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Floristic composition of a Dense Ombrophilous Forest fragment in a peri-urban zone, Maciço de Baturité, Ceará, Brazil[1]

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A B S T R A C T

Ceará state is mostly covered by the deciduous Caatinga vegetation, but also harbor other vegetation types, such as coastal forests, savannas and, in the windward face of its highlands, remnants of Humid Forests. These areas have high botanical richness, and it is essential to conduct floristic studies to help in the vegetation knowledge. This study aimed at carrying out a floristic survey in the Experimental Campus of Environmental Education and Ecology of UECE, in Pacoti, Ceará state, with the intention to document the area's flora, located in the peri-urban area of Pacoti town, in the Maciço de Baturité highland. To this end, 12 field collections were carried out in the area throughout 2019. In total, 225 species distributed in 164 genera and 69 families were inventoried. The most representative families were Asteraceae (31 spp.), Fabaceae (17 spp.), Malvaceae (14 spp.). The most representative habits were herbs (47.55%) and shrubs (16.88%). We also found 10 new records for Ceará, 20 new occurrences for the Atlantic Forest, as well as several endemic and native Brazilian species. The area presents a great species richness and diversity, many of which occur in various Brazilian domains, some endemic to the Atlantic Forest, thus being fundamental to this area conservation, bringing benefits to the surrounding population.

Keywords: Endemism. Atlantic Rainforest. Humid Forest. Mountain Forests. Brazilian semiarid.

Composição florística de um fragmento de Floresta Ombrófila Densa em zona periurbana, Maciço de Baturité, Ceará, Brasil

R E S U M O

O estado do Ceará é coberto majoritariamente pela vegetação caducifólia da Caatinga, mas também abriga outros tipos de vegetação, como florestas costeiras, savanas e, na face de barlavento de suas terras altas, remanescentes de florestas úmidas. Essas áreas possuem alta riqueza botânica, sendo fundamental a realização de estudos florísticos para auxiliar no conhecimento da vegetação. Este estudo teve como objetivo realizar um levantamento florístico no Campus Experimental de Educação Ambiental e Ecologia da UECE, em Pacoti, estado do Ceará, com o intuito de documentar a flora da área, localizada na zona periurbana do município de Pacoti, no Maciço de Baturité. Para tanto, foram realizadas 12 coletas de campo na área ao longo de 2019. No total, foram inventariadas 225 espécies distribuídas em 164 gêneros e 69 famílias. As famílias mais representativas foram Asteraceae (31 spp.), Fabaceae (17 spp.), Malvaceae (14 spp.). Os hábitos mais representativos foram ervas (47,55%) e arbustos (16,88%). Encontramos também 10 novos registros para o Ceará, 20 novas ocorrências para a Mata Atlântica, além de diversas espécies endêmicas e nativas brasileiras. A área apresenta grande riqueza e diversidade de espécies, muitas das quais ocorrem em vários domínios brasileiros, algumas endêmicas da Mata Atlântica, sendo assim fundamental para a conservação desta área, trazendo benefícios para a população do entorno.

Palavras chaves: Endemismos. Mata Atlântica. Mata Úmida. Matas Serranas. Semiárido brasileiro.

Introduction

Brazil presents a diversity of environmental and climatic conditions, such as maritimity, relief, continentality, and altimetric variations, bringing to the country a great natural complexity, thus characterizing the domains that occur in it. (IBGE 2023). Such biodiversity is linked to the high number of species, genes and ecosystems, which generate benefits for the Brazilian population and on a global scale (Roma and Viana, 2023).

The Atlantic Forest biome occupies approximately 15% of the national territory, being present in 17 states and 3,429 municipalities (Pinto et al., 2022). Due to intense fragmentation and anthropization, this hotspot (Myers et al., 2000) presents high vulnerability to environmental changes. One of the main challenges consists of the impact of the legacy of human activities that interfere with this biome, manifested by the reduction of forest cover, alteration in the composition and structure of the remaining communities, causing the incidence of invasive species (Stocki, 2021).

