Floristic survey of a Caatinga area of high biological importance in the Mesoregion of Paraíba backlands, Northeast Brazil

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Floristic survey of a Caatinga area of high biological importance in the Mesoregion of Paraíba backlands, Northeast Brazil[1]

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Título resumido: Floristic survey of a Caatinga area

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ABSTRACT – (Floristic survey of a Caatinga area of high biological importance in the Mesoregion of Paraíba backlands, Northeast Brazil). The Caatinga occupies an area of approximately 912,529 km², being one of the most distinct phytogeographic regions of the Brazilian territory. It has a vegetation that varies according to its distribution and relationship with the geography of each area. This study aimed to carry out a floristic survey of ABA farm, located in the municipality of Passagem, mesoregion of the Paraíba backlands. For four years, fortnightly botanical collections were carried out in all the plant's physiognomies on the farm, following a standard botanical protocol of floristic survey and herborization techniques. The results of this research brought up an important floristic list, consisting of 322 species from 194 genera belonging to 62 botanical families. Among these families, the ones with the higher number of species were Fabaceae (48 spp.), Euphorbiaceae (23 spp.), Convolvulaceae (21 spp.), Malvaceae (19 spp.) and Asteraceae (15 spp.). The habits were herbs (108 spp.), trees (59 spp.), subshrubs (56 spp.), shrubs (46 spp.), lianas (46 spp.), epyphytes and parasites (four spp.) In addition, 38 new species records were registered for the Paraíba State.
Keywords: diversity, flora, floristic composition, semiarid

RESUMO – (Levantamento florístico de uma área de Caatinga de alta importância biológica na Mesorregião do Sertão Paraibano, Nordeste do Brasil). A Caatinga ocupa uma área de aproximadamente 912.529 km², sendo umas das regiões fitogeográficas mais distintas do território brasileiro. Possui uma vegetação que varia conforme a sua distribuição e relação com a geografia de cada área. Este trabalho teve como objetivo fazer um levantamento florístico da Fazenda ABA, localizada no município de Passagem, mesorregião do sertão paraibano. Durante quatro anos foram realizadas coletas botânicas quinzenais em todas as fitofisionomias da Fazenda ABA, obedecendo a um protocolo botânico padrão de técnicas de levantamento florístico e herborização de exsicatas. Os resultados desta pesquisa geraram uma lista florística importante, constituída de 322 espécies de 194 gêneros pertencentes a 62 famílias botânicas, dentre estas as famílias que mais se destacaram em número de espécies temos Fabaceae (48 spp.), Euphorbiaceae (23 spp.), Convolvulaceae (21 spp.), Malvaceae (19 spp.) e Asteraceae (15 spp.). Os hábitos foram o herbáceo (108 spp.), arbóreo (59 spp.), subarbustivo (56 spp.), arbustivo (46 spp.), lianas (46 spp.), epífitas e parasitas (quatro spp.). Além disso foram apontados 38 novos registros de espécies para o Estado da Paraíba.
Palavra-chave: composição florística, diversidade, flora, semiárido

Introduction

The Caatinga is located in the northeastern semiarid and occupies an area of approximately 912,529 km² (Silva *et al*. 2017), being one of the most distinct phytogeographic regions of the Brazilian territory. Its flora, in the Caatinga domain, has a representation of 5.022 species, with 2.307 species being found in the Paraíba State, according to a study presented in BFG (2021).

The Caatinga climate is semi-arid, forming vegetation mosaics, mostly deciduous, xerophilous and prickly plants, with poorly distributed rainfall and precipitation in a period of three to six months (IBGE 2004, Silva *et al.* 2017). In the Northern backland depression, rainfall is more concentrated in this ecoregion than in other parts of the Caatinga, varying from 500 to 800 mm (Veloso *et al.* 2002).

ABA Farm is located in an area which is considered by MMA (2002) as of high biological importance in the Caatinga, placed in the mountain complex also named Aba after the river that crosses this geologic mountain complex. The totality of its area presents many phytophysiognomies with mountains up to 800 m high and dense well-preserved tree-shrub caatinga associated to riparian forest, rupiculous flora and open fields. Among these areas riparian forests, open fields with the presence of exotic species and montane vegetation can be found (MMA 2002).

In the mesoregion of the Paraíba hinterland, floristic studies have been developed in the last five years and have improved knowledge about the state's flora, contributing to a better understanding of the flora and vegetation of Caatinga areas (Lucena *et al.* 2015, Torres *et al*. 2016, Brito *et al.* 2018, Costa *et al*. 2019, Fernando *et al*. 2021). The present study consists of a floristic survey of ABA farm, in the municipality of Passagem, Paraíba State, Northeast Brazil.

Material and methods

Study area - The municipality of Passagem is located in the mesoregion of the Paraiba hinterland, bordering with Quixaba and São Mamede by north, Taperoá e Cacimba by south, and Cacimba de Areia by east (IBGE 2019) (figure 1). The climate is semi-arid (Bsh), warm and dry, with an average annual temperature of 25ºC (Francisco 2015, IBGE 2019).

ABA farm is located at 4.6km from the urban area of Passagem, occupies an area of 350 ha of which 120 are legal reserve. Although most of the farm is located on a plain, the caatingas also reach the mountains, where the wavy to sgrongly wavy relief predominates, with elevations ranging from 300m to 810m, with emphasis on the Aba Mountains and Preacas (Beltrão *et al.* 2005).

The set of mountains which compose the farm (figure 2) shows a well-preserved vegetation, compared to vegetation at the lower altitudes of the area. The predominant vegetation is dense tree-shrubby, with some segments of open shrubby caatinga, riparian forests of a temporary river, rupiculous and aquatic vegetation. In the area where the farm is located there are many antrophic activities such as cattle and goat raising and their subsistence farming. Such activities do not expand to the mountainous areas, being limited to the surroundings of mountains or close to houses.

Data collection - Floristic sampling was carried out from 2014 to 2017, period in which the botanical collections were carried out through exploratory and random walks in the study area, seeking to cover

the larger possible area and all phytophysiognomies present. Fertile specimens were collected using the technique and method by preparing the botanical material according to parameters of usual taxonomy (Judd *et al.* 2009, IBGE 2012). Important features and information for the identification of the taxa were recorded in a field book, in addition to the photographic record, geographic coordinates, landscape and soil characterization.

