



CHECKLIST OF THE FLORA OF THE RESTINGAS OF MARANHÃO STATE, NORTHEAST, BRAZIL

Eduardo Bezerra de Almeida Jr.	Department of Biology / Laboratory of Botanical Studies, Federal University of Maranhão, CEP 65085-580, São Luís-MA, Brazil
Ariade Nazaré Fontes Silva	Department of Biology / Postgraduate Program in Botany, Federal Rural University of Pernambuco, CEP 52171-900, Recife, Brazil
Gustavo Pereira Lima	Department of Biology / Postgraduate Program in Biodiversity and Conservation, Federal University of Maranhão, CEP 65085-580, São Luís, Brazil
Ingrid Fabiana Fonseca Amorim	Department of Biology / Postgraduate Program in Biodiversity and Conservation, Federal University of Maranhão, CEP 65085-580, São Luís, Brazil
Flávia Cristina Vieira Serra	Department of Biology / Postgraduate Program in Biodiversity and Conservation, Federal University of Maranhão, CEP 65085-580, São Luís, Brazil
Bruna Emanuele Freire Correia	Department of Biology / Postgraduate Program in Biodiversity and Conservation, Federal University of Maranhão, CEP 65085-580, São Luís, Brazil
Monielle Alencar Machado	Department of Biology / Postgraduate Program in Biodiversity and Conservation, Federal University of Maranhão, CEP 65085-580, São Luís, Brazil
Renata Adélia Gueiros de Almeida	Freelance biologist
Alan Rodrigo Ribeiro de Castro	Graduated in Biology
Nivaldo de Figueiredo	Department of Biology / Postgraduate Program in Biodiversity and Conservation, Federal University of Maranhão, CEP 65085-580, São Luís, Brazil
Rafael Marques da Silva	Freelance biologist
Francisco Soares Santos-Filho	Center of Natural Sciences, State University of Piauí, CEP 64.002-150, Teresina-PI, Brazil

ABSTRACT The present study was developed with the main query the records of Herbarium of Maranhão (MAR) of Universidade Federal do Maranhão (UFMA), Herbarium Rosa Mochel (SLUI) of Universidade Estadual do Maranhão (UEMA) and Herbarium Afrânio Fernandes (HAF) of Universidade Estadual do Piauí (UESPI). The Maranhão state has 25 coastal municipalities, but the checklist included species recorded only in nine municipalities. The floristic list presented a total of 401 species, 262 genera and 84 families. The values were considered low due to the length of the coastline of Maranhão. About 8% of the species cataloged were first occurrence records for Maranhão State. Six habit categories were recorded, highlighting herbs (131 species), shrubs (92 species) and trees (85 species). Lastly, we conclude that little is known about the restinga vegetation of Maranhão, due to a lack of investment in floristic inventories and shortage of botany professionals in the Maranhão State.

KEYWORDS : floristic, herbarium, northeast, coastal vegetation

INTRODUCTION

The restinga vegetation is characterized by being an ecosystem with area status in ecological succession process, as part of the Atlantic Biome (Scarano 2002) or it can be considered as a type of vegetation that occurs in coastal plain Quaternary occupying the coastal plain and which present distinct and physiognomically distributed mosaic (Souza et al. 2008).

This environment extremely fragile, presents edaphic and climatic factors of great influence in the establishment of plant communities (Mather 1968, Araújo 2000). However, the anthropic interference – through the real estate speculation and exploitation of land – it has contributed to the accelerated predatory activity (Santos-Filho and Zickel 2013), showing the importance to develop studies for better comprehension of this ecosystem vegetal composition.

The Northeast region has the longest coastline of Brazil with two fronts: Eastern northeastern coast and the northern northeastern coast (Santos-Filho and Zickel 2013). A variety of floristic studies were developed on the eastern coast of Brazil (Ab'Sáber 2006), mainly in the states of Pernambuco (Sacramento et al. 2007, Zickel et al. 2007, Silva et al. 2008, Almeida Jr. et al. 2009, Cantarelli et al. 2012) and Bahia (Brito et al. 1993, Menezes et al. 2009, Queiroz et al. 2012, Silva and Menezes 2012, Gomes and Guedes 2014, Santos et al. 2015). Floristic records are also presented to the Rio Grande do Norte (Freire 1990, Almeida Jr. et al. 2006, Almeida Jr. and Zickel 2009), Alagoas (Esteves 1980, Almeida Jr. et al. 2016), Paraíba (Oliveira-Filho and Carvalho 1993, Pontes and Barbosa 2008) and Sergipe (Oliveira et al. 2014, Oliveira et al. 2015).

In the septentrional northeastern coast, the amount of available studies

still does not represent the actual richness of flora of the restingas. In Ceará, Matias and Nunes (2001), Castro et al. (2012) and Santos-Filho et al. (2011) showed specific floristic lists, the latter being prepared from compiling records in Herbaria. In Piauí, Santos-Filho et al. (2013), Santos-Filho et al. (2015a) and Santos-Filho et al. (2015b) highlighted the species found in the state's restingas. Coastal areas classified as coastal trays ("tabuleiros litorâneos") also had published floristic lists (Santos-Filho et al. 2016).

Particularly on the coast of Maranhão, which comprises 640 km of coastline (El Robrini et al. 2006), studies on the flora of the restinga vegetation are scarce, given that the first floristic survey was published by Cabral-Freire and Monteiro (1993). Years later emerged new publications on the flora of coastal Maranhão environments (Sousa et al. 2008, Amorim et al. 2016, Araujo et al. 2016, Serra et al. 2016, Silva et al. 2016), these records, although important, do not cover the actual extension of the Maranhão coast.

Given the accelerated fragmentation that contributes to the extinction of endemic species (Silva et al. 2000), the compilation of floristic and/or herbaria records allows to know the history of species that colonized the area and therefore assist in proposing policies conservation of remaining vegetation fragments (Almeida Jr. et al. 2012). In this context, in an effort to fill this gap, this study aims to prepare a checklist of species recorded in the restinga vegetation of Maranhão, marking the resumption of this research regarding the need to know the richness and plant diversity of these areas.

Material and Methods

Maranhão coastline (Figure 1) is one of the longest in Brazil with about 640 km, between the mouth of the rivers Gurupi and Parnaíba (El Robrini et al. 2006). Along the coast we observe a great diversity of flora and fauna, especially the vegetation of restinga and dunes (Santos Filho and Zickel 2013).

The listed species were compiled of scientific articles (Freire Cabral and Monteiro 1993, Sousa et al. 2008, Amorim et al. 2016, Araujo et al. 2016, Castro and Almeida Jr. 2016, Serra et al. 2016), book chapters (Amorim et al. 2016, Silva et al. 2016), Master's dissertations (Machado 2016) and PhD theses (Ribeiro 2011) referring to restinga vegetation in Maranhão. They were also consulted cataloged herbarium specimens in the collection of Maranhão Herbarium (MAR) of the Federal University of Maranhão, the Herbarium Rosa Mochel (SLUI) of the State University of Maranhão, the Rioclarenses Herbarium (HRCB) of the Paulista State University and The New York Botanical Garden (NY).

The list of species follows the proposed classification of APG IV (2016). The spelling and synonymization species were carried out through the website Flora of Brazil list (<http://reflora.jbrj.gov.br/>). When the record was not found, it was consulted the database Tropics (<http://www.tropicos.org>). With regard to the species conservation status was consulted IUCN database (2016), in order to highlight the endemic species or some level of threat of extinction. To check the registration of the relevant species to Maranhão (both for restinga vegetation and to other state ecosystems) was used the site Flora of Brazil. The habit of the species was determined according to Whittaker (1975), using the information available in the herbarium identification cards.

Results

Maranhão has 25 coastal municipalities (IBGE 2011), but only ten municipalities have species recorded (Alcantara, Araiões, Barreirinhas, Cândido Mendes, Paço do Lumiar, Paulino Neves, Raposa, São José de Ribamar, São Luís and Tutóia). Despite having the second largest coastline of Brazil, no records were found for the remaining 15 coastal municipalities of Maranhão.

The floristic list of the Maranhão coast restingas presented a total of 401 species distributed among 262 genera and 84 families (Table 1). The number of species was considered low when compared to the length of the coastline of Maranhão (about 640 km long). In spite of its importance, this study recommends that further studies should be carried out by not cover the real floristic richness of the Maranhão coast.

