE		18408
<i>Mandevilla bahiensis</i> (Woodson) M.F.Sales & Kin.-Gouv.	Vin	R	BA	CA/CE		25708
<i>Mandevilla sancta</i> (Stadelm.) Woodson	Vin	R	BA	CA/CE		25710
<i>Mandevilla tenuifolia</i> (J.C.Mikan) Woodson	Sub	R/T		AM/CA/CE/AF		22269
<i>Marsdenia caatingae</i> Morillo	Shrub	R		CA/AF		22273
<i>Marsdenia macrophylla</i> (Humb. & Bonpl. ex Schult.) E.Fourn	Vin	T		AM/CA/CE/AF		23068
APODANTHACEAE						
<i>Pilostyles blanchetii</i> (Gardner) R.Br.	Hrb	P		CA/CE		27135
ARACEAE						
<i>Anthurium affine</i> Schott	Hrb	R		CA/CE/AF		22998
<i>Anthurium pentaphyllum</i> (Aubl.) G.Don	Hrb	HE		AM/AF/PN		27137
<i>Anthurium petrophilum</i> K.Krause	Hrb	R/T		CA		18810
<i>Philodendron imbe</i> Schott ex Kunth.	Vin	HE		AF		22143
<i>Thaumatococcus leal-costae</i> (Mayo & G.M. Barroso) et al.	Hrb	T	NE	CA/AF		22141
ARECACEAE						
<i>Syagrus coronata</i> (Mart.) Becc.	Pal	T		CA/CE		18800
<i>Syagrus vagans</i> (Bondar) A.D.Hawkes	Pal	T		CA		18801
ASTERACEAE						
<i>Acanthospermum hispidum</i> DC.	Hrb	T		AM/CA/CE/AF/PM/PN		27127
<i>Albertinia brasiliensis</i> Spreng.	Shrub	T		CA/CE/AF		26291
<i>Baccharis trinervis</i> Pers.	Sub	T		AM/CA/CE/AF/PM		23093
<i>Blanchetia heterotricha</i> DC.	Sub	T		CA/AF		18414
<i>Cyrtocymura scorpioides</i> (Lam.) H.Rob.	Sub	T		AM/CA/CE/AF/PM/PN		22309
<i>Erechtites hieracifolius</i> (L.) Raf. ex DC.	Hrb	T		AM/CA/CE/AF/PM/PN		27128
<i>Lepidaploa chalybaea</i> (Mart. ex DC.) H.Rob.	Sub	T		CA/CE		18815
<i>Lepidaploa cotoneaster</i> (Willd. Ex Spreng) H.Rob.	Shrub	T		CA/AF		18413
<i>Melanthera latifolia</i> (Gardner) Cabrera	Hrb	T		AM/CA/CE/AF/PN	LC	21790
<i>Moquiniastrum oligocephalum</i> (Gardner) G. Sancho	Shrub	T		CA/CE		21795

Table 1. Continued...

Species	H	SB	LE	PD	CS	Voucher (HURB)
<i>Platypodanthera melissifolia</i> (DC.) R.M.King & H.Rob.	Hrb	T		CA/CE		18415
<i>Tilesia baccata</i> (L.) Pruski*	Shrub	T		AM/CA/CE/AF		25685
<i>Trixis antimenorrhoea</i> (Schrank) Kuntze	Sub	T		CE/AF		22983
<i>Verbesina macrophylla</i> (Cass.) S.F.Blake	Shrub	T		CA/AF		22306
<i>Wedelia goyazensis</i> Gardner	Shrub	T		CA		27751
BIGNONIACEAE						
<i>Adenocalymma coriaceum</i> A.DC.	Vin	T		AF		22301
<i>Anemopaegma velutinum</i> Mart. ex DC.	Shrub	T		CA/CE		18836
<i>Fridericia bahiensis</i> (Schauer ex. DC.) L.G.Lohmann	Shrub	T		CA/CE/AF		24488
<i>Fridericia platyphylla</i> (Cham.) L.G.Lohmann	Vin	T		AM/CA/CE/AF/PN		18827
<i>Jacaranda jasminoides</i> (Thunb.) Sandwith	Tree	T		CA/CE/AF		21788
<i>Stizophyllum perforatum</i> (Cham.) Miers	Vin	T		CE/AF		22989
<i>Tanaecium selloi</i> (Spreng.) L.G.Lohmann	Vin	T		AM/CA/CE/AF/PM		27129
BORAGINACEAE						
<i>Cordia superba</i> Cham.	Shrub	T		CA/CE/AF		18844
<i>Cordia trichotoma</i> (Vell.) Arráb. ex Steud.	Tree	T		CA/CE/AF/PM		24456
<i>Heliotropium angiospermum</i> Murray	Hrb	T		CA/AF		25736
<i>Myriopus membranaceus</i> (DC.) J.I.M. Melo	Shrub	T		CA/CE/AF		18928
<i>Myriopus rubicundus</i> (Salzm. ex DC.) Luebert	Shrub	T		CA/CE/AF		25509
<i>Varronia curassavica</i> Jacq.	Shrub	T		AM/CA/CE/AF/PM		25702
<i>Varronia globosa</i> Jacq.	Sub	T		CA/AF		27142
<i>Varronia multispicata</i> (Cham.) Borhidi	Shrub	T		AM/CA/CE/AF		19788
BROMELIACEAE						
<i>Aechmea aquilega</i> (Salisb.) Griseb.	Hrb	E		AM/CA/CE/AF		22178
<i>Aechmea disjuncta</i> (L.B.Sm.) Leme & J.A.Siqueira	Hrb	E	BA	AF	EN	26088
<i>Aechmea perforata</i> L.B.Sm.	Hrb	E		CA/AF		22281
<i>Alcantarea nahoumii</i> (Leme) J.R.Grant	Hrb	R	BA	CA/AF	VU	22160
<i>Billbergia euphemiae</i> E.Morren	Hrb	E		AF		22304
<i>Billbergia macrocalyx</i> Hook.	Hrb	E		CE/AF		Souza et al 2021
<i>Billbergia porteana</i> Brong. ex Beer	Hrb	E		CA/CE/AF		22164
<i>Bromelia laciniosa</i> Mart. ex Schult. & Schult.f.	Hrb	T	NE	CA		25984
<i>Cryptanthus bahianus</i> L.B.Sm.	Hrb	T		CA		18805
<i>Dyckia maracasensis</i> Ule	Hrb	T	BA	CA		22132
<i>Encholirium spectabile</i> Mart. ex Schult. & Schult.f.	Hrb	R		CA/AF		Souza et al 2021
<i>Hohenbergia blanchetii</i> (Baker) E.Morren ex Mez	Hrb	E		AF		Souza et al 2021
<i>Hohenbergia flava</i> Leme & C.C.Paula	Hrb	E	BA	AF		22155
<i>Hohenbergia lanata</i> E.Pereira & Moutinho	Hrb	T	BA	AF		23066
<i>Hohenbergia sandrae</i> Leme	Hrb	T	BA	AF		26375
<i>Karawata multiflora</i> (L.B.Sm.) J.R.Maciél & G.Sousa	Hrb	E		AF		22127
<i>Neoglaziovia variegata</i> (Arruda) Mez	Hrb	T		CA		25526
<i>Orthophytum maracasense</i> L.B.Sm.	Hrb	R/T	NE	CA		Souza et al 2021
<i>Orthophytum rubrum</i> L.B.Sm.	Hrb	E			VU	Souza et al 2021
<i>Orthophytum saxicola</i> Ule	Hrb	E	BA			22997
<i>Tillandsia candida</i> Leme	Hrb	E	BA	CA		Souza et al 2021
<i>Tillandsia chapeuensis</i> Rauh	Hrb	R	BA	CA		Souza et al 2021
<i>Tillandsia gardneri</i> Lindl.	Hrb	E		CA/CE/AF/PM	LC	22210
<i>Tillandsia geminiflora</i> Brongn.	Hrb	E		CA/CE/AF/PM	LC	22151
<i>Tillandsia juncea</i> (Ruiz & Pav.) Poiret	Hrb	E		CA/AF		25936
<i>Tillandsia loliacea</i> Mart. ex Schult. & Schult.f.	Hrb	E		CA/CE/AF/PM/PN		22130
<i>Tillandsia millagensis</i> Leme	Hrb	R	BA	CA	EN	19012
<i>Tillandsia polystachia</i> (L.) L.	Hrb	E		AM/CA/CE/AF		22131
<i>Tillandsia recurvata</i> (L.) L.	Hrb	R		CA/CE/AF/PM		22149