The collected material was incorporated to HCSTR collection, acronym according to Thiers 2022, which is constantly updated. The specimens were identified with the help of specialized literature and examinations by specialists. The floristic list was ordered alphabetically by family and species and the circumscription of botanical families followed the proposal of "Angiosperm Phylogeny Group" (APG IV 2016). In order to check the writing of scientific names, the electronic databases of Flora do Brasil (BFG 2021) and Tropicos (http://www.tropicos.org) were consulted.

Results and Discussion

Three hundred and twenty-two species and 194 genera distributed in 62 botanical families were identified. Two families of Pteridophytes were found, with the predominant species being *Selaginella convoluta* (Arn.) Spring occurring in all phytophysiognomies of the farm, mainly in the riparian forest. Angiosperms were the group which prevailed in the study area, with 60 families registered, two of them being basal Angiosperms (Annonaceae and Aristolochiaceae) represented by the species *Annona leptopetala* (R.E.Fr.) H.Rainer and *Aristolochia birostris* Duch.

Eudicotyledons were predominant in the angiosperms group with 47 families, with Fabaceae (48 spp.), Euphorbiaceae (23 spp.), Convolvulaceae (21 spp.), Malvaceae (19 spp.) and Asteraceae (15 spp.) being the most representative ones. As for Monocotyledons, 11 families were registered, being represented maily by Poaceae (nine spp.), Bromeliaceae (six spp.), Commelinaceae (six spp.) and Cyperaceae (five spp.) which frequentely occurred in the study area.

Among the genera, the most represented were: *Ipomoea* L. with nine species and *Euphorbia* L., *Oxalis* L. and *Tillandsia* L. with five species each. Among life forms, the herbaceous was the predominant one (108 spp.), followed by trees (59 spp.), subshrubs (56 spp.), shrubs (46 spp.), lianas (46 spp.), epiphytes and parasitic forms (four spp.). All species are listed in Table 1.

Thirty-eight new species ocurrences were recorded for the Paraíba State (see * in table 1), one of these being new occurrences of genera: *Eriope* Kunth ex Benth. Three new occurrences for the Caatinga domain were also record: *Helicteres andersonii* Cristóbal (Malvaceae), *Niedenzuella multiglandulosa* (A. Juss.) WR Anderson (Malpighiaceae) and *Oxalis latifolia* Kunth (Oxalidaceae); and two new species described by (Monteiro et al 2018) and (Harley et al 2019) were recorded:

Harpochilus paraibanus F.K.S. Monteiro, J.I.M Melo & E.M.P. Fernando and *Mesosphaerum caatingense* Harley & J.F.B. Pastore.

Eriope Bonpl. ex Benth. constitutes a new occurrence of the genus for the Paraíba State by the species *Eriope macrostachya* Mart. ex Benth. It is a shrub from the Lamiaceae family, which was found flowering between April and July and fruiting in August, at 810m heigh, the highest point of ABA farm. The species *Niedenzuella multiglandulosa* (A.Juss.) W.R. Anderson represents a new record for the Caatinga domain. It is a vine with yellow flowers and its populations were found in the riparian woods of the farm.

Two new species were described at the ABA Farm by Monteiro et al. (2018) and Harley et al. (2019); one of them from the Acanthaceae family, genus *Harpochilus* Nees, which is shrub species with a cream yellow inflorescence (*Harpochilus paraibanus* FKS Monteiro, JIM Melo & EMP Fernando), described for the Paraíba semiarid (Monteiro *et al.* 2018). The second species found was from the Lamiaceae family, genus *Mesosphaerum* P. Browne, a subshrub described for the Caatinga, with distribution in the States of Paraíba, Pernambuco and Rio Grande do Norte, *Mesosphaerum caatingense* Harley & J.F.B. Pastore (Harley *et al.* 2019).

The farm's riparian forest has a rich vegetation, with the most frequent species being *Microdesmia rigida* (Benth.) Sothers & Prance (Oiticica), *Erythrina velutina* Willd. (Mulungu), *Tabebuia aurea* (Silva Manso) Benth. & Hook.f. ex S.Moore (Craibeira), *Lonchocarpus sericeus* (Poir.) Kunth ex DC. (Ingazeira) and *Sapium glandulosum* (L.) Morong. (Leiteiro). Less frequently, the species *Sebastiana riparia* Schrad can be found near the water streams.

Some floristic studies were carried out in Caatinga areas in the interior of Paraíba (Santos *et al.* 2010, Lucena *et al.* 2015, Silva *et al*. 2015, Gadelha-Neto *et al*. 2018), which in terms of vegetation have a similarity of species with this study. As in previous studies, the most representative family in species number in the ABA Farm is Fabaceae, which reaffirms it as one of the most abundant plant families in the Caatinga.

There is a potential for preservation in the study area due to its rates of endemism, with 94 species for Brazil, with the species *Trianthema portulacastrum* L., *Ruellia bahiensis* (Nees) Morong e *Harpochilus paraibanus* F.K.S. Monteiro, J.I.M. Melo & E.M.P. Fernando corresponding to species exclusive to the Caatinga area (BFG 2021).

Furthermore, in this floristic survey, herbs are the predominant habit (108 spp.), which differs from other plant surveys (Silva *et al.* 2015, Gadelha-Neto *et al*. 2018) that have woody plants as the predominant habit. Several factors may indicate why this habit prevailed: the environment may be favorable, which favors the number of species or it may be due to the scarcity of collections focused on the herbaceous stratum in other studies with similar environments.

Conclusions

ABA farm is highly preserved area, with exotic species found only in the vicinity of the residences. It has a high expressiveness in species richness (322 species), besides presenting 38 new records. The area is classified by the MMA (Ministry of the Environment) as an Caatinga area prone to desertification, which makes it an area of high importance for conservation. The data from this research will support the implementation of an RPPN (Particular Reserve from the Natural Property) on the farm and its management plan.