The families with the highest number of species were Fabaceae (62 species), Poaceae (27 spp.), Rubiaceae (22 spp.), Cyperaceae (19

spp.), Asteraceae (17 spp.), Malvaceae (15 spp.), Apocynaceae (13 spp.), Euphorbiaceae (12 spp.), Myrtaceae (12 spp.), Malpighiaceae (11 spp.), Passifloraceae (10 spp.), Bignoniaceae (9 spp.) Melastomataceae (9 spp.) and Convolvulaceae (7 spp.) corresponding to 61% of the total species recorded for the Maranhão coast. Approximately 35% of families had only one species. The genus that have the highest number of species were *Cyperus* (8 spp.), *Myrcia* and *Paspalum* (6 spp., each), *Passiflora* (5 spp.), *Eugenia* and *Paepalanthus* (4 spp., each).

Regarding the habit, were recorded 131 herbs, 92 shrubs, 85 trees, 57 vines, 32 subshrubs, and four hemiparasites (Figure 2). The herbs and shrubs strongly represent throughout the Maranhão coastline.

It is worth mentioning that among the listed species has not been recorded any endemic, rare or endangered species. This may be a reflection of the low number of floristic studies that preclude further analysis on the coastal flora of the state of Maranhão.

Discussion

Considering the studies from compilation of herbaria records and analyzing the relationship between the coastal land area and the number of records of those States, they have been cataloged to the coast of Pernambuco (which has about 187 km of extension) a total of 477 species (Zickel et al. 2007) and Sergipe (168 km coastal length) approximately 831 species (Oliveira et al. 2014) (Table 2).

The families with the greatest species richness were also identified as highly relevant in the checklist produced for the restingas of Pernambuco (Zickel et al. 2007), Ceará (Santos-Filho et al. 2011), Sergipe (Oliveira et al. 2014) and Piauí (Santos-Filho et al. 2015a). The greatest richness of Fabaceae in coastal areas due to wide variety of habits (Cantarelli et al. 2012) and the ease of developing in dystrophic soils, such as the restingas (Oliveira et al. 2014).

The Cyperaceae family presents well represented in the northeastern restingas due to ease of dispersion and vegetative propagation that contribute to reproductive success (Cantarelli et al. 2012). However, for the present study, the number of species to Cyperaceae may be considered low (see Table 1). This is due both to the low sampling effort of targeted botanical collections for monocots groups, as the difficulty of identifying these species. It can be seen on these data, the need to expand floristic studies and encourage the development of taxonomic research to be known Maranhão State flora.

Amongst the species cataloged, about 8% are records of first occurrence for the state of Maranhão (Table 1). Among them, the *Cnidioscolus urens* species, which has wide distribution and can develop in different ecosystems, including in disturbed areas (Melo and Sales 2008), did not present, so far, collecting record. This reinforces the necessity of floristic studies in the restingas of the northern coast (Santos-Filho and Zickel 2013) mainly in Maranhão, given the lack of knowledge about the species that are commonly observed in the different ecosystems of the country.

Different habits recorded in this work, particularly herbs and shrubs, can be cited as the most prominent in areas of restinga (Zickel et al. 2007, Almeida Jr. et al. 2009). The herbs and shrubs present populations, most often, developed, forming clumps, which reduces the space of the lower layer and contributes to grow these plants on different abiotic conditions on different physiognomies (Adams Jr. et al. 2009, Zickel et al. 2007).

It may be concluded that little is known about the restinga vegetation of Maranhão State considering the entire coastal extension. With the possible causes: the difficulty of access to coastal areas, the lack of investment for development projects to support floristic inventories, and especially by the scarcity of botanical professionals to join efforts aimed at identifying the species of this ecosystem. It is worth emphasizing that surveys need to be developed before the vegetation is suppressed due to the rapid progress of human activities.

Acknowledgements

The authors would like to thank the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) and the Universidade Federal do Maranhão (UFMA) for granting Undergraduate Research scholarships (PIBIC/UFMA). The Fundação de Amparo à Pesquisa e Desenvolvimento Científico do Maranhão

(FAPEMA) for funding the project "Flora Maranhense: Ampliação e Informatização da Coleção Botânica do Herbário do Departamento de

Biologia – UFMA" (Process 2887/12) and the concession of scientific productivity scholarship to the first author.

Table 1

Families / Species	Habit	Voucher/Reference
Aizoaceae		
<i>Sesuvium portulacastrum</i> (L.) L.	Herb	HRCB 12673
Alstroemeriaceae		
<i>Bomarea edulis</i> (Tussac) Herb.	Vine	MAR 4070
Amaranthaceae		
<i>Alternanthera brasiliana</i> (L.) Kuntze	Subshrub	MAR 2573
<i>Alternanthera littoralis</i> var. <i>maritima</i> (Mart.) Pedersen	Subshrub	MAR 2572
<i>Alternanthera tenella</i> Colla	Subshrub	Araujo et al. (2016)
<i>Blutaparon portulacoides</i> (A. St.-Hil.) Mears	Herb	MAR 4086
<i>Gomphrena leucocephala</i> Mart.	Subshrub	Amorim et al. (2016)
Anacardiaceae		
<i>Anacardium occidentale</i> L.	Tree	MAR 1656
<i>Spondias mombin</i> L.	Tree	MAR 2591
<i>Tapirira obtusa</i> (Benth.) J.D. Mitch.	Tree	MAR 4075
Annonaceae		
<i>Annona exsucca</i> DC.	Shrub	Cabral-Freire & Monteiro (1993)
<i>Annona glabra</i> L.	Tree	Serra et al. (2016)
<i>Duguetia surinamensis</i> R.E.Fr.*	Tree	Serra et al. (2016)
Apocynaceae		
<i>Asclepias curassavica</i> L.	Herb	Cabral-Freire & Monteiro (1993)
<i>Calotropis procera</i> (Aiton) W.T. Aiton	Shrub	HRCB 42593
<i>Hancornia speciosa</i> Gomes	Tree	Sousa et al. (2008)
<i>Himatanthus articulatus</i> (Vahl) Woodson*	Tree	MAR 1147
<i>Himatanthus drasticus</i> (Mart.) Plumel	Tree	Amorim et al. (2016)
<i>Mandevilla hirsuta</i> (A. Rich.) K. Schum.	Vine	MAR 2568
<i>Mandevilla martii</i> (Müll. Arg.) Pichon	Vine	Amorim et al. (2016)
<i>Mandevilla scabra</i> (Hoffmanns. ex Roem. & Schult.) K. Schum.	Vine	MAR 2569
<i>Matelea maritima</i> (Vell.) Fontella*	Vine	Cabral-Freire & Monteiro (1993)
<i>Odontanea nitida</i> (Vahl) Mull. Arg	Vine	Ribeiro (2011)
<i>Oxypetalum banksii</i> R.Br. ex Schult.	Vine	Cabral-Freire & Monteiro (1993)
<i>Rhabdadenia biflora</i> (Jacq.) Müll. Arg.	Vine	HRCB 10551
<i>Secondatia desinflora</i>	Vine	Sousa et al. (2008)
Araceae		
<i>Anthurium sinuatum</i> Benth. ex Schott*	Herb	Cabral-Freire & Monteiro (1993)
<i>Dracontium asperum</i> K. Koch*	Herb	Cabral-Freire & Monteiro (1993)
<i>Philodendron cutatum</i> Schott	Vine	Amorim et al. (2016)
<i>Philodendron hederaceum</i> (Jacq.) Schott*	Vine	Cabral-Freire & Monteiro (1993)
Areaceae		
<i>Allagoptera campestris</i> (Mart.) Kuntze	Herb	Cabral-Freire & Monteiro (1993)
<i>Astrocaryum aculeatum</i> G.Mey.*	Tree	Cabral-Freire & Monteiro (1993)
<i>Astrocaryum vulgare</i> Mart.	Tree	MAR 4257
<i>Attalea speciosa</i> Mart. ex Spreng.	Tree	Cabral-Freire & Monteiro (1993)
<i>Euterpe oleracea</i> Mart.	Tree	Cabral-Freire & Monteiro (1993)
<i>Mauritia flexuosa</i> L. f.	Tree	Cabral-Freire & Monteiro (1993)
Asteraceae		
<i>Ambrosia microcephala</i> DC.	Herb	SLUI 150
<i>Cyrtocymura scorpioides</i> (Lam.) H. Rob.	Subshrub	Cabral-Freire & Monteiro (1993)
<i>Eclipta prostrata</i> (L.) L.	Herb	HRCB 11572
<i>Eleutheranthera ruderalis</i> (Sw.) Sch. Bip.	Herb	HRCB 10668
<i>Emilia fosbergii</i> Nicolson	Herb	Araujo et al. (2016)
<i>Emilia sonchifolia</i> (L.) DC. ex Wight	Herb	MAR 2693
<i>Lepidaploa arenaria</i> (Mart. ex DC.) H.Rob.	Subshrub	Silva et al. (2016)
<i>Lepidaploa helophila</i> (Mart. ex DC.) H. Rob.*	Subshrub	MAR 2696
<i>Mikania cordifolia</i> (L.f.) Willd.*	Vine	MAR 1655
<i>Rolandra fruticosa</i> (L.) Kuntze	Subshrub	MAR 5824
<i>Tilesia baccata</i> (L.f.) Pruski	Shrub	Machado (2016)
<i>Tridax procumbens</i> L.	Herb	Amorim et al. (2016)
<i>Vernonia fruticulosa</i> Mart	Herb	Ribeiro (2011)
<i>Vernonanthura brasiliana</i> (L.) H.Rob.	Shrub	MAR 4081