Table 1. Continued...

Species	H	SB	LE	PD	CS	Voucher (HURB)
<i>Tillandsia streptocarpa</i> Baker	Hrb	E/R		AM/CA/CE/AF/PM	LC	23065
<i>Tillandsia stricta</i> Sol.	Hrb	E		CA/CE/AF/PM		18799
<i>Tillandsia tenuifolia</i> L.	Hrb	E		AM/CA/CE/AF		Souza et al 2021
<i>Tillandsia usneoides</i> (L.) L.	Hrb	E		AM/CA/CE/AF/PM	LC	23067
<i>Vriesea neoglutinosa</i> Mez	Hrb	E		AF	LC	22133
<i>Vriesea procera</i> (Mart. ex Schult. & Schult.f.) Wittm.	Hrb	E		CA/CE/AF		Souza et al 2021
<i>Wittmackia bicolor</i> (L.B.Sm.) Aguirre-Santoro	Hrb	E	BA	AF		Souza et al 2021
<i>Wittmackia lingulatooides</i> (Leme & H.Luther) Aguirre-Santoro	Hrb	E	NE	CA/AF		22128
CACTACEAE						
<i>Arrojadoa penicillata</i> (Gürke) Britton & Rose	Shrub	R/T		CA		22162
<i>Cereus jamacaru</i> DC.	Tree	T		CA/CE		18802
<i>Melocactus ernestii</i> Vaupel	Sub	R		CA/AF		22159
<i>Pilosocereus pachycladus</i> F.Ritter	Shrub	T		CA/CE		18803
<i>Pilosocereus pentaedrophorus</i> (Cels) Byles & Rowley	Shrub	R/T		CA/AF		22146
<i>Rhipsalis floccosa</i> Salm-Dyck ex Pfeiff.	Hrb	E		CA/CE/AF/PN	LC	22277
<i>Rhipsalis lindbergiana</i> K.Schum.	Hrb	E		CA/AF		22159
CAPPARACEAE						
<i>Colicodendron yco</i> Mart.	Shrub	T	NE	CA		25701
<i>Cynophalla hastata</i> (Jacq.) J.Presl	Shrub	T	NE	CA/AF		22271
<i>Neocalyptocalyx longifolium</i> (Mart.) Cornejo & Iltis	Shrub	T	NE	CA		25692
CARICACEAE						
<i>Jacaratia corumbensis</i> Kuntze	Shrub	T		CE		25506
CELASTRACEAE						
<i>Monteverdia acanthophylla</i> (Reissek) Biral	Shrub	T		CA/CE		26011
<i>Monteverdia rigida</i> (Mart.) Biral	Shrub	T		CA/CE		22163
CHRYSOBALANACEAE						
<i>Hirtella racemosa</i> Lam.	Shrub	T		AM/CA/CE/AF	LC	22322
CLEOMACEAE						
<i>Physostemon guianense</i> (Aubl.) Malme	Hrb	T		AM/CA/CE/PN		25733
CLUSIACEAE						
<i>Clusia dardanoi</i> G.Mariz & Maguire	Tree	T	NE	CA		18772
<i>Clusia fluminensis</i> Planch. & Triana	Shrub	T		AF		18814
COMMELINACEAE						
<i>Callisia repens</i> (Jacq.) L.	Hrb	T		CA/AF/PP		18389
<i>Commelina erecta</i> L.	Hrb	T		AM/CA/CE/AF/PN		25698
<i>Dichorisandra</i> aff. <i>rhizantha</i> Aona	Hrb	T	BA	AF		27133
<i>Dichorisandra saxatilis</i> Aona & M.C.E.Amaral	Hrb	R	BA	CA	EN	22985
CONVOLVULACEAE						
<i>Cuscuta partita</i> Choisy	Hrb	P		AM/CA/CE/AF		25522
<i>Evolvulus echioides</i> Moric.	Sub	T		CA		24314
<i>Evolvulus glomeratus</i> Nees & Mart.	Hrb	T		AM/CA/CE/AF/PM		22291
<i>Evolvulus pterocaulon</i> Moric.	Hrb	T		CA/CE/AF		24467
<i>Ipomoea bahiensis</i> Willd. ex Roem. & Schult.	Vin	T		AM/CA/CE/AF		24462
<i>Ipomoea franciscana</i> Choisy	Vin	T		CA		19793
<i>Ipomoea nil</i> (L.) Roth	Vin	T		AM/CA/CE/AF/PN		27121
<i>Ipomoea pintoii</i> O'Donell	Vin	T		CA		25510
<i>Ipomoea rosea</i> Choisy	Vin	T	NE	CA/CE/AF		26290
<i>Jacquemontia densiflora</i> (Meisn.) Hallier f.	Vin	T		CA/CE/AF		25536
CUCURBITACEAE						
<i>Apodanthera glaziovii</i> Cogn.	Vin	T	NE	CA		25507
<i>Gurania</i> cf. <i>acuminata</i> Cogn.	Vin	T		AM		26296
CYPERACEAE						