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Conflicts of interest

There is no conflict of interest.

Autor contributions

Emanoel Messias Pereira Fernando: Contribution to the study design; Data collection; Data analysis and manuscript preparation.

Ketley Gomes Campos: Contribution to manuscript preparation; Critiques and addition of intellectual content.

Mickaelly de Lucena Mamede: Contribution in manuscript preparation; Critiques and addition of intellectual content.

Maria de Fátima de Araújo Lucena: Substantial contribution to the study's design and concept; Revision and addition of intellectual content.

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Table 1. List of families and species of the ABA Farm, Passagem, Paraíba State, Brazil. * New records of Paraiba State; ** New records for the Caatinga (Figures 3 e 4).

Family/Species	Habit	Voucher
Acanthaceae		
Dicliptera ciliaris Juss.	Subshrub	Fernando 339
*Harpochilus paraibanus F.K.S.*Monteiro, J.I.M Melo & E.M.P.Fernando	Shrub	Fernando 138
Justicia aequilabris (Nees) Lindau	Subshrub	Fernando 329
Justicia asclepiadea (Nees) Wassh. & C.Ezcurra *	Subshrub	Fernando 429
Justicia sp.	Subshrub	Fernando 354
Ruellia asperula (Mart. ex Ness) Lindau	Subshrub	Fernando 146
Ruellia bahiensis (Nees) Morong *	Subshrub	Fernando 460
Ruellia paniculata L.	Shrub	Fernando 459
Aizoaceae		
Trianthema portulacastrum L.	Herb	Fernando 206
Amaranthaceae		
Alternanthera brasiliana (L.) Kuntze	Subshrub	Fernando 262
Alternanthera tenella Colla	Subshrub	Fernando 137
Amaranthus spinosus L.	Herb	Fernando 203
Amaranthus viridis L.	Subshrub	Fernando 417
Amaranthus sp.	Subshrub	Fernando 428
Froelichia humboldtiana (Roem. & Schult.) Seub.	Herb	Fernando 123
Gomphrena celosioides Mart. *	Subshrub	Fernando 306
Gomphrena demissa Mart.	Subshrub	Fernando 226
Gomphrena vaga Mart.	Shrub	Fernando 234
Amaryllidaceae		
Zephyranthes cearensis (Herb.) Baker	Herb	Fernando 386
Anacardiaceae		
Astronium urundeuva (M.Allemão) Engl	Tree	Fernando 140
Schinopsis brasiliensis Engl.	Tree	Fernando 158
Spondias tuberosa Arruda	Tree	Fernando 176
Annonaceae		
Annona leptopetala (R.E.Fr.) H.Rainer	Tree	Fernando 384
Apocynaceae		
Allamanda blanchetii A.DC.	Shrub	Fernando 416
Aspidosperma pyrifolium Mart. & Zucc.	Tree	Fernando 182
Aspidosperma sp.	Tree	Fernando 312
Calotropis procera (Aiton) W.T.Aiton	Tree	Fernando 355
Funastrum clausum (Jacq.) Schltr.	Liana	Fernando 462
Araceae		
Philodendron acutatum Schott	Liana	Fernando 194
Taccarum ulei Engl. & K.Krause	Herb	Fernando 385
Arecaceae		
Copernicia prunifera (Mill.) H.E.Moore	Tree	Fernando 197
Syagrus cearensis Noblick	Tree	Fernando 202

Aristolochiaceae		
Aristolochia birostris Duch.	Herb	Fernando 145
Asteraceae		
Bidens bipinnata L.	Herb	Fernando 439
Bidens pilosa L.	Herb	Fernando 260
Bidens subalternans DC. *	Herb	Fernando 442
Bidens sp.	Subshrub	Fernando 192
Centratherum punctatum Cass.	Herb	Fernando 121
Chresta martii (DC.) H.Rob.	Subshrub	Fernando 136
Conocliniopsis prasiifolia (DC.) R.M.King & H.Rob. *	Shrub	Fernando 319
Cyrtocymura scorpioides (Lam.) H.Rob.	Subshrub	Fernando 350
Delilia biflora (L.) Kuntze	Herb	Fernando 321
Eclipta prostrata (L.) L.	Herb	Fernando 111
Pectis oligocephala (Gardner) Sch.Bip.	Herb	Fernando 415
Pluchea sagittalis (Lam.) Cabrera *	Subshrub	Fernando 454
Porophyllum ruderale (Jacq.) Cass.	Subshrub	Fernando 328
Tilesia baccata (L.) Pruski	Subshrub	Fernando 411
Tridax procumbens L.	Herb	Fernando 110
Bignoniaceae		
Anemopaegma citrinum Mart. ex DC.	Liana	Fernando 419
Anemopaegma laeve DC.	Liana	Fernando 201
Dolichandra quadrivalvis (Jacq.) L.G.Lohmann	Liana	Fernando 376
Fridericia platyphylla (Cham.) L.G.Lohmann	Liana	Fernando 380
Handroanthus impetiginosus (Mart. ex DC.) Mattos	Tree	Fernando 337
Tabebuia aurea (Silva Manso) Benth. & Hook.f. ex S.Moore	Tree	Fernando 160
Tanaecium dichotomum (Jacq.) Kaehler & L.G.Lohmann	Liana	Fernando 467
Tanaecium parviflorum (Mart. ex DC.) Kaehler & L.G.Lohmann	Liana	Fernando 380
Tanaecium pyramidatum (Rich.) L.G.Lohmann	Liana	Fernando 215
Bixaceae		
Cochlospermum vitifolium (Willd.) Spreng.	Tree	Fernando 461
Boraginaceae		
Cordia oncocalyx Allemão	Tree	Fernando 601
Cordia trichotoma (Vell.) Arráb. ex Steud.	Tree	Fernando 124
Euploca polyphylla (Lehm.) J.I.M.Melo & Semir	Herb	Fernando 190
Euploca sp.	Shrub	Fernando 412
Heliotropium indicum L.	Herb	Fernando 366
Heliotropium sp.	Shrub	Fernando 225
Myriopus rubicundus (Salzm. ex DC.) Luebert	Shrub	Fernando 235
Myriopus salzmannii (DC.) Diane & Hilger	Liana	Fernando 287
Varronia globosa Jacq.	Shrub	Fernando 218
Varronia leucocephala (Moric.) J.S.Mill.	Shrub	Fernando 133
Bromeliaceae		
Encholirium spectabile Mart. ex Schult. & Schult.f.	Herb	Fernando 170