<i>Wedelia hookeriana</i> Gardner*	Subshrub	MAR 2698
<i>Wedelia villosa</i> Gardner*	Subshrub	MAR 4082
<i>Wulffia baccata</i> (L.) Kuntze	Shrub	Ribeiro (2011)
Bignoniaceae		
<i>Anemopaegma chamberlaynii</i> (Sims) Bureau & K.Schum	Vine	Amorim et al. (2016)
<i>Anemopaegma parkeri</i> Sprague	Vine	HRCB 11573
<i>Arrabidaea dispar</i> Bur ex K. Schum	Vine	Ribeiro (2011)
<i>Arrabidaea florida</i> A. DC.	Vine	Ribeiro (2011)
<i>Bignonia aequinoctialis</i> L.	Vine	Cabral-Freire & Monteiro (1993)
<i>Bignonia corymbosa</i> (Vent.) L.G. Lohmann	Vine	HRCB 12679
<i>Fridericia caudigera</i> (S.Moore) L.G.Lohmann*	Vine	HRCB 9959
<i>Fridericia conjugata</i> (Vell) L. G. Lohmann	Shrub	Silva et al. (2016)
<i>Tabebuia aurea</i> (Silva Manso) Benth. & Hook.f. ex S.Moore	Tree	Sousa et al. (2008)
Bixaceae		
<i>Cochlospermum orinocense</i> (Kunth) Steud.	Tree	MAR 4113
Boraginaceae		
<i>Euploca polyphylla</i> (Lehm.) J.I.M.Melo & Semir	Herb	HRCB 13464
<i>Tournefortia bicolor</i> Sw.	Shrub	HRCB 12676
<i>Tournefortia volubilis</i> L.	Vine	MAR 2582
<i>Varronia globosa</i> Jacq.	Shrub	MAR 4112
<i>Varronia multispicata</i> (Cham.) Borhidi	Shrub	MAR 2581
Burseraceae		
<i>Protium heptaphyllum</i> (Aubl.) Marchand	Tree	MAR 2585
Cactaceae		
<i>Cereus jamacaru</i> DC.	Tree	MAR 6644
<i>Cereus mirabella</i> N.P. Taylor	Tree	Silva et al. (2016)
<i>Hylocereus setaceus</i> (Salm-Dyck) R.Bauer.	Shrub	Silva et al. (2016)
Cannabaceae		
<i>Trema micranta</i> (L.) Blume	Tree	HRCB 13448
Capparaceae		
<i>Cynophalla flexuosa</i> (L.) J. Presl	Shrub	MAR 4121
Celastraceae		
<i>Maytenus obtusifolia</i> Mart.	Shrub	Silva et al. (2016)
Chrysobalanaceae		
<i>Chrysobalanus icaco</i> L.	Shrub	MAR 2708
<i>Hirtella ciliata</i> Mart. & Zucc.	Tree	MAR 7071
<i>Hirtella racemosa</i> Lam.	Tree	MAR 2705
Clusiaceae		
<i>Platonia insignis</i> Mart.	Tree	NY 01022879
<i>Clusia rosea</i> Jacq.	Tree	Ribeiro (2011)
Combretaceae		
<i>Combretum mellifluum</i> Eichler	Shrub	Sousa et al.(2008)
<i>Conocarpus erectus</i> L.	Shrub	MAR 4269
<i>Terminalia argentea</i> Mart.	Shrub	MAR 4267
<i>Terminalia glabrescens</i> Mart.	Shrub	MAR 4268
Commelinaceae		
<i>Commelina benghalensis</i> L.	Herb	Amorim et al. (2016)
<i>Commelina elegans</i> Kunth	Herb	Ribeiro (2011)
<i>Commelina erecta</i> L.	Herb	MAR 4236
<i>Dichorisandra hexandra</i> (Aubl.) C.B. Clarke	Herb	HRCB 10669
Connaraceae		
<i>Connarus favosus</i> Planch.	Shrub	HRCB 11625
Convolvulaceae		
<i>Ipomoea bahiensis</i> Willd. ex Roem. &Schult.	Herb	MAR 7120
<i>Ipomoea imperati</i> (Vahl) Griseb.	Herb	HRCB 9945
<i>Ipomoea nil</i> (L.) Roth	Herb	MAR 7106
<i>Ipomoea pes-caprae</i> (L.) R. Br.	Herb	MAR 1213
<i>Merremia aegyptia</i> (L.) Urb.	Herb	MAR 4027
<i>Merremia tuberosa</i> (L.) Rendle	Herb	MAR 4119
<i>Merremia umbellata</i> (L.) Hallier f.	Vine	Amorim et al. (2016)
Costaceae		
<i>Costus arabicus</i> L.	Herb	Cabral-Freire & Monteiro (1993)
Cyperaceae		
<i>Cyperus aggregatus</i> (Willd.) Endl.	Herb	Amorim et al. (2016)
<i>Cyperus cf difformes</i> L.	Herb	Silva et al. (2016)
<i>Cyperus cf esculentus</i> L.	Herb	Silva et al. (2016)
<i>Cyperus laxus</i> Lam.	Herb	HRCB 12674
<i>Cyperus ligularis</i> L.	Herb	HRCB 10544
<i>Cyperus luzulae</i> (L.) Retz.	Herb	HRCB 12675
<i>Cyperus rotundus</i> L.	Herb	Silva et al. (2016)
<i>Cyperus surinamensis</i> Rottb.	Herb	Amorim et al. (2016)
<i>Eleocharis geniculata</i> (L.) Roem. & Schult.	Herb	HRCB 10547