Table 1. Continued...

Species	H	SB	LE	PD	CS	Voucher (HURB)
<i>Trilepis lhotzkiana</i> Nees ex Arn.	Hrb	R		AM/CA/CE/AF		23064
DIOSCOREACEAE						
<i>Dioscorea campestris</i> Griseb.	Vin	T		CA/CE/AF/PM	LC	22148
<i>Dioscorea sincorensis</i> R.Knuth	Vin	T		CA/CE		19797
EBENACEAE						
<i>Diospyros inconstans</i> Jacq.	Shrub	T		AM/CA/CE/AF/PM/PN	LC	22283
ERYTHROXYLACEAE						
<i>Erythroxylum caatingae</i> Plowman	Tree	T		CA		22997
<i>Erythroxylum revolutum</i> Mart.	Tree	T	NE	CA/AF		18834
EUPHORBIACEAE						
<i>Actinostemon concolor</i> (Spreng.) Müll.Arg.	Shrub	T		AM/CA/AF/PM		18817
<i>Astraea surinamensis</i> (Miq.) O.L.M. Silva & Cordeiro	Hrb	T		AM/CA/CE/AF/PM/PN		27119
<i>Cnidocolus obtusifolius</i> Pohl ex Baill.	Shrub	T		CA		25735
<i>Cnidocolus urens</i> (L.) Arthur	Shrub	T		AM/CA/CE/AF		24469
<i>Croton argyrophyllus</i> Kunth	Shrub	T		AM/CA		18440
<i>Croton echioides</i> Baill.	Shrub	T		CA/CE		18818
<i>Croton grewioides</i> Baill.	Shrub	T		CA		25996
<i>Croton heliotropifolius</i> Kunth	Shrub	T		CA/CE/AF		22974
<i>Croton tetradenius</i> Baill.	Shrub	T		CA/CE/AF		25696
<i>Dalechampia brasiliensis</i> Lam.	Vin	T		CA/CE/AF		18398
<i>Euphorbia comosa</i> Vell.	Sub	T		AM/CA/CE/AF		18394
<i>Euphorbia heterodoxa</i> Müll.Arg.	Hrb	R		CA		25533
<i>Euphorbia phosphorea</i> Mart.	Shrub	R		CA		22295
<i>Euphorbia prostrata</i> Aiton	Hrb	T		AM/CA/CE/AF/PM/PN		27120
<i>Jatropha martiusii</i> (Pohl) Baill.	Shrub	T		CA/PN		27158
<i>Jatropha mollissima</i> (Pohl) Baill.	Shrub	T		AM/CA/CE		26311
<i>Jatropha ribifolia</i> (Pohl) Baill.	Shrub	T		CA/CE/PM/PN		25689
<i>Manihot carthagenensis</i> (Jacq.) Müll.Arg.	Shrub	T		AM/CA/CE		18925
<i>Sapium glandulosum</i> (L.) Morong	Shrub	T		AM/CA/CE/AF		22172
<i>Sapium obovatum</i> Klotzsch ex Müll.Arg.	Shrub	T		AM/CA/CE		27134
<i>Sebastiania brevifolia</i> (Müll.Arg.) Müll.Arg.	Sub	R/T		CA/CE		27168
<i>Stillingia trapezoidea</i> Ule	Shrub	R/T		CA		19794
FABACEAE						
<i>Albizia polycephala</i> (Benth.) Killip ex Record	Tree	T		CA/CE/AF		25991
<i>Anadenanthera colubrina</i> (Vell.) Brenan	Tree	T		CA/CE/AF		25995
<i>Bauhinia catingae</i> Harms	Shrub	T		CA/CE		22990
<i>Bauhinia cheilantha</i> (Bong.) Steud.	Shrub	T		CA/CE		25987
<i>Cenostigma pluviosum</i> (DC.) Gagnon & G.P.Lewis	Shrub	T		AM/CA/CE/AF/PN		25993
<i>Cenostigma pyramidale</i> (Tul.) Gagnon & G.P.Lewis	Shrub	T		CA		22986
<i>Centrosema virginianum</i> (L.) Benth.	Vin	T		AM/CA/CE/AF/PM/PN		27124
<i>Chamaecrista belemii</i> (H.S.Irwin & Barneby) H.S.Irwin & Barneby	Shrub	T		CA	LC	22285
<i>Chamaecrista flexuosa</i> (L.) Greene	Sub	T		AM/CA/CE/AF/PM/PN		24465
<i>Chamaecrista nictitans</i> (L.) Moench	Sub	T		AM/CA/CE/AF/PM/PN		25743
<i>Crotalaria holosericea</i> Nees & Mart.	Sub	T		CA		19000
<i>Crotalaria incana</i> L.	Sub	T		AM/CA/CE/AF/PM/PN		27130
<i>Dioclea lasiophylla</i> Mart. ex Benth.	Vin	T		CA/AF		27144
<i>Erythrina</i> sp.	Tree	T	BA			26321
<i>Hymenaea courbaril</i> L.	Tree	T		AM/CA/CE/AF/PN	LC	26013
<i>Indigofera suffruticosa</i> Mill.	Shrub	T		AM/CA/CE/AF/PM		22979
<i>Libidibia ferrea</i> (Mart. ex Tul.) L.P.Queiroz	Tree	T		CA/CE/AF		26283
<i>Luetzelburgia purpurea</i> D.B.O.S.Cardoso et al.	Tree	T		CA/AF		25997

Table 1. Continued...