Neoglaziovia variegata (Arruda) Mez	Herb	Fernando 378
Tillandsia loliacea Mart. ex Schult. & Schult.f.	Epi	Fernando 129
Tillandsia mallemontii Glaz. ex Mez *	Herb	Fernando 602
Tillandsia recurvata (L.) L.	Epi	Fernando 345
Tillandsia streptocarpa Baker	Epi	Fernando 144
Tillandsia usneoides (L.) L.	Epi	Fernando 344
Burseraceae		
Commiphora leptophloeos (Mart.) J.B.Gillett	Tree	Fernando 195
Cactaceae		
Cereus jamacaru DC.	Tree	Fernando 603
Melocactus ernestii Vauple	Herb	Fernando 187
Melocactus zehntneri (Britton & Rose) Luetzelb.	Herb	Fernando 604
Pilosocereus chrysostele (Vaupel) Byles & G.D.Rowley	Shrub	Fernando 188
Tacinga inamoena (K.Schum.) N.P.Taylor & Stuppy	Herb	Fernando 173
Tacinga palmadora (Britton & Rose) N.P.Taylor & Stuppy	Shrub	Fernando 200
Xiquexique gounellei (F.A.C.Weber) Lavor & Calvente	Tree	Fernando 172
Capparaceae		
Cynophalla flexuosa (L.) J.Presl	Tree	Fernando 166
Neocalyptrocalyx longifolium (Mart.) Cornejo & Iltis	Shrub	Fernando 139
Celastraceae		
Monteverdia erythroxyla (Reissek) Biral	Tree	Fernando 400
Chysobalanaceae		
Microdesmia rigida (Benth.) Sothers & Prance	Tree	Fernando 162
Cleomaceae		
Physostemon guianense (Aubl.) Malme	Herb	Fernando 220
Tarenaya spinosa (Jacq.) Raf.	Shrub	Fernando 155
Combretaceae		
Combretum leprosum Mart.	Shrub	Fernando 163
Combretum rotundifolium Rich. *	Tree	Fernando 397
Commelinaceae		
Commelina benghalensis L.	Herb	Fernando 310
Commelina diffusa Burm.f.	Herb	Fernando 280
Commelina erecta L.	Herb	Fernando 224
Commelina obliqua Vahl	Herb	Fernando 293
Dichorisandra hexandra (Aubl.) C.B.Clarke	Subshrub	Fernando 326
Tripogandra diuretica (Mart.) Handlos	Herb	Fernando 295
Convolvulaceae		
Bonamia agrostopolis (Vell.) Hallier f.	Liana	Fernando 330
Cuscuta partita Choisy	Parasite	Fernando 444
Distimake aegyptius (L.) A.R.Simões & Staples	Liana	Fernando 134
Evolvulus filipes Mart.	Herb	Fernando 248
Evolvulus frankenioides Moric.	Herb	Fernando 251
Evolvulus linarioides Meisn. *	Subshrub	Fernando 361
Evolvulus ovatus Fernald	Herb	Fernando 115
Ipomoea asarifolia (Desr.) Roem. & Schult.	Liana	Fernando 364

Ipomoea bahiensis Willd. ex Roem. & Schult	Liana	Fernando 330
Ipomoea blanchetii Choisy	Liana	Fernando 396
Ipomoea carnea Jacq.	Subshrub	Fernando 605
Ipomoea incarnata (vahl) Choisy *	Liana	Fernando 167
Ipomoea longeramosa Choisy	Liana	Fernando 279
Ipomoea marcellia Meisn.	Liana	Fernando 457
*Ipomoea nil (*L.) Roth	Liana	Fernando 606
Ipomoea subincana (Choisy) Meisn.	Liana	Fernando 398
Jacquemontia evolvuloides (Moric.) Meisn.	Liana	Fernando 240
Jacquemontia gracillima (Choisy) Hallier f.	Herb	Fernando 285
Jacquemontia mucronifera (Choisy) Hallier f.	Herb	Fernando 113
Operculina macrocarpa (L.) Urb.	Liana	Fernando 292
Turbina cordata (Choisy) D.F.Austin & Staples	Liana	Fernando 343
Cucurbitaceae		
Doyerea emetocathartica Grosourdy	Liana	Fernando 465
Cucumis anguria L.	Liana	Fernando 242
Cucumis sp.	Liana	Fernando 282
Momordica charantia L.	Liana	Fernando 367
Cyperaceae		
Cyperus aggregatus (Willd.) Endl.	Herb	Fernando 272
Cyperus esculentus L. *	Herb	Fernando 126
Cyperus ligularis L.	Herb	Fernando 151
Eleocharis filiculmis Kunth	Herb	Fernando 127
Fimbristylis littoralis Gaudich.	Herb	Fernando 125
Dioscoreaceae		
Dioscorea campestris Griseb.	Liana	Fernando 232
Dioscorea grandiflora Mart. ex Griseb. *	Liana	Fernando 394
Erythroxylaceae		
Erythroxylum pungens O.E.Schulz	Tree	Fernando 377
Euphorbiaceae		
Acalypha multicaulis Müll.Arg. *	Herb	Fernando 424
Astraea lobata (L.) Klotzsch	Herb	Fernando 341
Bernardia sidoides (Klotzsch) Müll.Arg.	Subshrub	Fernando 276
Bernardia sp.	Herb	Fernando 422
Cnidoscolus quercifolius Pohl	Tree	Fernando 174
Cnidoscolus urens (L.) Arthur	Subshrub	Fernando 181
Croton adenocalyx Baill.	Shrub	Fernando 228
Croton heliotropiifolius Kunth	Shrub	Fernando 180
Croton hirtus L'Hér.	Herb	Fernando 264
Dalechampia scandens L.	Liana	Fernando 342
Ditaxis malpighiacea (Ule) Pax & K.Hoffm. *	Shrub	Fernando 311
Euphorbia comosa Vell.	Tree	Fernando 421
Euphorbia hirta L.	Herb	Fernando 427
Euphorbia hyssopifolia L.	Herb	Fernando 109