<i>Fimbristylis cymosa</i> R.Br.	Herb	HRCB 13200
<i>Fimbristylis spadicea</i> (L.) Vahl	Herb	Amorim et al. (2016)
<i>Fuirena robusta</i> Kunth	Herb	Amorim et al. (2016)
<i>Fuirena umbellata</i> Rottb.	Herb	Serra et al. (2016)
<i>Kyllinga brevifolia</i> Rottb.	Herb	Amorim et al. (2016)
<i>Kyllinga cf. pumila</i> Michx.	Herb	Silva et al. (2016)
<i>Kyllinga odorata</i> Vahl	Herb	Amorim et al. (2016)
<i>Pycneus polystachyos</i> (Rottb.) P.Beauv.	Herb	Serra et al. (2016)
<i>Scleria bracteata</i> Cav.	Herb	HRCB 13435
<i>Scleria gaertneri</i> Raddi.	Herb	Silva et al. (2016)
Dichapetalaceae		
<i>Dichapetalum rugosum</i> (Vahl) Prance	Shrub	MAR 2600
Dilleniaceae		
<i>Curatella americana</i> L.	Tree	MAR 2601
<i>Davilla elliptica</i> A. St.-Hil.	Vine	MAR 6048
<i>Davilla flexuosa</i> A. St.-Hil.	Vine	MAR 2720
Ebenaceae		
<i>Diospyros hispida</i> A.DC.	Tree	Sousa et al. (2008)
Eriocaulaceae		
<i>Paepalanthus bifidus</i> (Schrad.) Kunth	Herb	HRCB 10673
<i>Paepalanthus lamarckii</i> Kunth	Herb	Serra et al. (2016)
<i>Paepalanthus polytrichoides</i> Kunth	Herb	HRCB 10672
<i>Paepalanthus subtilis</i> Miq.	Herb	Serra et al. (2016)
Erythroxylaceae		
<i>Erythroxylum passerinum</i> Mart.	Shrub	Serra et al. (2016)
<i>Syngonanthus umbellatus</i> (Lam.) Ruhl.	Herb	Ribeiro (2011)
Euphorbiaceae		
<i>Cnidocolus urens</i> (L.) Arthur	Shrub	MAR 4007
<i>Croton aff campestris</i> A.St.-Hil.	Subshrub	Silva et al. (2016)
<i>Croton glandulosus</i> L.	Shrub	MAR 6049
<i>Croton hirtus</i> L'Hér.	Shrub	Amorim et al. (2016)
<i>Dalechampia scandens</i> L.	Vine	MAR 5178
<i>Dalechampia pernambucensis</i> Baill.	Herb	Silva et al. (2016)
<i>Euphorbia hyssopifolia</i> L.	Herb	MAR 2721
<i>Mabea pohliana</i> (Benth.) Müll. Arg.	Vine	Ribeiro (2011)
<i>Microstachys corniculata</i> (Vahl) Griseb	Subshrub	Amorim et al. (2016)
<i>Manihot tristis</i> Müll. Arg.	Subshrub	Silva et al. (2016)
<i>Ricinus communis</i> L.	Shrub	Cabral-Freire & Monteiro (1993)
<i>Sapium glandulosum</i> (L.) Morong	Tree	Cabral-Freire & Monteiro (1993)
Fabaceae		
<i>Abarema cochleata</i> (Willd.) Barneby & J.W.Grimes	Tree	MAR 2789
<i>Abrus precatorius</i> L.	Vine	HRCB 12087
<i>Acacia mangium</i> Willd.	Tree	Silva et al. (2016)
<i>Aeschynomene brevipes</i> Benth.	Subshrub	MAR 4297
<i>Aeschynomene fluminensis</i> Vell.	Subshrub	MAR 4291
<i>Aeschynomene paniculata</i> Willd. ex Vogel	Shrub	Amorim et al. (2016)
<i>Bowdichia virgilioides</i> Kunth	Tree	Sousa et al.(2008)
<i>Calopogonium mucunoides</i> Desv.	Vine	SLUI 680
<i>Canavalia rosea</i> (Sw.) DC.	Vine	Amorim et al. (2016)
<i>Centrosema arenarium</i> Benth.*	Vine	Cabral-Freire & Monteiro (1993)
<i>Centrosema brasilianum</i> (L.) Benth.	Vine	MAR 6777
<i>Centrosema pubescens</i> Benth.	Vine	HRCB 12012
<i>Chamaecrista diphylla</i> (L.) Greene	Subshrub	MAR 2783
<i>Chamaecrista flexuosa</i> (L.) Greene	Subshrub	MAR 6793
<i>Chamaecrista hispidula</i> (Vahl) H.S. Irwin & Barneby	Subshrub	Araujo et al. (2016)
<i>Chamaecrista rotundifolia</i> (Pers.) Greene	Shrub	Amorim et al. (2016)
<i>Chloroleucon acacioides</i> (Ducke) Barneby & J.W. Grimes	Tree	MAR 4303
<i>Clitoria falcata</i> Lam.*	Vine	HRCB 10526
<i>Clitoria guianensis</i> (Aubl.) Benth.	Subshrub	SLUI 283
<i>Clitoria laurifolia</i> Poir.	Subshrub	Araujo et al. (2016)
<i>Copaifera langsdorffii</i> Desf.	Tree	MAR 4316
<i>Crotalaria retusa</i> L.	Herb	MAR 4308
<i>Dalbergia ecastaphyllum</i> (L.) Taub.	Shrub	MAR 2819
<i>Desmodium barbatum</i> (L.) Benth.	Shrub	MAR 2807
<i>Desmodium triflorum</i> (L.) DC.	Subshrub	MAR 4294
<i>Dimorphandra gardneriana</i> Tul.	Tree	Sousa et al. (2008)
<i>Dioclea grandiflora</i> Mart. ex Benth.*	Vine	MAR 2804
<i>Dioclea reflexa</i> Hook. f.*	Vine	Serra et al. (2016)
<i>Dioclea virgata</i> (Rich.) Amshoff	Vine	SLUI 157
<i>Entada polystachya</i> (L.) DC.	Shrub	HRCB 10656

<i>Erythrina amazonica</i> Krukoff	Shrub	MAR 4261
<i>Galactia striata</i> (Jacq.) Urb.	Vine	Araujo et al. (2016)
<i>Guilandina bonduc</i> L.	Shrub	MAR 4260
<i>Hymenaea courbaril</i> L.	Tree	Serra et al. (2016)
<i>Indigofera hirsuta</i> L.	Herb	Silva et al. (2016)
<i>Indigofera microcarpa</i> Desv.	Herb	SLUI 93
<i>Inga pilosula</i> (Rich.) J.F. Macbr.*	Tree	Cabral-Freire & Monteiro (1993)
<i>Inga thibaudiana</i> DC.	Tree	Cabral-Freire & Monteiro (1993)
<i>Leucaena leucocephala</i> (Lam.) de Wit	Shrub	Amorim et al. (2016)
<i>Machaerium aculeatum</i> Raddi*	Vine	Cabral-Freire & Monteiro (1993)
<i>Macroptilium atropurpureum</i> (Sessé & Moc. ex DC.) Urb	Herb	Silva et al. (2016)
<i>Macroptilium lathyroides</i> (L.) Urb.	Vine	MAR 2816
<i>Mimosa caesalpiniiifolia</i> Benth.	Shrub	MAR 2799
<i>Mimosa candollei</i> R. Grether	Herb	Araujo et al. (2016)
<i>Mimosa invisita</i> Mart. ex Colla*	Shrub	MAR 2795
<i>Mimosa pudica</i> L.	Herb	Amorim et al. (2016)
<i>Mimosa pudica</i> var. <i>tetrandra</i> (Humb. & Bonpl. ex Willd.) DC.	Herb	Araujo et al. (2016)
<i>Mucuna urens</i> (L.) Medik	Vine	Cabral-Freire & Monteiro (1993)
<i>Parkia platycephala</i> Benth.	Tree	Sousa et al. (2008)
<i>Periandra mediterranea</i> (Vell.) Taub.	Shrub	Ribeiro (2011)
<i>Phaseolus vulgaris</i> L.	Subshrub	Amorim et al. (2016)
<i>Plathymenia reticulata</i> Benth.	Tree	MAR 6338
<i>Rhynchosia phaseoloides</i> (Sw.) DC.	Vine	Cabral-Freire & Monteiro (1993)
<i>Senna occidentalis</i> (L.) Link	Shrub	MAR 1536
<i>Stryphnodendron coriaceum</i> Benth.	Tree	Sousa et al. (2008)
<i>Stylosanthes angustifolia</i> Vogel	Subshrub	MAR 4216
<i>Stylosanthes gracilis</i> Kunth.	Tree	Ribeiro (2011)
<i>Stylosanthes guianensis</i> (Aubl.) Sw.	Herb	MAR 2817
<i>Vatairea macrocarpa</i> (Benth) Ducke	Tree	Sousa et al. (2008)
<i>Zornia diphylla</i> (L.) Pers.	Herb	Cabral-Freire & Monteiro (1993)
<i>Zornia guanipensis</i> Pittier	Subshrub	MAR 4300
<i>Zornia reticulata</i> Sm.	Subshrub	MAR 4307
Gentianaceae		
<i>Coutoubea spicata</i> Aubl	Herb	Silva et al. (2016)
<i>Irlbachia pratensis</i> (Kunth) L. Cobb & Maas	Herb	Ribeiro (2011)
<i>Schultesia guianensis</i> (Aubl.) Malme	Herb	HRCB 13447
<i>Tetrapollinia caerulea</i> (Aubl.) Maguire & BM Boom.	Herb	Ribeiro (2011)
Heliconiaceae		
<i>Heliconia psittacorum</i> L.f.	Herb	MAR 4145
Hidroleaceae		
<i>Hydrolea spinosa</i> L.	Shrub	Serra et al. (2016)
Humiriaceae		
<i>Humiria balsamifera</i> (Aubl.) A.St.-Hil.	Tree	Ribeiro (2011)
Hypericaceae		
<i>Vismia guianensis</i> (Aubl.) Choisy	Tree	MAR 1042
Krameriaceae		
<i>Krameria tomentosa</i> A.St.-Hil.	Shrub	MAR 6075
Lamiaceae		
<i>Amasonia campestris</i> (Aubl.) Moldenke	Subshrub	MAR 4256
<i>Marsypianthes chamaedrys</i> (Vahl) Kuntze	Herb	MAR 4143
Lauraceae		
<i>Cassytha filiformis</i> L.	Hemiparasite	MAR 4970
Lecythidaceae		
<i>Gustavia augusta</i> L.	Shrub	MAR 4139
<i>Lecythis lurida</i> (Miers) S.A. Mori	Tree	Cabral-Freire & Monteiro (1993)
Lentibulariaceae		
<i>Utricularia fimbriata</i> Kunth.*	Herb	Serra et al. (2016)
<i>Utricularia nigrescens</i> Sylvén*	Herb	Serra et al. (2016)
Loganiaceae		
<i>Antonia ovata</i> Pohl.	Tree	MAR 1888
<i>Spigelia anthelmia</i> L.	Herb	MAR 4138
Loranthaceae		
<i>Psittacanthus dichroos</i> (Mart.) Mart.*	Hemiparasite	Cabral-Freire & Monteiro (1993)
<i>Phthirusa pyrifolia</i> (HBK) Eichl	Hemiparasite	Ribeiro (2011)
Lythraceae		
<i>Cuphea tenella</i> Hooker et Arn.	Herb	Ribeiro (2011)
Malpighiaceae		
<i>Banisteriopsis muricata</i> (Cav.) Cuatrec.	Vine	Serra et al. (2016)
<i>Bunchosia maritima</i> (Vell.) J.F. Macbr.	Shrub	MAR 2763
<i>Byrsonima crassifolia</i> (L.) Kunth	Tree	MAR 2759
<i>Byrsonima chrysophylla</i> Kunth.	Shrub	Ribeiro (2011)
<i>Byrsonima gardneriana</i> A.Juss.	Tree	MAR 2759