Species	H	SB	LE	PD	CS	Voucher (HURB)
<i>Mimosa arenosa</i> (Willd.) Poir.	Shrub	T		CA		22973
<i>Mimosa gemmulata</i> Barneby	Shrub	T		CA/CE		25524
<i>Mimosa tenuiflora</i> (Willd.) Poir.	Tree	T		CA/CE		26001
<i>Nissolia vincentina</i> (Ker Gawl.) T.M.Moura & Fort.-Perez	Vin	T		AM/CA/CE/AF		26282
<i>Peltogyne pauciflora</i> Benth.	Tree	T		CA		25750
<i>Periandra coccinea</i> (Schrad.) Benth.	Vin	T		AM/CA/CE/AF		18821
<i>Poecilanthe ulei</i> (Harms) Arroyo & Rudd	Shrub	T		CA/AF		25523
<i>Poeppigia procera</i> (Poepp. ex Spreng.) C. Presl	Shrub	T		AM/CA/AF		18826
<i>Rhynchosia minima</i> (L.) DC.	Vin	T		AM/CA/CE/AF/PN		18811
<i>Rhynchosia phaseoloides</i> (Sw.) DC.	Vin	T		AM/CA/CE/AF		26280
<i>Senegalia bahiensis</i> (Benth.) Seigler & Ebinger	Shrub	T		CA/AF		25531
<i>Senna macranthera</i> (DC. ex Collad.) H.S.Irwin & Barneby	Tree	T		CA/CE/AF		22282
<i>Senna spectabilis</i> (DC.) H.S.Irwin & Barneby	Tree	T		AM/CA/CE/AF		22289
<i>Stylosanthes scabra</i> Vogel	Hrb	T		AM/CA/CE/AF/PM/PN		27118
<i>Stylosanthes viscosa</i> (L.) Sw.	Sub	T		AM/CA/CE/AF/PM/PN		24480
<i>Trischidium molle</i> (Benth.) H.E.Ireland	Shrub	T		CA/AF/PN		22300
<i>Zornia latifolia</i> Sm.	Sub	T		AM/CA/CE/AF/PM/PN		25725
<i>Zornia myriadena</i> Benth.	Hrb	T		CA/CE		19015
LAMIACEAE						
<i>Aegiphila verticillata</i> Vell.	Shrub	T	BA	AM/CA/CE/AF/PN		22292
<i>Mesosphaerum sidifolium</i> (L'Hér.) Harley & J.F.B.Pastore	Sub	T		CA/CE/AF		18409
<i>Rhaphiodon echinus</i> (Nees & Mart.) Schauer	Hrb	T		CA/CE/AF		22992
LECYTHIDACEAE						
<i>Eschweilera ovata</i> (Cambess.) Mart. ex Miers	Tree	T		AM/AF		18813
LOASACEAE						
<i>Aosa gilgiana</i> (Urb.) Weigend	Sub	R/T		CA	VU	22153
<i>Aosa rupestris</i> (Gardner) Weigend	Sub	R/T		CA		25700
LOMARIOPSIDACEAE						
<i>Lomariopsis marginata</i> (Schrad.) Kuhn	Hrb	E		AF		22168
LORANTHACEAE						
<i>Psittacanthus cordatus</i> (Hoffmanns.) G.Don	Hrb	HP		AM/CE/AF/PN		22996
<i>Pusillanthus pubescens</i> (Rizzini) Caires	Hrb	HP		CA		27136
<i>Struthanthus marginatus</i> (Desr.) G.Don	Hrb	HP		AM/CA/CE/AF		26293
LYTHRACEAE						
<i>Pleurophora anomala</i> (A.St.-Hil) Koehne	Sub	T		CA		25512
MALPIGHIACEAE						
<i>Amorimia rigida</i> (A.Juss.) W.R.Anderson	Vin	T		AF		24476
<i>Amorimia velutina</i> W.R.Anderson	Vin	T		CA/CE	DD	25530
<i>Banisteriopsis malifolia</i> (Nees & Mart.) B. Gates	Vin	T		AM/CA/CE/AF		19006
<i>Dicella macroptera</i> (Mart.) A. Juss	Vin	T		AM/CA/CE		25755
<i>Galphimia brasiliensis</i> (L.) A.Juss.	Sub	T		CA/CE/AF		25723
<i>Heteropterys trichanthera</i> A.Juss.	Vin	T		CA/CE		24468
<i>Mascagnia sepium</i> (A.Juss.) Griseb.	Vin	T		CA/CE/AF		26305
<i>Stigmaphyllon auriculatum</i> (Cav.) A.Juss.	Vin	T		CA/AF		25697
MALVACEAE						
<i>Ceiba erianthos</i> (Cav.) K.Schum.	Shrub	T		CA/AF		18365
<i>Corchorus hirtus</i> L.	Sub	T		AM/CA/CE/AF/PN		18824
<i>Herissantia tiubae</i> (K.Schum.) Brizicky	Shrub	T		CA/CE		22981
<i>Melochia tomentosa</i> L.	Sub	T		CA/CE/AF		22995
<i>Pavonia cancellata</i> (L.) Cav.	Hrb	T		AM/CE/CA/AF		24471
<i>Pavonia martii</i> Colla	Shrub	T		CA/CE		19795

Table 1. Continued...