Euphorbia insulana Vell.	Herb	Fernando 291
Euphorbia prostrata Aiton	Herb	Fernando 243
Gymnanthes boticario Esser, M.F.A.Lucena & M.Alves	Shrub	Fernando 399
Jatropha mollissima (Pohl) Baill.	Shrub	Fernando 154
Manihot dichotoma Ule. *	Tree	Fernando 217
Ricinus communis L.	Shrub	Fernando 455
Sapium glandulosum (L.) Morong	Tree	Fernando 391
Sebastiania riparia Schrad.	Tree	Fernando 214
Tragia volubilis L.	Liana	Fernando 246
Hydrocharitaceae		
Egeria densa Planch.	Herb	Fernando 153
Lamiaceae		
Eriope macrostachya Mart. ex Benth. *	Shrub	Fernando 334
Hypenia salzmannii (Benth.) Harley	Shrub	Fernando 371
Leonotis nepetifolia (L.) R.Br	Herb	Fernando 450
Leucas martinicensis (Jacq.) R.Br.	Herb	Fernando 418
Marsypianthes chamaedrys (Vahl) Kuntze	Subshrub	Fernando 275
Mesosphaerum caatingense Harley & J.F.B.Pastore	Subshrub	Fernando 193
Mesosphaerum pectinatum (L.) Kuntze	Shrub	Fernando 351
Mesosphaerum suaveolens (L.) Kuntze	Subshrub	Fernando 270
Vitex megapotamica (Spreng.) Moldenke	Tree	Fernando 382
Vitex triflora Vahl *	Tree	Fernando 332
Leguminosae		
Amburana cearensis (Allemão) A.C.Sm.	Tree	Fernando 373
Anadenanthera colubrina (Vell.) Brenan	Tree	Fernando 161
Arachis dardani Krapov. & W.C.Greg.	Herb	Fernando 219
Bauhinia cheilantha (Bong.) Steud.	Tree	Fernando 267
Calliandra depauperata Benth. *	Shrub	Fernando 402
Cenostigma pyramidale (Tul.) Gagnon & G.P.Lewis	Shrub	Fernando 177
Centrosema brasilianum (L.) Benth.	Liana	Fernando 437
Centrosema pascuorum Mart. ex Benth.	Liana	Fernando 304
Chamaecrista duckeana (P.Bezerra & Afr.Fern.) H.S.Irwin & Barneby *	Subshrub	Fernando 263
Chamaecrista pilosa (L.) Greene *	Subshrub	Fernando 283
Chamaecrista rotundifolia (Pers.) Greene	Herb	Fernando 268
Chamaecrista serpens (L.) Greene	Herb	Fernando 252
Chamaecrista supplex (Mart. ex Benth.) Britton & Rose ex Britton & Killip	Herb	Fernando 286
Crotolaria retusa L.	Subshrub	Fernando 365
Ctenodon martii (Benth.) D.B.O.S.Cardoso, P.L.R.Moraes &H.C.Lima	Tree	Fernando 383
Ctenodon monteiroi (Afr.Fern. & P.Bezerra) D.B.O.S.Carsono, Filardi & H.C.Lima	Subshrub	Fernando 148
Desmanthus virgatus (L.) Willd.	Herb	Fernando 209

Dioclea virgata (Rich.) Amshoff	Liana	Fernando 119
Enterolobium contortisiliquum (Vell.) Morong	Tree	Fernando 363
Erythrina velutina Willd.	Tree	Fernando 106
Indigofera blanchetiana Benth. *	Subshrub	Fernando 340
Indigofera hirsuta L.	Subshrub	Fernando 244
Indigofera lespedezioides Kunth *	Subshrub	Fernando 289
Indigofera microcarpa Desv.	Subshrub	Fernando 156
Indigofera suffruticosa Mill.	Subshrub	Fernando 288
Libidibia ferrea (Mart. ex Tul.) L.P.Queiroz	Tree	Fernando 168
Lonchocarpus sericeus (Poir.) Kunth ex DC.	Tree	Fernando 130
Luetzelburgia auriculata (Allemão) Ducke	Tree	Fernando 358
Macropsychanthus grandiflorus (Mart. ex Benth.) L.P.Queiroz & Snak	Liana	Fernando 370
Macroptilium atropurpureum (Sessé & Moc. ex DC.) Urb.	Herb	Fernando 309
Macroptilium gracile (Poepp. ex Benth.) Urb.	Liana	Fernando 452
Mimosa borboremae Harms	Herb	Fernando 451
Mimosa candollei R.Grether	Shrub	Fernando 116
Mimosa ophthalmocentra Mart. ex Benth.	Subshrub	Fernando 118
Mimosa tenuiflora (Willd.) Poir.	Tree	Fernando 149
Neptunia plena (L.) Benth.	Subshrub	Fernando 362
Parkinsonia aculeata L.	Tree	Fernando 430
Peltogyne pauciflora Benth.	Tree	Fernando 233
Piptadenia retusa (Jacq.) P.G.Ribeiro, Seigler & Ebinger	Shrub	Fernando 142
Pithecellobium diversifolium Benth.	Tree	Fernando 463
Poecilanthe grandiflora Benth.	Tree	Fernando 464
Prosopis juliflora (SW.) DC.	Tree	Fernando 352
Rhynchosia minima (L.) DC.	Liana	Fernando 446
Senna macranthera (DC. ex Collad.) H.S.Irwin & Barneby	Shrub	Fernando 152
Senna spectabilis (DC.) H.S.Irwin & Barneby	Shrub	Fernando 327
Stylosanthes viscosa (L.) Sw.	Subshrub	Fernando 338
Tephrosia purpurea (L.) Pers.	Subshrub	Fernando 347
Vachellia farnesiana (L.) Wight & Arn.	Tree	Fernando 374
Loasaceae		
Mentzelia aspera L.	Herb	Fernando 316
Loganiaceae		
Spigelia anthelmia L.	Herb	Fernando 278
Lomariopsidaceae		
Nephrolepis biserrata (Sw.) Schott	Herb	Fernando 348
Lythraceae		
Cuphea brachiata Martius ex Koehne	Herb	Fernando 404
Cuphea circaeoides Sm. ex Sims	Herb	Fernando 372
Cuphea impatientifolia A.St.-Hil.	Herb	Fernando 298
Malpighiaceae		
Bronwenia megaptera (B.Gates) W.R.Anderson & C.C.Davis *	Liana	Fernando 368