<i>Diplopterys pubipetala</i> (A. Juss.) W.R. Anderson & C. Davis	Vine	Cabral-Freire & Monteiro (1993)
<i>Heteropterys nervosa</i> A. Juss.	Vine	MAR 2425
<i>Stigmaphyllon bannisterioides</i> (L.) C. E. Anderson	Shrub	Amorim et al. (2016)
<i>Stigmaphyllon paralias</i> A. Juss.	Shrub	Ribeiro (2011)
<i>Tetrapterys discolor</i> (G. Mey.) DC.	Vine	MAR 2748
<i>Tetrapterys maranhensis</i> A. Juss.	Vine	MAR 2747
Malvaceae		
<i>Apeiba tibourbou</i> Aubl.	Tree	MAR 4962
<i>Guazuma ulmifolia</i> Lam.	Shrub	MAR 1522
<i>Helicteres heptandra</i> L.B.Sm	Shrub	MAR 4000
<i>Hibiscus dimidiatus</i> Schrank	Shrub	Cabral-Freire & Monteiro (1993)
<i>Hibiscus tiliaceus</i> L.	Shrub	SLUI 104
<i>Pachira aquatica</i> Aubl.	Tree	Amorim et al. (2016)
<i>Pavonia cancellata</i> (L.) Cav.	Herb	MAR 4028
<i>Pavonia malacophylla</i> (Link & Otto) Garcke	Shrub	Cabral-Freire & Monteiro (1993)
<i>Pseudobombax grandifloxurum</i> (Cav.) A. Robyns*	Tree	Cabral-Freire & Monteiro (1993)
<i>Sida ciliaris</i> L.	Herb	Serra et al. (2016)
<i>Sida cordifolia</i> L.	Herb	MAR 4162
<i>Sterculia striata</i> A.St.-Hil. & Naudin	Tree	Correia, B. E. F., 356
<i>Urena lobata</i> L.	Subshrub	Cabral-Freire & Monteiro (1993)
<i>Waltheria indica</i> L.	Herb	Araujo et al. (2016)
<i>Waltheria viscosissima</i> A.St.-Hil.	Shrub	MAR 2647
Maranthaceae		
<i>Goepertia arrabidaei</i> (Körn.) Borchs. & S. Suárez*	Herb	Cabral-Freire & Monteiro (1993)
Marcgraviaceae		
<i>Schwartzia brasiliensis</i> (Choisy) Bedell ex Gir.-Cañas*	Vine	Cabral-Freire & Monteiro (1993)
Melastomataceae		
<i>Clidemia hirta</i> (L.) D. Don	Shrub	Cabral-Freire & Monteiro (1993)
<i>Comolia lythrioides</i> (Steudel) Naudin	Herb	Ribeiro (2011)
<i>Miconia ciliata</i> (Rich.) DC.	Shrub	Cabral-Freire & Monteiro (1993)
<i>Mouriri acutiflora</i> Naudin	Tree	Cabral-Freire & Monteiro (1993)
<i>Mouriri elliptica</i> Mart.	Shrub	HAF 2558
<i>Mouriri grandiflora</i> DC.	Tree	MAR 1116
<i>Mouriri guianensis</i> Aubl.	Shrub	Serra et al. (2016)
<i>Nepsera aquatica</i> (Aubl.) Naudin	Herb	MAR 4051
<i>Tococa guianensis</i> Aubl.	Tree	MAR 4053
Menispermaceae		
<i>Odontocarya duckei</i> Barneby	Vine	Cabral-Freire & Monteiro (1993)
Molluginaceae		
<i>Mollugo verticillata</i> L.	Herb	Amorim et al. (2016)
Moraceae		
<i>Ficus americana</i> subsp. <i>guianensis</i> (Desv.) C.C. Berg	Tree	Cabral-Freire & Monteiro (1993)
<i>Ficus catappifolia</i> Kunth & C.D. Bouché	Tree	Cabral-Freire & Monteiro (1993)
Myrtaceae		
<i>Eugenia biflora</i> (L.) DC.	Tree	Cabral-Freire & Monteiro (1993)
<i>Eugenia patrisii</i> Vahl	Shrub	Cabral-Freire & Monteiro (1993)
<i>Eugenia puniceifolia</i> (Kunth) DC.	Shrub	MAR 1069
<i>Eugenia stictopetala</i> Mart. ex DC.	Shrub	Cabral-Freire & Monteiro (1993)
<i>Myrcia brasiliensis</i> Kiaersk.	Shrub	Silva et al. (2016)
<i>Myrcia cuprea</i> (O. Berg) Kiaersk.	Shrub	Cabral-Freire & Monteiro (1993)
<i>Myrcia</i> aff. <i>laruotteana</i> Cambess.	Tree	Machado (2016)
<i>Myrcia obtusa</i> Schauer	Tree	Ribeiro (2011)
<i>Myrcia splendens</i> (Sw.) DC.	Tree	MAR 8136
<i>Myrcia sylvatica</i> (G. Mey.) DC.	Tree	MAR 4287
<i>Myrciaria cuspidata</i> O. Berg	Tree	MAR 4284
<i>Psidium myrsinites</i> DC.	Tree	Santos et al. (2008)
Nyctaginaceae		
<i>Guapira opposita</i> (Vell.) Reitz	Shrub	MAR 4141
<i>Guapira pernambucensis</i> (Casar.) Lundell	Shrub	MAR 1534
Ochnaceae		
<i>Ouratea fieldingiana</i> (Gardner) Engl.	Shrub	MAR 1068
<i>Ouratea hexasperma</i> (A. Sthil).	Tree	Santos et al. (2008)
<i>Ouratea racemiformis</i> Ule	Shrub	Ribeiro (2011)
<i>Sauvagesia erecta</i> L.	Herb	MAR 4135
Olacaceae		
<i>Agonandra brasiliensis</i> Miers	Tree	Santos et al. (2008)
<i>Dulacia candida</i> (Poepp.) Kuntze	Shrub	Cabral-Freire & Monteiro (1993)
<i>Heisteria ovata</i> Benth.	Shrub	MAR 4133
<i>Ximenia americana</i> L.	Shrub	MAR 4450
Onagraceae		
<i>Ludwigia affinis</i> (DC.) H. Hara	Shrub	Cabral-Freire & Monteiro (1993)
<i>Ludwigia hyssopifolia</i> (G. Don) Exell	Herb	Cabral-Freire & Monteiro (1993)