Species	H	SB	LE	PD	CS	Voucher (HURB)
<i>Sida cordifolia</i> L.	Sub	T		AM/CA/CE/AF/PM/PN		26308
<i>Sida galheirensis</i> Ulbr.	Sub	T		CA/CE/AF		18853
<i>Sidastrum multiflorum</i> (Jacq.) Fryxell	Shrub	T		AM/CA/CE		25517
<i>Waltheria communis</i> A.St.-Hil.	Sub	T	BA	CA/CE/AF/PM/PN		23312
<i>Waltheria indica</i> L.	Hrb	T		AM/CA/CE/AF/PM/PN		24478
MARANTACEAE						
<i>Maranta zingiberina</i> L.Andersson	Hrb	T		CA/AF	LC	25684
MELASTOMATACEAE						
<i>Miconia minutiflora</i> (Bonpl.) DC.	Tree	T		AM/CA/CE/AF		22311
<i>Tibouchina</i> sp.	Shrub	R	BA	CA		18372
MELIACEAE						
<i>Melia azedarach</i> L.*	Tree	T		AM/CA/CE/AF		26000
<i>Trichilia elegans</i> A.Juss.	Shrub	T		AM/CA/CE/AF		21796
<i>Trichilia hirta</i> L.	Shrub	T	BA	AM/CA/CE/AF	LC	24485
<i>Dorstenia caatingae</i> R.M.Castro	Hrb	T	NE	CA		22284
<i>Ficus calyptroceras</i> (Miq.) Miq.	Tree	HE		CA/CE/AF/PN	LC	18808
<i>Ficus enormis</i> Mart. ex Miq.	Tree	HE		CA/CE/AF		18807
MYRTACEAE						
<i>Algrizea macrochlamys</i> (DC.) Proença & NicLugh.	Shrub	T	BA	CA		25518
<i>Algrizea minor</i> Sobral, Faria Júnior & Proença	Shrub	T		CA/CE		22317
<i>Eugenia duarteana</i> Cambess.	Shrub	T		CA		26015
<i>Eugenia puniceifolia</i> (Kunth) DC.	Shrub	T		AM/CA/CE/AF/PN		24463
<i>Eugenia rosea</i> DC.	Shrub	T		CA	VU	24464
<i>Eugenia uniflora</i> L.	Shrub	T		CA/CE/AF/PM		26287
<i>Eugenia zigzag</i> K.Cout. & Sobral	Tree	T		CA		22313
<i>Myrciaria floribunda</i> (H.West ex Willd.) O.Berg	Tree	T		AM/CA/CE/AF	LC	19007
<i>Psidium appendiculatum</i> Kiaersk	Tree	T		CA/CE		26332
<i>Psidium cauliflorum</i> Landrum & Sobral	Tree	T		AF		27159
<i>Psidium schenckianum</i> Kiaersk.	Shrub	T		CA		18929
NEPHROLEPIDACEAE						
<i>Nephrolepis rivularis</i> (Vahl) Mett. ex Krug	Hrb	E		AM/AF		22169
NYCTAGINACEAE						
<i>Boerhavia diffusa</i> L.*	Hrb	T		AM/CA/CE/AF		25748
NYMPHAEACEAE						
<i>Nymphaea pulchella</i> DC.	Hrb	A		AM/CA/CE/AF/PM		18823
OCHNACEAE						
<i>Ouratea parvifolia</i> (A.St.-Hil.) Engl.	Shrub	T		CA/CE		25688
ORCHIDACEAE						
<i>Acianthera ochreatea</i> (Lindl.) Pridgeon & M.W.Chase	Hrb	E	BA	CA/CE/AF		18388
<i>Catasetum luridum</i> (Link. & Otto) Lindl.	Hrb	E		CA/AF		22158
<i>Cyrtopodium flavum</i> Link & Otto ex Rchb.f.	Hrb	E		AF		22279
<i>Cyrtopodium saintlegerianum</i> Rchb.f.	Hrb	E		AM/CA/CE		22157
<i>Encyclia jenischiana</i> (Rchb.f.) Porto & Brade	Hrb	R		CA		25705
<i>Epidendrum secundum</i> Jacq.	Hrb	R/T		AM/CA/CE/AF	LC	25706
<i>Vanilla palmarum</i> (Salzm. ex Lindl.) Lindl.	Hrb	HE		AM/CA/CE/AF		23085
OXALIDACEAE						
<i>Oxalis frutescens</i> L.	Hrb	T		AM/CA/CE/AF		25695
<i>Oxalis psoraleoides</i> Kunth	Sub	T		CA/CE/AF/PN		27139
PASSIFLORACEAE						
<i>Passiflora cincinnata</i> Mast.	Vin	T		AM/CA/CE/AF		23089
<i>Passiflora edmundoi</i> Sacco	Vin	T		CA/AF		27138
<i>Passiflora kermesina</i> Link & Otto	Vin	T		CA/CE/AF		22994

Table 1. Continued...