Diplopterys lutea (Griseb.) W.R.Anderson & C.C.Davis	Liana	Fernando 169
Diplopterys pubipetala (A.Juss.) W.R.Anderson & C.C.Davis	Liana	Fernando 458
Galphimia brasiliensis (L.) A.Juss.	Subshrub	Fernando 405
Heteropterys grandiflora A.Juss. *	Liana	Fernando 208
Niedenzuella multiglandulosa (A.Juss.) W.R.Anderson **	Liana	Fernando 301
Ptilochaeta nudipes Griseb. *	Shrub	Fernando 349
Malvaceae		
Briquetiastrum spicatum (Kunth in H.B.K.) Bovini	Shrub	Fernando 294
Ceiba erianthos (Cav.) K.Schum.	Tree	Fernando 607
Corchorus argutus Kunth *	Subshrub	Fernando 407
Corchorus hirtus L.	Subshrub	Fernando 222
Helicteres andersonii Cristóbal *	Tree	Fernando 387
Helicteres baruensis Jacq.	Shrub	Fernando 313
Helicteris sp.	Tree	Fernando 247
Herissantia crispa (L.) Brizicky *	Subshrub	Fernando 297
Herissantia tiubae (K.Schum.) Brizicky	Shrub	Fernando 409
Malvastrum coromandelianum (L.) Garcke	Subshrub	Fernando 379
Melochia pyramidata L.	Herb	Fernando 389
Melochia tomentosa L.	Shrub	Fernando 175
Pavonia cancellata (L.) Cav	Herb	Fernando 305
Pseudobombax marginatum (A.St.-Hil., Juss. & Cambess.) A.Robyns	Tree	Fernando 608
Sida harleyi Krapov.	Subshrub	Fernando 290
Sida cordifolia L.	Subshrub	Fernando 440
Sida galheirensis Ulbr.	Subshrub	Fernando 212
Waltheria operculata Rose	Shrub	Fernando 448
Waltheria rotundifolia Schrank	Subshrub	Fernando 114
Molluginaceae		
Mollugo verticillata L.	Herb	Fernando 191
Myrtaceae		
Eugenia flavescens DC. *	Tree	Fernando 414
Eugenia stictopetala Mart. ex DC.	Tree	Fernando 199
Eugenia sp.	Tree	Fernando 315
Nyctaginaceae		
Boerhavia coccinea Mill. *	Herb	Fernando 449
Boerhavia diffusa L.	Herb	Fernando 204
Guapira laxa (Netto) Furlan *	Tree	Fernando 216
Onagraceae		
Ludwigia erecta (L.) H.Hara	Shrub	Fernando 317
Ludwigia octovalvis (Jacq.) P.H.Raven	Herb	Fernando 132
Oxalidaceae		
Oxalis corniculata L.	Herb	Fernando 223
Oxalis cratensis Oliv. ex Hook.	Herb	Fernando 408
Oxalis divaricata Mart. ex Zucc.	Herb	Fernando 236
Oxalis latifolia Kunth *	Herb	Fernando 390

Oxalis psoraleoides Kunth	Shrub	Fernando 229
Passifloraceae		
Passiflora cincinnata Mast.	Liana	Fernando 445
Passiflora foetida L.	Liana	Fernando 135
Piriqueta dentata Arbo *	Subshrub	Fernando 256
Piriqueta racemosa (Jacq.) Sweet	Herb	Fernando 198
Piriqueta viscosa Griseb.	Herb	Fernando 257
Piriqueta sp.	Shrub	Fernando 420
Turnera subulata Sm.	Shrub	Fernando 308
Phyllantaceae		
Astrocasia jacobinensis (Müll.Arg.) G.L.Webster *	Tree	Fernando 314
Phyllanthus caroliniensis Walter *	Herb	Fernando 241
Phyllanthus niruri L.	Herb	Fernando 178
Phyllanthus tenellus Roxb. *	Herb	Fernando 441
Phyllanthus sp.	Herb	Fernando 322
Phytolaccaceae		
Microtea scabrida Urb.	Herb	Fernando 284
Microtea celosioides Moq. ex Sennikov & Sukhor.	Herb	Fernando 406
Microtea sp.	Herb	Fernando 221
Plantaginaceae		
Angelonia biflora Benth.	Herb	Fernando 141
Angelonia campestris Nees & Mart.	Subshrub	Fernando 266
Scoparia dulcis L.	Herb	Fernando 189
Stemodia maritima L.	Herb	Fernando 108
Plumbaginaceae		
Plumbago scandens L.	Herb	Fernando 122
Poaceae		
Cenchrus echinatus L.	Herb	Fernando 274
Digitaria insularis (L.) Fedde	Herb	Fernando 207
Digitaria sp.	Herb	Fernando 131
Echinochloa crus-pavonis (Kunth) Schult.	Herb	Fernando 254
Melinis sp.	Herb	Fernando 128
Panicum stramineum Hitchc. & Chase	Herb	Fernando 273
Tripogon spicatus (Nees) Ekman	Herb	Fernando 393
Urochloa mutica (Forssk.) T.Q.Nguyen	Herb	Fernando 255
Urochloa plantaginea (Link) R.D.Webster	Herb	Fernando 269
Polygalaceae		
Asemeia violacea (Aubl.) J.F.B.Pastore & J.R.Abbott	Herb	Fernando 249
Polygala paniculata L.	Herb	Fernando 271
Pontederiaceae		
Heteranthera oblongifolia Mart. ex Schult. & Schult.f.	Herb	Fernando 447
Portulacaceae		
Portulaca elatior Mart. ex Rohrb.	Herb	Fernando 211
Portulaca halimoides L.	Herb	Fernando 239
Rhamnaceae		