<i>Ludwigia octovalvis</i> (Jacq.) P.H.Raven	Herb	Silva et al. (2016)
Opiliaceae		
<i>Agonandra brasiliensis</i> Miers ex Benth. & Hook.f.	Tree	MAR 1630
Orchidaceae		
<i>Catasetum discolor</i> (Lindl.) Lindl	Herb	Ribeiro (2011)
<i>Oeceoclades maculata</i> (Lindl.) Lindl.	Herb	Cabral-Freire & Monteiro (1993)
Orobanchaceae		
<i>Buchnera palustris</i> (Aubl.) Spreng	Herb	Amorim et al. (2016)
Passifloraceae		
<i>Passiflora coccinea</i> Aubl.	Vine	MAR 2652
<i>Passiflora foetida</i> L.	Vine	MAR 2653
<i>Passiflora nitida</i> Kunth	Vine	Cabral-Freire & Monteiro (1993)
<i>Passiflora silvestres</i> Vell.	Vine	Amorim et al. (2016)
<i>Passiflora subrotunda</i> Mast.	Vine	Amorim et al. (2016)
<i>Piriqueta duarteana</i> (A. St.-Hil., A. Juss. & Cambess.) Urb.	Herb	Silva et al. (2016)
<i>Piriqueta viscosa</i> Griseb.	Herb	Cabral-Freire & Monteiro (1993)
<i>Turnera pumilea</i> L.	Herb	Araujo et al. (2016)
<i>Turnera subulata</i> Sm.	Shrub	MAR 8831
<i>Turnera ulmifolia</i> L.	Herb	Ribeiro (2011)
Phyllanthaceae		
<i>Hyeronima alchorneoides</i> Allemão*	Tree	Cabral-Freire & Monteiro (1993)
<i>Margaritaria nobilis</i> L.f.	Shrub	MAR 2609
<i>Phyllanthus niruri</i> L.	Herb	Amorim et al. (2016)
<i>Phyllanthus tenellus</i> Roxb.	Herb	Amorim et al. (2016)
Plantaginaceae		
<i>Scoparia dulcis</i> L.	Herb	MAR 2677
<i>Stemodia foliosa</i> Benth.*	Subshrub	Serra et al. (2016)
Plumbaginaceae		
<i>Plumbago scandens</i> L.	Subshrub	MAR 2690
Poaceae		
<i>Andropogon cf eucostachyus</i> Kunth	Herb	Silva et al. (2016)
<i>Andropogon leucostachyus</i> Kunth	Herb	Cabral-Freire & Monteiro (1993)
<i>Cenchrus echinatus</i> L.*	Herb	MAR 5990
<i>Dactyloctenium aegyptium</i> (L.) Willd.	Herb	MAR 2750
<i>Digitaria horizontalis</i> Willd.	Herb	Amorim et al. (2016)
<i>Eragrostis ciliaris</i> (L.) R. Br.	Herb	Cabral-Freire & Monteiro (1993)
<i>Hymenachne pernambucensis</i> (Spreng.) Zuloaga	Herb	Serra et al. (2016)
<i>Homolepis isocalycia</i> (G.Mey.) Chase	Herb	Ribeiro (2011)
<i>Megathyrsus maximus</i> (Jacq.) B.K.Simon & S.W.L.Jacobs	Herb	Amorim et al. (2016)
<i>Panicum campestre</i> Nees ex Trin.	Herb	Silva et al. (2016)
<i>Panicum cayennense</i> Lam.	Herb	Amorim et al. (2016)
<i>Panicum trichoides</i> Sw.	Herb	Cabral-Freire & Monteiro (1993)
<i>Paspalum ligulare</i> Nees	Herb	Amorim et al. (2016)
<i>Paspalum arenarium</i> Schrad.*	Herb	Cabral-Freire & Monteiro (1993)
<i>Paspalum conjugatum</i> Berg.	Herb	Ribeiro (2011)
<i>Paspalum lingure</i> Nees	Herb	Araujo et al. (2016)
<i>Paspalum maritimum</i> Trin.	Herb	SLUI 831
<i>Paspalum millegrana</i> Schrad. ex Schult.	Herb	Cabral-Freire & Monteiro (1993)
<i>Rugoloa pilosa</i> (Sw.) Zuloaga	Herb	Amorim et al. (2016)
<i>Rugoloa polygonata</i> (Schrad.) Zuloaga	Herb	Amorim et al. (2016)
<i>Setaria parviflora</i> (Poir.) Kerguelén	Herb	Silva et al. (2016)
<i>Setaria vulpiseta</i> (Lam.) Roem. & Schult.	Herb	Cabral-Freire & Monteiro (1993)
<i>Sporobolus indicus</i> (L.) R. Br.	Herb	Amorim et al. (2016)
<i>Sporobolus virginicus</i> (L.) Kunth	Herb	MAR 1958
<i>Streptostachys asperifolia</i> Desv.	Herb	Cabral-Freire & Monteiro (1993)
<i>Urochloa brizantha</i> (Hochst. ex A. Rich.) R.D. Webster	Herb	Silva et al. (2016)
<i>Urochloa plantaginea</i> (Link) R.D.Webster	Herb	Amorim et al. (2016)
Polygalaceae		
<i>Asemeia martiana</i> (A.W. Benn.) J.F.B. Pastore & J.R. Abbott	Herb	Araujo et al. (2016)
<i>Asemeia monticola</i> (Kunth) J.F.B.Pastore & J.R.Abbott	Herb	Cabral-Freire & Monteiro (1993)
<i>Asemeia violacea</i> (Aubl.) J.F.B.Pastore & J.R.Abbott	Herb	MAR 5828
<i>Polygala glochidiata</i> Kunth.	Herb	Silva et al. (2016)
<i>Polygala paniculata</i> L.	Herb	MAR 4266
<i>Polygala violacea</i> Aubl.	Herb	Serra et al. (2016)
Polygonaceae		
<i>Coccoloba latifolia</i> Lam.	Tree	SLUI 137
<i>Coccoloba mollis</i> Casar.	Tree	MAR 4131
<i>Coccoloba ramosissima</i> Wedd.	Shrub	MAR 4129
<i>Securidaca bialata</i> Benth.	Vine	Ribeiro 2011
Rubiaceae		
<i>Alibertia aff. edulis</i> (Rich.) A.Rich.	Tree	Machado (2016)
<i>Amaioua guianensis</i> Aubl.	Tree	Ribeiro (2011)

<i>Borreria latifolia</i> (Aubl.) K. Schum.	Herb	Araujo et al. (2016)
<i>Borreria verticillata</i> (L.) G.Mey.	Herb	MAR 4226
<i>Chiococca alba</i> (L.) Hitchc.	Shrub	MAR 2764
<i>Chiococca nitida</i> Benth.	Shrub	MAR 4103
<i>Chomelia obtusa</i> Cham. & Schltldl.	Shrub	Cabral-Freire & Monteiro (1993)
<i>Duroia macrophylla</i> Huber	Tree	MAR 4096
<i>Faramea nitida</i> Benth	Shrub	MAR 5830
<i>Guettarda angelica</i> Mart. ex Müll. Arg.	Shrub	MAR 6347
<i>Guettarda platypoda</i> DC.	Shrub	MAR 4116
<i>Guettarda spruceana</i> Müll.Arg.	Tree	Machado (2016)
<i>Isertia spiciformis</i> DC.	Shrub	MAR 4093
<i>Mitracarpus salzmannianus</i> DC.	Subshrub	MAR 4104
<i>Perama hirsuta</i> Aubl.	Herb	Ribeiro (2011)
<i>Psychotria barbiflora</i> DC.	Shrub	Ribeiro (2011)
<i>Psychotria hoffmannseggiana</i> (Willd. ex Schult.) Müll.Arg.	Shrub	MAR 4108
<i>Richardia grandiflora</i> (Cham. & Schltldl.) Steud.	Shrub	Amorim et al. (2016)
<i>Tocoyena brasiliensis</i> Mart.	Tree	MAR 2765
<i>Tocoyena cf. bullata</i> (Vell.) Mart.	Shrub	Silva et al. (2016)
<i>Tocoyena formosa</i> (Cham. & Schltldl.) K.Schum.	Tree	Sousa et al. (2008)
<i>Tocoyena aff. sellowiana</i> (Cham. & Schltldl.) K.Schum.	Shrub	Machado (2016)
Rutaceae		
<i>Zanthoxylum rhoifolium</i> Lam.	Tree	Cabral-Freire & Monteiro (1993)
Salicaceae		
<i>Banara guianensis</i> Aubl.	Shrub	Cabral-Freire & Monteiro (1993)
<i>Casearia grandiflora</i> Cambess.	Shrub	Cabral-Freire & Monteiro (1993)
Sapindaceae		
<i>Matayba discolor</i> Radlk.	Shrub	Ribeiro (2011)
<i>Matayba guianensis</i> Aubl.	Shrub	Cabral-Freire & Monteiro (1993)
<i>Pseudima frutescens</i> (Aubl.) Radlk.	Shrub	Machado (2016)
<i>Serjania paucidentata</i> DC.	Subshrub	Silva et al. (2016)
<i>Serjania salzmanniana</i> Schltldl.	Vine	Serra et al. (2016)
Sapotaceae		
<i>Manilkara bidentata</i> (A.DC.) A. Chev.	Tree	MAR 2675
<i>Manilkara triflora</i> (Allemão) Monach.	Shrub	MAR 2676
<i>Manilkara zapota</i> (L.) P. Royen	Tree	Amorim et al.(2016)
<i>Pouteria ramiflora</i> (Mart.) Radlk.	Tree	Santos et al. (2008)
Simaroubaceae		
<i>Simaba cedron</i> Planch.	Tree	Ribeiro (2011)
<i>Simarouba versicolor</i> A.St.-Hil.	Tree	MAR 4629
Smilacaceae		
<i>Smilax syphilitica</i> Humb. & Bonpl. ex Willd.	Vine	MAR 7136
Solanaceae		
<i>Physalis angulata</i> L.	Herb	MAR 538
<i>Solanum americanum</i> Mill.	Subshrub	Cabral-Freire & Monteiro (1993)
<i>Solanum grandiflorum</i> Ruiz & Pav.	Shrub	Cabral-Freire & Monteiro (1993)
<i>Solanum paniculatum</i> L.	Shrub	Cabral-Freire & Monteiro (1993)
<i>Solanum subinerme</i> Jacq.	Shrub	MAR 3515
Theaceae		
<i>Ternstroemia dentata</i> (Aubl.) Sw.	Tree	Ribeiro (2011)
Urticaceae		
<i>Cecropia pachystachya</i> Trécul	Tree	Amorim et al. (2016)
Verbenaceae		
<i>Lantana camara</i> L.	Shrub	Cabral-Freire & Monteiro (1993)
<i>Lippia microphylla</i> Cham.	Shrub	Ribeiro (2011)
Violaceae		
<i>Pombalia calceolaria</i> (L.) Paula-Souza	Herb	MAR 2744
Viscaceae		
<i>Phoradendron quadrangulare</i> (Kunth) Griseb.	Hemiparasite	Serra et al. (2016)
Vitaceae		
<i>Cissus erosa</i> Rich.	Vine	MAR 5823
<i>Cissus verticillata</i> (L.) Nicolson & C.E. Jarvis	Vine	Cabral-Freire & Monteiro (1993)
Vochysiaceae		
<i>Qualea grandiflora</i> Mart.	Tree	MAR 7078
<i>Qualea parviflora</i> Mart.	Tree	MAR 7074
<i>Salvertia convallariodora</i> A.St.-Hil.	Tree	MAR 7128
Xyridaceae		
<i>Xyris jupicai</i> Rich.	Herb	Serra et al. (2016)
<i>Xyris paraensis</i> Poepp. ex Kunth	Herb	Ribeiro (2011)