Species	H	SB	LE	PD	CS	Voucher (HURB)
PLANTAGINACEAE						
<i>Scoparia dulcis</i> L.	Sub	T		AM/CA/CE/AF/PM/PN		26330
<i>Stemodia foliosa</i> Benth.	Hrb	T		CA/CE/AF		26332
POACEAE						
<i>Aristida setifolia</i> Kunth	Hrb	T		CA/CE/AF		26327
<i>Cenchrus ciliaris</i> L.*	Hrb	T		AM/CA/CE		26326
<i>Cenchrus purpureus</i> (Schumach.) Morrone*	Hrb	T		AM/CA/CE/AF/PN		26329
<i>Ichnanthus calvescens</i> (Nees ex Trin.) Döll	Hrb	T		AM/CA/CE/AF/PN		22988
<i>Ichnanthus nemoralis</i> (Schrad. ex Schult.) Hitchc. & Chase	Hrb	T		AM/CA/CE/AF		23088
<i>Lasiacis cf. ligulata</i> Miers	Hrb	T		AM/CA/CE/AF		27156
<i>Melinis repens</i> (Willd.) Zizka*	Hrb	T		AM/CA/CE/AF/PM/PN		23087
<i>Pappophorum pappiferum</i> (Lam.) Kuntze	Hrb	T		CA/CE/AF/PN		22138
<i>Setaria setosa</i> (Sw.) P.Beauv.	Hrb	T		CA/CE/AF		24140
POLYGALACEAE						
<i>Asemeia ovata</i> (Poir.) J.F.B.Pastore & J.R.Abbott	Hrb	T		AM/CA/CE/AF/PN		24459
<i>Asemeia parietaria</i> (Chodat) J.F.B.Pastore & J.R.Abbott	Hrb	T		AM/CA/CE/AF/PM/PN		22987
<i>Coccoloba schwackeana</i> Lindau	Shrub	T		CA		26004
POLYPODIACEAE						
<i>Campyloneurum angustifolium</i> (Sw.) F	Hrb	E		AM/CE/AF		18812
<i>Microgramma geminata</i> (Schrad.) R.M.Tryon & A.F.Tryon	Hrb	E		AF		22166
<i>Microgramma vacciniifolia</i> (Langsd. & Fisch.) Copel.	Hrb	E		CA/CE/AF/PM		22165
<i>Serpocaulon triseriale</i> (Sw.) A.R.Sm.	Hrb	R/T		AM/CA/CE/AF/PM/PN		18045
PONTEDERIACEAE						
<i>Eichhornia paniculata</i> (Spreng.) Solms	Hrb	A		CA/CE/AF		18849
PORTULACACEAE						
<i>Portulaca elatior</i> Mart. ex Rohrb.	Hrb	R/T		CA/CE/AF		22975
<i>Portulaca halimoides</i> L.	Hrb	R/T		AM/CA/CE/AF/PM	LC	25734
RHAMNACEAE						
<i>Sarcomphalus joazeiro</i> (Mart.) Hauenschild	Tree	T		CA		24472
RUBIACEAE						
<i>Aleis floribunda</i> Schott	Tree	T		CA/CE/AF		25992
<i>Borreria verticillata</i> (L.) G.Mey.	Sub	T		AM/CA/CE/AF/PM/PN		23082
<i>Coutarea hexandra</i> (Jacq.) K.Schum.	Shrub	T		AM/CA/CE/AF/PM/PN		19002
<i>Guettarda angelica</i> Mart. ex Müll.Arg.	Shrub	T	NE	CA		18924
<i>Hexasepalum apiculatum</i> (Willd.) Delprete & J.H. Kirkbr.	Sub	T		AM/CA/CE/AF/PM		22323
<i>Hexasepalum radula</i> (Willd.) Delprete & J.H. Kirkbr.	Sub	T		CA/CE/AF		25703
<i>Randia armata</i> (Sw.) DC.	Shrub	T		AM/CA/CE/AF		26005
RUTACEAE						
<i>Zanthoxylum rhoifolium</i> Lam.	Tree	T		AM/CA/CE/AF/PM/PN		26006
SANTALACEAE						
<i>Phoradendron mucronatum</i> (DC) Kr. & Urban	Hrb	HP		AM/CA/CE/AF/PN		27140
SAPINDACEAE						
<i>Averrhoidium gardnerianum</i> Baill.	Shrub	T		CA/CE/AF		22303
<i>Cardiospermum corindum</i> L.	Vin	T		CA/CE/AF		22303
<i>Dodonaea viscosa</i> Jacq.	Shrub	T		AM/CA/CE/AF/PM		26008
<i>Serjania paludosa</i> Cambess.	Vin	T		CA/CE		24474
SAPOTACEAE						
<i>Pouteria citriodora</i> Alves-Araújo	Tree	T	BA	CA		24483
<i>Pouteria gardneriana</i> (A.DC.) Radlk.	Shrub	T		CA/CE/AF		25994
<i>Sideroxylon obtusifolium</i> (Roem. & Schult.) T.D.Penn.	Shrub	T		CA/CE/AF/PN	LC	22318
SCHOEPFIACEAE						
<i>Schoepfia brasiliensis</i> A.DC.	Shrub	T		AM/CA/CE/AF		25718

Table 1. Continued...

Species	H	SB	LE	PD	CS	Voucher (HURB)
SIMAROUBACEAE						
<i>Simarouba amara</i> Aubl.	Tree	T		AM/CA/CE/AF		22265
SOLANACEAE						
<i>Solanum</i> sp.1	Sub	E				18774
<i>Solanum</i> sp 2	Shrub	T				27147
TALINACEAE						
<i>Talinum paniculatum</i> (Jacq.) Gaertn.	Hrb	T		AM/CA/CE/AF/PM/PN		25737
TURNERACEAE						
<i>Oxossia calyptrocarpa</i> (Urb.) L.Rocha	Shrub	T		CA/CE/AF		18839
<i>Piriqueta racemosa</i> (Jacq.) Sweet	Hrb	T		CA/CE/AF		25747
<i>Turnera cearensis</i> Urb.	Sub	T		CA/AF		25709
<i>Turnera chamaedrifolia</i> Cambess.	Shrub	T		CA/CE/AF		23072
<i>Turnera Undulata</i> Sm.	Sub	T		AM/CA/CE/AF		22308
VELLOZIACEAE						
<i>Vellozia candida</i> J.C.Mikan	Hrb	R		CA/AF		22299
<i>Vellozia plicata</i> Mart.	Hrb	R		CA/CE/AF		22274
VERBENACEAE						
<i>Lantana camara</i> L.*	Shrub	T		AM/CA/CE/AF/PM/PN		24481
<i>Lantana canescens</i> Kunth	Shrub	T		AM/CA/CE/AF		25513
<i>Lantana pohliana</i> Schauer	Shrub	T		CA/CE		25720
<i>Lippia lasiocalycina</i> Cham.	Shrub	T		CA/CE/AF/PN		19003
<i>Lippia organoides</i> Kunth	Shrub	T		AM/CA/CE/AF/PN		24484
<i>Lippia</i> sp. 1	Sub	T				25528
<i>Priva bahiensis</i> A.DC.	Hrb	T		CA/AF		22978
<i>Tamonea curassavica</i> (L.) Pers.	Shrub	T		CA/CE		27173
VITACEAE						
<i>Cissus blanchetiana</i> Planch	Vin	T		CA/AF		27171

Regarding habits of the sampled species, herbs accounted for 34.81%, shrubs for 28.16%, subshrubs for 13.29%, vines for 12.65% and trees for 10.44%. Therefore, about 60% of the plants in the area belong to the non-woody stratum and 40% to the woody stratum. Bromeliaceae was predominant among the herbs (37 spp.); for shrubs, the main family was Euphorbiaceae (13 spp.), followed by Fabaceae (9 spp.); among trees, the family Fabaceae stood out (11 spp.); while for vines, Apocynaceae was the most common family (5 spp.); and for subshrubs, Fabaceae was the main family (4 spp.).

Seven species were considered naturalized/exotic (Table 1), while 40 were found to be endemic to Northeast Brazil, of which 24 were exclusive to Bahia (Table 1). Twenty-seven species are distributed in all Brazilian phytogeographic domains, 53 species were endemic to the Caatinga phytogeographic domain, and 18 species were endemic to the Atlantic Forest (Table 1).