Sarcomphalus joazeiro (Mart.) Hauenshild	Tree	Fernando 150
Rubiaceae		
Borreria spinosa Cham. & Schltdl.	Herb	Fernando 112
Hexasepalum gardneri (K.Schum.) J.H.Kirkbr & Delprete	Herb	Fernando 117
Hexasepalum redula (Willd.) Delprete & J.H.Kirkbr.	Subshrub	Fernando 237
Guettarda angelica Mart. ex Müll. Arg.	Shrub	Fernando 353
Guettarda sericea Müll. Arg.	Shrub	Fernando 413
Mitracarpus sp.	Herb	Fernando 359
Richardia grandiflora (Cham. & Schltdl.) Steud.	Subshrub	Fernando 277
Richardia scabra L.	Herb	Fernando 261
Ricardia sp.	Shrub	Fernando 231
Santalaceae		
Phoradendron quadrangulare (Kunth) Griseb.	Parasite	Fernando 120
Phoradendron mucronatum (DC.) Krug & Urb.	Parasite	Fernando 401
Phoradendron perrottetii (DC.) Eichler	Parasite	Fernando 159
Sapindaceae		
Cardiospermum corindum L.	Liana	Fernando 164
Serjania glabrata Kunth	Liana	Fernando 609
Sapotaceae		
Sideroxylon obtusifolium (Roem. & Schult.) T.D.Penn.	Tree	Fernando 375
Selaginellaceae		
Selaginella convoluta (Arn.) Spring	Herb	Fernando 157
Solanaceae		
Nicotiana glauca Graham	Shrub	Fernando 179
Physalis angulata L.	Herb	Fernando 423
Schwenckia americana Rooyen ex L.	Herb	Fernando 183
Talinaceae		
Talinum paniculatum (Jacq.) Gaertn.	Herb	Fernando 318
Talinum fruticosum (L.) Juss.	Herb	Fernando 296
Verbenaceae		
Lantana camara L.	Shrub	Fernando 171
Lantana radula Sw.	Shrub	Fernando 324
Lippia origanoides Kunth	Subshrub	Fernando 468
Lippia sp.	Shrub	Fernando 388
Stachytarpheta cayennensis (Rich.) Vahl	Subshrub	Fernando 265
Stachytarpheta coccinea Schauer	Subshrub	Fernando 281
Stachytarpheta microphylla Walp. *	Subshrub	Fernando 265
Vitaceae		
Cissus decidua Lombardi	Liana	Fernando 165
Zygophyllaceae		
Kallstroemia tribuloides (Mart.) Steud.	Shrub	Fernando 213

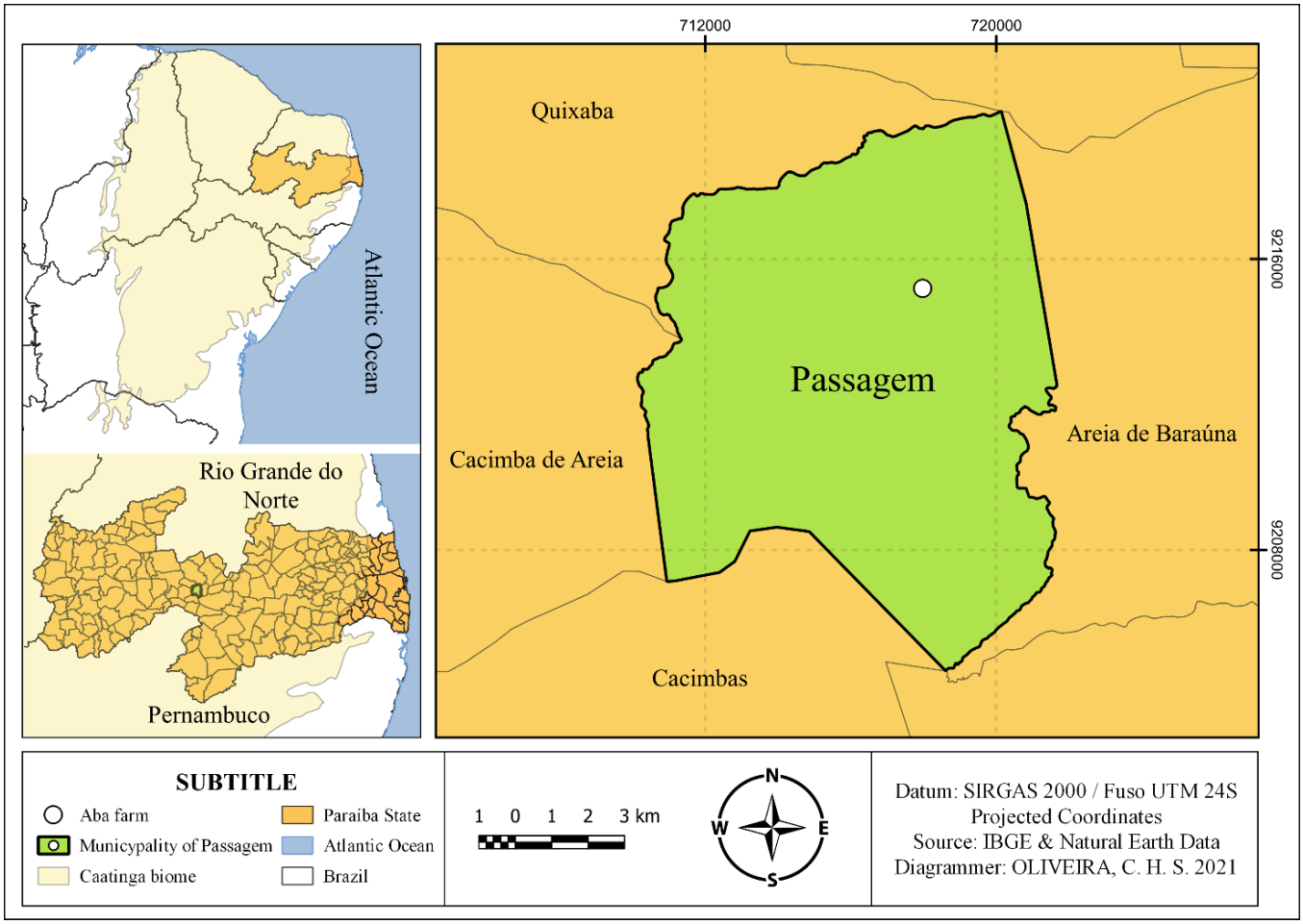

Figure 1. Location map of the municipality of Passagem, Paraíba State, Brasil.