Table 2

State	Nº of spp.	Extension	Reference
Piauí	363 spp	66 km	Santos Filho et al. (2015)
Sergipe	831 spp	168 km	Oliveira et al. (2014)
Pernambuco	477 spp	187 km	Zickel et al. (2007)
Ceará	392 spp	573 km	Santos-Filho et al. (2011)
Maranhão	401 spp	640 km	present study

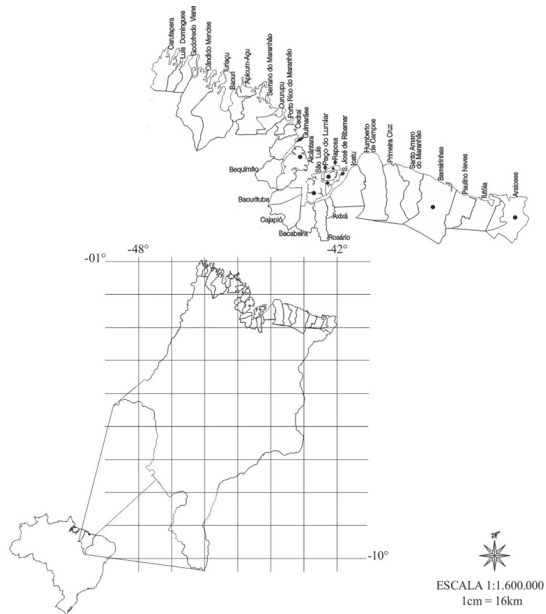


Figure 1 - Maranhão coastline

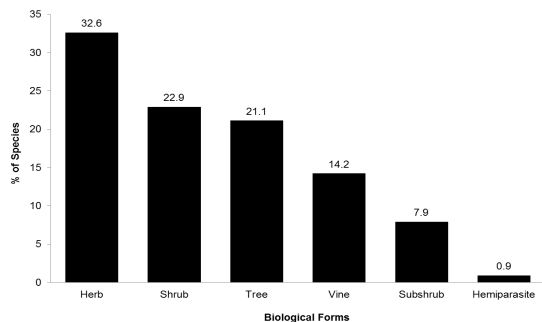


Figure 2 - Life forms of the flora of the restingas of Maranhão, Brazil.

REFERENCES:

[1] Ab'Sáber, A.N. 2006. Brasil: paisagens de exceção: o litoral e o pantanal matogrossense: patrimônios básicos. Cotia: Ateliê Editorial, 182 p.

[2] Almeida Jr., E.B.; Zickel C.S.; Pimentel R.M.M. 2006. Caracterização e espectro biológico da vegetação do litoral arenoso do Rio Grande do Norte. Revista de Geografia 23(3): 66-86.

[3] Almeida Jr., E.B.; Zickel C.S. 2009. Fisionomia psamófila-reptante: riqueza de espécies na praia da Pipa, Rio Grande do Norte, Brasil. Pesquisas, Botânica 60: 289-299.

[4] Almeida Jr., E.B.; Olivio, M.A.; Araujo, E.L.; Zickel, C.S. 2009. Caracterização da vegetação de restinga da RPPN de Maracaipé, Pernambuco, com base na fisionomia, flora, nutrientes do solo e lençol freático. Acta Botanica Brasilica 23(1): 36-48.

[5] Almeida Jr., E.B.; Santos-Filho F.S.; Zickel C.S. 2012. Conserving species of the *Manilkara* spp. threatened with extinction in vegetation fragments in ecotone zones. International Journal of Biodiversity and Conservation Mar 4(3): 113-117, doi: 10.5897/IJBCC11.103.

[6] Amorim, I.F.F.; Santos-Filho, F.S.; Almeida Jr., E.B. 2016. Fitossociologia do estrato herbáceo de uma área de dunas em Araçagi, Maranhão. Pages 29-44 In: Eduardo Bezerra de Almeida Jr., Francisco Soares Santos-Filho (Orgs) Biodiversidade do Meio Norte do Brasil: conhecimentos ecológicos e aplicações. Ied.Curitiba: Editora CRV.

[7] APG IV. 2016. An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG IV. Botanical Journal of the Linnean Society 161(2): 105-121.

[8] Araujo, D.S.D.; Pereira M.C.A.; Pimentel M.C.P. 2004. Pesquisas de Longa Duração na Restinga de Jurubatiba – Ecologia, História Natural e Conservação. São Carlos: Ed. RiMa: Flora e restinga de comunidades na restinga de Jurubatiba – Síntese dos conhecimentos com enfoque especial para a formação aberta de Clusia; p. 59-76.

[9] Araujo, A.C.M.; Silva, A.N.F.; Almeida Jr., E.B. 2016. Caracterização estrutural e status de conservação do estrato herbáceo de dunas da Praia de São Marcos, Maranhão, Brasil. Acta Amazonica 46(3): 247-258.

[10] Britto, I.C.; Queiroz L.P.; Guedes, M.L.S.; OLIVEIRA, N.C.; SILVA, L.B.N. 1993.

Flora fanerogâmica das dunas e lagoas do Abaeté, Salvador, Bahia. Sítientibus (11): 31-46.

[11] Cabral-Freire, M.C.C.; Monteiro, R. 1993. Florística das praias da Ilha de São Luís, estado do Maranhão (Brasil): diversidade de espécies e suas ocorrências no litoral brasileiro. Acta Amazonica 23(2-3): 125-140.

[12] Cantarelli, J.R.R.; Almeida Jr., E.B.; Santos-Filho F.S.; Zickel, C.S. 2012. Tipos fitofisionômicos e florística da restinga da APA de Guadalupe, Pernambuco, Brasil. Insula (41): 95-117.

[13] Castro, A.S.; Moro, M.F.; Menezes, M.O.T. 2012. O Complexo vegetal da zona litorânea do Ceará: Pecém, São Gonçalo do Amarante. Acta Botanica Brasilica 26(1): 108-124.