We found in the studied area seven species exclusive to ombrophilous forests: *Aechmea bicolor* L.B.Sm., *Aechmea disjuncta* (L.B.Sm.) Leme & J.A.Siqueira, *Adenocalymma coriaceum* A.DC., *Billbergia macrocalyx* Hook., *Lomariopsis marginata* (Schrad.) Kuhn and *Psidium cauliflorum* Landrum & Sobral.

On the general list, 21 species were exclusively related to dry vegetation (Caatinga *stricto sensu*, deciduous and semideciduous forests): *Amorimia rigida* (A.Juss.) W.R.Anderson, *Amorimia velutina* W.R.Anderson, *Bromelia laciniosa* Mart. ex Schult. & Schult.f., *Colicodendron yco* Mart., *Croton grewoides* Baill., *Cryptanthus bahianus* L.B.Sm., *Eugenia rosea* DC., *Eugenia zigzag* K.Cout. & Sobral, *Hippeastrum stylosum* Herb., *Hohenbergia lanata* E.Pereira & Moutinho, *Ipomoea franciscana* Choisy, *Ipomoea pintoii* O'Donell, *Luetzelburgia purpurea* D.B.O.S.Cardoso et al., *Neoglaziovia variegata* (Arruda) Mez, *Orthophytum maracasense* L.B.Sm., *Pouteria citriodora* Alves-Araújo, *Psidium schenckianum* Kiaersk., *Pusillanthus pubescens* (Rizzini) Caires, *Ruellia asperula* (Mart. ex Nees) Lindau, *Ruellia bahiensis* (Nees) Morong and *Spondias bahiensis* P. Carvalho et al.

Eleven species were exclusively related to rocky outcrops (inselbergs, *campos de altitude* and *campos rupestres*): *Alcantarea nahoumii* (Leme) J.R.Grant, *Dichorisandra saxatilis* Aona & M.C.E.Amaral, *Dyckia maracasensis* Ule, *Encholirium spectabile* Mart. ex Schult. & Schult.f., *Euphorbia heterodoxa* Müll.Arg., *Euphorbia phosphorea* Mart., *Mandevilla bahiensis* (Woodson)

M.F.Sales & Kin.-Gouv., *Mandevilla sancta* (Stadelm.) Woodson, *Marsdenia caatingae* Morillo, *Melocactus ernestii* Vaupel, *Orthophytum saxicola* Ule, *Tillandsia milagrensis* Leme and *Tillandsia chapeuensis* Rauh.

Of the species identified, 29 are classified as threatened according to Flora e Funga do Brasil (2022) and/or are on the list of threatened endemic species of Bahia (SEMA 2017). Of these, 20 are considered to be of 'Least Concern' (LC), three species (*Aechmea disjuncta* (L.B.Sm.) Leme & J.A.Siqueira, *Dichorisandra saxatilis* and *Tillandsia milagrensis*) are classified as 'Endangered' (EN) and *Amorimia velutina* W.R.Anderson is indicated as having 'Deficient Data' (DD). Finally, the species *Alcantarea nahoumii* (Leme) J.R.Grant (Figure 1b), *Aosa gilgiana* (Urb.) Weigend, *Alternanthera multicaulis* (Mart.) Kuntze, *Eugenia rosea* DC. and *Orthophytum rubrum* L.B.Sm are considered 'Vulnerable' (VU) (Table 1).

4. DISCUSSION

Floristic inventories conducted in the Caatinga and Atlantic Rain Forest domains have revealed high richness and endemism of species, even those with high anthropization degree due to human activities over the years (Amorim et al., 2005; Cardoso & Queiroz, 2007; Amorim et al., 2009; Thomas et al. 2009; Gomes & Alves, 2010; Costa et al., 2015; Queiroz et al., 2015; Oliveira et al. 2016; Vitória et al., 2019). An updated list of Caatinga plants indicates the presence of 3,347 species, 962 genera and 153 families, with 15% endemism (Fernandes et al., 2020). The floristic composition of Serra do Jatobá is composed of 316 species, a relatively high number in comparison to other studies of Caatinga areas, which have varied from 211 to 450 species (Gomes & Alves, 2010; Costa et al., 2015; Queiroz et al., 2015; Vitória et al., 2019). It is worth mentioning that the size of the area and the way of sampling directly influence the quantification of the species in the cited studies.

In this study, the predominant habit types were shrubs, with approximately 38.05%, followed by herbs with 33.58% and trees with 12.31%. The proportion of non-woody species (undershrubs, herbs and vines) was greater than the woody species (shrubs and trees), a result also reported by Souza & Rodal (2010) and Queiroz et al. (2015). Queiroz et al. (2015) pointed to the fact that the majority of the floristic studies of Caatinga areas have been focused on woody plants, leaving a gap in information about non-woody plants, which have been found to be predominant with high diversity. Thus, it is important to conduct further floristic studies of plants with all habits to obtain more details about the vegetation studied here.

Although the study area is a transition between caatinga and Atlantic Forest, the main groups found follow the caatinga pattern. The high richness found for the family Fabaceae reinforces its status as the main Caatinga family (Table 1). We found 36 species of Fabaceae distributed in 25 genera, with predominance of tree and shrub habits (Table 1). The great diversity of the Fabaceae family in the Caatinga can be explained by the morphological adaptations of its species, to enable them to withstand the periodic water shortages, high temperatures and low humidity (Cardoso & Queiroz, 2010).

Euphorbiaceae has been reported to be among the most representative families in various studies of Caatinga areas (Table 1), and it also stood out in this study, with 22 species, mainly in the *Croton* L. (five spp.) (Table 1). *Croton* species are common elements of the secondary vegetation, resulting from a natural process of regeneration of vegetation. They are important floristic elements of arid and semiarid regions such as the Caatinga domain (Carneiro-Torres et al., 2011).