Figure 2. General aspects of the Aba mountains, Passagem, Paraíba State, Brazil.

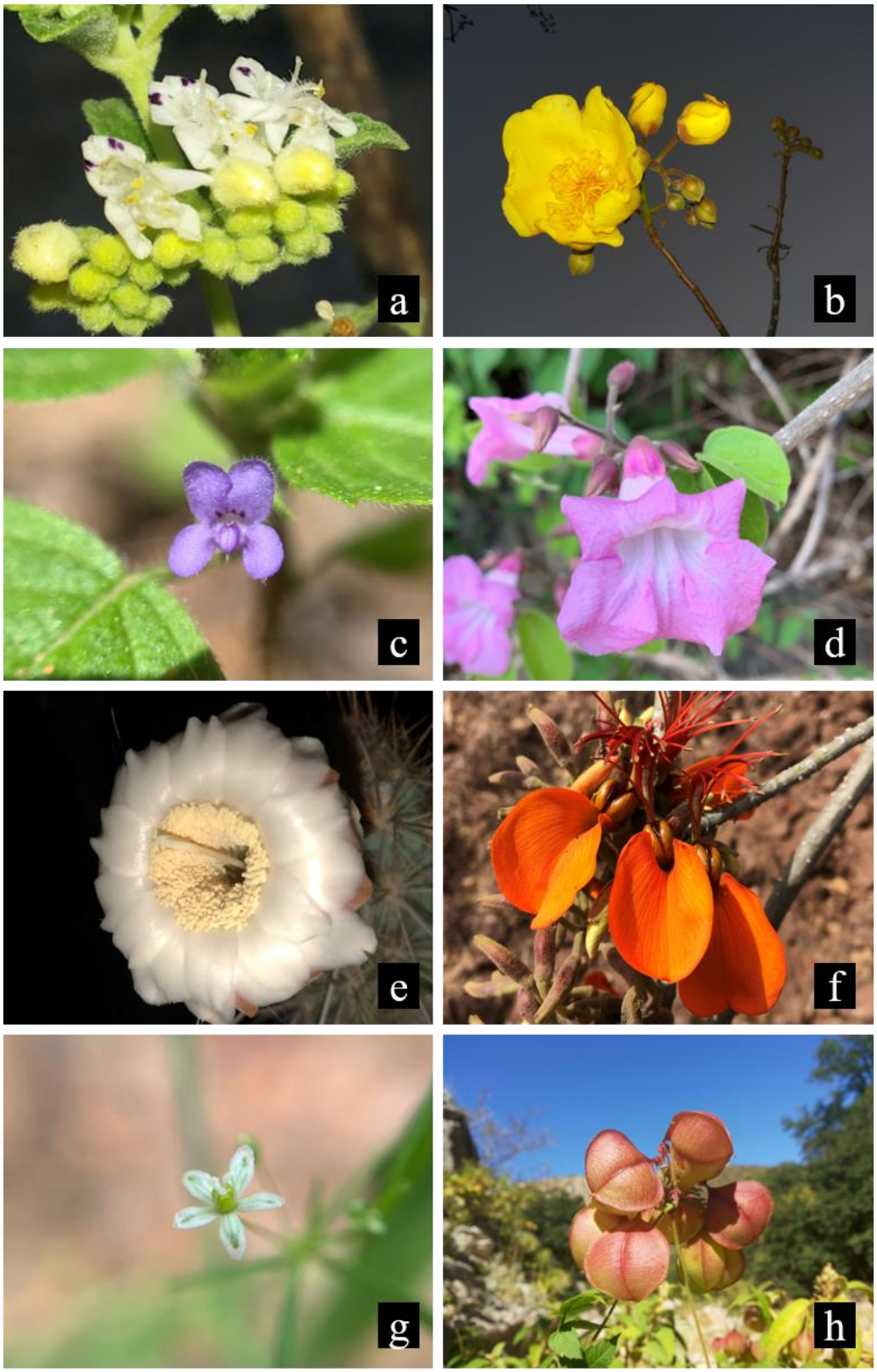

Figure 3. a. *Mesosphaerum caatingense* Harley & J.F.B.Pastore. b. *Cochlospermum vitifolium* (Willd.) Spreng. c. *Mesosphaerum suaveolens* (L.) Kuntze. d. *Tanaecium dichotomum* (Jacq.) Kaehler & L.G.Lohmann. e. *Xiquexique gounellei* (F.A.C.Weber) Lavor & Calvente. f. *Erythrina velutina* Willd. g. *Mollugo verticillata* L. h. *Cardiospermum corindum* L.

Figure 4. a. *Harpochilus paraibanus* F.K.S.Monteiro, J.I.M Melo & E.M.P.Fernando. b. *Distimake aegyptius* (L.) A.R.Simões & Staples. c. *Allamanda blanchetii* A.DC. d. *Chamaecrista duckeana* (P.Bezerra & Afr.Fern.) H.S.Irwin & Barneby. e. *Eclipta próstata* (L.) L. f. *Commiphora leptophloeos* (Mart.) J.B.Gillett. g. *Cenostigma pyramidale* (Tul.) Gagnon & G.P.Lewis. h. *Handroanthus impetiginosus* (Mart. ex DC.) Mattos.

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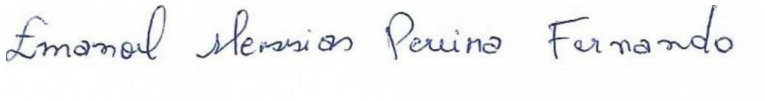

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