[14] Castro, A.R.R.; Almeida Jr., E.B. 2016. Expansion of the geographic distribution of *Faramea nitida* Benth. in the restinga of Maranhão state, northeastern Brazil. Check List 12(1):1831.

[15] El-Robrini, M.; Marques, V.; Silva, M.A.M.S.; El-Robrini, M.H.S.; Feitosa, A.C.; Tarouco, J.E.F.; Santos, J.H.S.; Viana, J.R. 2006. Erosão e progradação do litoral brasileiro. (MA). 130 pages.

[16] Esteves, G.L. 1980. Contribuição ao conhecimento da vegetação de restinga de Maceió – Alagoas. Recife: Secretaria de Planejamento do Estado de Alagoas. 42 pages.

[17] Freire, M.S.B. 1990. Levantamento florístico do Parque Estadual das Dunas de Natal. Acta Botanica Brasilica 4(2): 41-59.

[18] Gomes, F.S.; Guedes, M.L.S. 2014. Flora vascular e formas de vida das formações de restinga do litoral norte da Bahia, Brasil. Acta Biológica Catarinense 1(1): 22-43.

[19] IBGE. 2011. Instituto Brasileiro de Geografia e Estatística. Anuário Estatístico do Brasil. (71):18-74.

[20] Machado, M.A. 2016. Caracterização Estrutural e fatores edáficos da vegetação lenhosa da restinga da Ilha de Curupu, Raposa-MA. Universidade Federal do Maranhão, São Luis (MA), Brazil. Master's dissertation, 63 pages.

[21] Mather, J.R.; Yoshioka, G.A. 1968. The role of climate in the distribution of vegetation. Annals of the Association of American Geographers 58: 29-41.

[22] Matias, L.Q.; Nunes, E.P. 2001. Levantamento florístico da área de proteção ambiental de Jericoacoara, Ceará. Acta Botanica Brasilica 15(1): 35-43.

[23] Melo, A.L.; Sales, M.F. 2008. O gênero *Cnidocolus* Pohl (Crotonoideae-Euphorbiaceae) no estado de Pernambuco, Brasil. Acta Botanica Brasilica 22(3): 806-827.

[24] Menezes, C.M.; Aguiar, L.G.P.A.; Espinheira, M.J.C.L.; Silva, V.I.S. 2009. Florística e Fitossociologia do componente arbóreo do município de Conde, Bahia, Brasil. Revista Biociências 15(1): 44-55.

[25] Oliveira-Filho, A.T.; Carvalho, D.A. 1993. Florística e fisionomia da vegetação no extremo norte do litoral da Paraíba. Brazilian Journal of Botany 16(1): 115-130.

[26] Oliveira, F.S.; Mendonça, M.W.A.; Vidigal, M.C.S.; Régio, M.M.C.; Albuquerque, P.M.C. 2010. Comunidade de abelhas (Hymenoptera, Apoidea) em ecossistema de dunas na Praia de Panaquatira, São José de Ribamar, Maranhão, Brasil. Revista Brasileira de Entomologia 54(1): 82-90.

[27] Oliveira, E.V.S.; Lima, J.F.; Silva, T.C.; Landim, M.F. 2014. Checklist of the flora of the Restingas of Sergipe State, Northeast Brazil. Check List 10(3): 529-549, doi: 10.15560/10.3.529.

[28] Oliveira, E.V.S.; Sobrinho, E.S.F.; Landim, M.F. 2015. Flora from the restingas of Santa Isabel Biological Reserve, northern coast of Sergipe state, Brazil. Check List 11(5): 1779, doi: http://dx.doi.org/10.15560/11.5.1779

[29] Pontes, A.F.; M.R.V. Barbosa. 2008 Floristic Survey of the AMEM Forest, Cabedelo, Paraíba, Brazil; p. 458-473 In W.W. Thomas and E.G. Britton (ed.). The Atlantic coastal forest of Northeastern Brazil. New York: The New York Botanical Garden.

[30] Queiroz, E.P.; Cardoso, D.B.O.S.; Ferreira, M.H.S. 2012. Composição florística da vegetação de restinga da APA Rio Capivara, Litoral Norte da Bahia, Brasil. Sítientibus, série Ciências Biológicas 12(1): 66-73.

[31] Ribeiro, E.K.M.D. 2011. Fenologia e atributos reprodutivos de espécies ocorrentes em restingas do Maranhão. Universidade Federal de Pernambuco, Recife (PE), Brazil. Ph.D. thesis, 107 pages.

[32] Sacramento, A.C.S.; Zickel, C.S. and Almeida Jr., E.B., 2007. Aspectos florísticos da vegetação de restinga no litoral de Pernambuco. Revista Árvore 31(6): 1121-1130.

[33] Santos-Filho, F.S.; Almeida Jr., E.B.; Bezerra, L.F.M.; Lima, L.F.; Zickel, C.S. 2011. Magnoliophyta, restinga vegetation, state of Ceará, Brazil. Check List 7(4): 478-485.

[34] Santos-Filho, F.S.; Zickel, C.S. 2013. Biodiversidade do Piauí: pesquisa & perspectivas. v.2. Curitiba: Editora CRV; 2013. Capítulo 1, Origem e estrutura da costa e vegetação de restinga: o caso do litoral do Piauí; p. 11-36.

[35] Santos-Filho, F.S.; Almeida Jr., E.B.; Zickel, C.S. 2013. Biodiversidade do Piauí: pesquisas & perspectivas. v.2. Curitiba: CRV; 2013. Capítulo 2, A flora das restingas de Parnaíba e Luiz Correia - litoral do Piauí, Brasil; p. 37-60.

[36] Santos-Filho, F.S.; Almeida Jr., E.B.; Lima, P.B. and Soares, C.J.R.S. 2015a. Checklist of the flora of the restingas of Piauí state, Northeast Brazil. Check List 11(2): 1598-1608.

[37] Santos-Filho, F.S.; Almeida Jr., E.B.; Soares, C.J.R.S.; Zickel, C.S. 2015b. Flora and woody vegetation structure in an Insular area of restinga in Brazil. International Journal of Ecology and Environmental Sciences 41(3-4): 147-160.

[38] Santos-Filho, F.S.; Mesquita, T. K. S.; Almeida Jr., E.B.; Zickel, C.S. 2016. A Flora de Cajueiro da Praia: uma área de tabuleiros do litoral do Piauí, Brasil. Revista Equador (UFPI) 5 (2): 21-35.

[39] Serra, F.C.V.; Lima, P.B.; Almeida Jr., E.B. 2016. Species richness in restinga vegetation on the eastern Maranhão State, Northeastern Brazil. Acta Amazonica 46(3): 271-280.

[40] Silva, J.M.C.; Tabarelli, M. 2000. Tree species impoverishment and the future flora of the Atlantic forest of northeast Brazil. Nature 404(6773): 72-74.

[41] Silva, S.S.L.; Zickel, C.S. and Castaro, L.A. 2008. Flora vascular e perfil fisionômico de uma restinga no litoral sul de Pernambuco. Acta Botanica Brasilica 22(4): 1123-1135.

[42] Silva, V.I.S.; Menezes, C.M. 2012. Contribuição para o conhecimento da vegetação de restinga de Massarandupió, Município de Entre Rios, BA, Brasil. Revista de Gestão Costeira Integrada 12: 239-251.

[43] Silva, A.N.F.; Araujo, A.C.M.; Almeida Jr., E.B. 2016. Flora fanerogâmica das dunas da praia de São Marcos, São Luis, Maranhão. Pp. 11-28 In: Eduardo Bezerra de Almeida Jr.; Francisco Soares Santos-Filho. (Org.). Biodiversidade do Meio Norte do Brasil: conhecimentos ecológicos e aplicações. Ied.Curitiba: Editora CRV.

[44] Sousa, H.S.; Castro, A.A.J.F.; Soares, F.A.R.; Farias, R.R.S de.; Sousa, S.R. 2008. Florística e Fitossociologia de Duas Áreas de Cerrado do Litoral, Tutóia e Paulino Neves, Nordeste do Maranhão. Publicações Avulsas em Conservação de Ecossistemas 1-26.

[45] Whittaker R.H. 1975. Communities and ecosystems. v. 2. New York: MacMillan.

[46] Zickel, C.S.; Almeida Jr, EB.; Medeiros, DPW.; Lima, PB.; Souza, TMS.; Lima, AB. 2007. Magnoliophyta species of restinga, state of Pernambuco, Brazil. Check List 3(3): 224-241.