We also found Myrtaceae to have high richness, with 11 species (Table 1). It is a family with wide distribution in various Brazilian domain, with great economic, ecological and medicinal importance (Morais et al., 2014). The genus *Eugenia* L. (five spp.) was predominant and the species *Eugenia rosea* DC., *Eugenia zigzag* K.Cout. & Sobral and *Algrizea macrochlamys* (DC.) Proença & NicLugh stood out for not only being endemic to Caatinga areas, but also endemic to Bahia. The presence of *E. zigzag* in Serra do Jatobá is a new record of a species only recently described, with only two records in the municipality of Livramento de Nossa Senhora (BA) (Sobral et al., 2018).

Verbenaceae (eight spp.) was mainly represented by *Lippia* L. (three spp.) (Table 1). According to Gomes et al. (2011), *Lippia* is a genus with large floristic richness in Caatinga areas. Fifteen species were found for the Asteraceae family, with the standouts being two species endemic to the Northeast region of Brazil (*Lepidaploa chalybaea* (Mart. ex DC.) H.Rob. and *Moquiniastrum oligocephalum* (Gardner) G.Sancho) (Table 1).

We found 36 epiphyte species in Serra do Jatobá (Table 1), with predominance of species of the families Bromeliaceae (30 spp.) and Orchidaceae (four spp.), a result also observed by Carvalho et al. (2020). The epiphyte species have an important ecological role because they influence the nutrient cycling and provide shelter and food for many animals (Freitas et al., 2016; Souza et al., 2021). The high number of species found belonging to the Bromeliaceae (37 spp.) can be related to the presence of a phorophyte (licuri palm) and the fact the study area is located in an ecotone with varying altitudes and different phytophysognomies, as also reported by Carvalho et al. (2020) and Souza et al. (2021). Besides this, the richness of Bromeliaceae can be associated

with the fact it is one of the main plant families that compose dry environments like inselbergs (Porembski, 2007; Verçoza & Bastos, 2013), as well as the sampling effort. In a study focused on the flora of inselbergs in the Milagres region, França et al. (1997) also observed that the Bromeliaceae was among the most representative families. The family contributed to the high number of herbaceous species, since all those listed have this habit (Table 1).

In this study, we observed 11 species endemic to Caatinga vegetation, such as *Croton grewoides* Baill., *Colicodendron yco* Mart., *Eugenia rosea* DC. and *Neoglaziovia variegata* (Arruda) Mez, and 53 species endemic to the Caatinga phytogeographic domain, such as *Arrojadoa penicillata* (Gürke) Britton & Rose (Figure 1c), *Encyclia jenischiana* (Rchb.f.) Porto & Brade, *Mimosa arenosa* (Willd.) Poir. (Table 1), and *Syagrus vagans* (Bondar) A.D.Hawkes (Figure 2g).

We found 24 species endemic to Bahia, such as *Algrizea macrochlamys* (DC.) Proença & NicLugh., *Dichorisandra saxatilis* Aona & M.C.E.Amaral (Figure 1f), *Mandevilla bahiensis* (Woodson) M.F.Sales & Kin.-Gouv. and *Orthophytum saxicola* Ule (Table 1).

In relation to the phytogeographic domains of the species found, 18 species are found in the AFPD and 30 species in both the CPD and AFPD (Table 1). The fact that the Serra do Jatobá is a boundary area with an Atlantic Forest fragment can explain this result, because although it is a Caatinga area, the region also shares many Atlantic Forest species.

We also identified the exotic species *Melia azedarach* L., of the Meliaceae family. *Melia azedarach* is an exotic/naturalized species occurring throughout Brazil, native to Asia and northern Australia (Batcher, 2000), and is considered to be one of the worst invasive exotic species in many regions of the world (Sampaio & Schmidt, 2013). Exotic species are defined as those that do not occur naturally in a geographic region, instead relying on human transport (Moro et al., 2012). They can alter alternative ecosystems and cause loss of biodiversity (MMA, 2006).

Of the species on the floristic list of Serra do Jatobá that were evaluated regarding the threat categories, the majority were classified as having 'Least Concern' (LC), i.e., having low risk of extinction (Table 1). *Alcantarea nahoumii* (Figure 1b), *Aosa gilgiana* and *Eugenia rosea* are species that occur exclusively in Bahia (Table 1) and were classified as 'vulnerable', with risk of extinction (CNCFlora, 2022). According to Bastos et al. (2018), *A. nahoumii* is a species that establishes communities for colonization and secondary succession of species of the Bromeliaceae family in rocky outcrops. The species is restricted to a few municipalities in Bahia (Milagres, Castro Alves, Elísio Medrado, Santa

Teresinha and Brejões) and is vulnerable due to the burning, extractive activity and absence of protection (Versieux, 2018).

We found *Orthophytum rubrum*, this species was described in 1955, the last specimens were only collected in 1979, since then the species has not been found in the field. It was believed to have disappeared, due mainly to the significant loss of habitat. However, in 2017 the species was again recorded (HURB 18251), in the municipality of Brejões (Bahia), with a population composed of fewer than 30 individuals, in an area with the presence of livestock grazing. In 2021, a new expedition was carried out in the same place and no *O. rubrum* individuals were found. During that expedition, a thorough sweep was performed to collect seeds for replenishment of degraded areas, but without success. In Serra do Jatobá, we only observed this species on the top of the inselberg near a small forest fragment, with a small population (fewer than 30 individuals). Unfortunately, this population is also vulnerable due to grazing by cattle and goats.

When comparing the species found in this study with the updated checklist of Brazilian Caatinga Plants of Fernandes et al. (2020), we verified that 28 species found in Serra do Jatobá are not on the list. This indicates that despite the existence of consolidated species lists, it is essential to conduct new floristic inventories in Caatinga areas. Furthermore, the recording of a recently described species distributed in the state of Bahia (*Eugenia zigzag*) and the presence of endemic Bahia species (*Alcantarea nahoumii*, *Aosa gilgiana* and *Eugenia rosea*) that are threatened with extinction reinforce the importance of floristic inventories of Caatinga areas in Bahia.

Less than 2% of the Caatinga vegetation is protected in conservation units (Teixeira et al., 2021). This scenario is even more discouraging, since no inselberg area is protected within the limits of the caatinga (Barbosa-Silva et al., 2022). The results of this study indicate that the Serra do Jatobá in Milagres, Bahia, is an area with high diversity and endemism, showing the need for ongoing research in this region for the future establishment of a conservation unit, mainly because it includes areas of inselberg.

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