A very representative biome in the Northeast is the Caatinga, which occupies more than half of the region, characterized by xerophytic vegetation, woody plants, generally with thorns, and having some representatives of succulents, such as the facheiro (*Facheiroa squamosa* (Gürke) P.J.Braun & Esteves) and the xique-xique (*Xiquexique gounellei* (F.A.C.Weber ex K.Schum.) Lavor & Calvente), presenting high plant diversity. Rainfall averages around 700 mm, thus characterizing the semi-arid climate (Cerezini and Castro, 2022; Cardoso and Nóbrega, 2024).

The Northeast region contains only 2% of the original extent of Atlantic Forests, being one of the regions with the highest degradation rates, since colonial times, with the extraction of native wood, thus, the creation of strategies for its conservation is extremely necessary (Moura et al., 2020; Silva and Moura 2021). The northeastern Atlantic Forest harbors four centers of diversity, two of which are located north of the São Francisco River, which are the Pernambuco Endemism Center, and the "Brejos Nordestinos", which have forest fragments within the semi-arid region (Campanili and Prochnow, 2006).

The Brejos de Altitudes are places with milder temperatures, different from the predominant semi-arid climate, and with higher rainfall amounts, occurring in some plateaus and plateaus in the Northeast region. In some states, such as Ceará and Paraíba, the main phytophysiognomies are the Ombrophilous Forest and Seasonal Forest (Moro et al., 2024). According to Campanili and Prochnow (2006) the phytophysiognomies that can be found are Dense and Open Ombrophylous Forest, Semideciduous and Deciduous Seasonal Forest, and Pioneer Formations. According to Branco et al. (2022), many areas of remaining Atlantic Forest are undergoing an environmental restoration process.

The Atlantic Forest in Ceará covers an area of 1,873 km^2 and is heterogeneously distributed (Benício et al., 2023). Enclaves of Humid Forest are dispersed in various regions of the state, such as in the crystalline mountain ranges in Maranguape, Pacatuba, Baturité, Uruburetama, and Meruoca, and in the sedimentary areas of the Ibiapaba Plateau and the Araripe Plateau, totaling 8% of the state's vegetation cover (Moro et al., 2015). Gomes et al. (2022) state that 52.5% of the humid sedimentary forests are protected by Conservation Units. Those of crystalline origin are protected in 55.89% of the protected areas.

The Maciço de Baturité presents one of the largest Atlantic Forest remnants in the state of Ceará. It has a total area of over 30,000 hectares and covers eight municipalities: Baturité, Capistrano, Palmácia, Pacoti, Guaramiranga, Mulungu, Aratuba, Redenção, Caridade and Canindé. It is worth noting that part of this vegetation is degraded due to anthropic actions (Pinheiro and Silva 2017). In order to reduce the human impacts of the ecosystems of the Baturité highlands, the Environmental Protection Area (Área de Proteção Ambiental – APA) Serra da Baturité was created in 1991 (SEMACE 1992).

The creation of the Serra de Baturité State APA favored the implementation of legal mechanisms for the control and preservation of natural resources, awakening ecological and conservationist awareness in the local population, which is now over 30 years old (Ribeiro et al., 2022). Teixeira et al. (2021) states that APAs have been under strong pressure in recent years, thus causing damage to biodiversity.

The Baturité Massif stands out as a tourist destination due to its pleasant climate, proximity to Fortaleza, and rich cultural and gastronomic experience, marked by quality coffee and typical cuisine. Furthermore, religious and cultural events, along with waterfalls and lush vegetation, reinforce the region's natural charm. This tourism activity strengthens the local economy by stimulating production, consumption, investment, and job creation, promoting social inclusion through the direct and indirect opportunities created by the sector (Peixoto et al., 2025). Many communities survive and derive their livelihood from the sale of services from this place, such as sightseeing,

lodging, and food, as well as products taken from the native vegetation (Silva et al., 2021).

Studies involving the Brejos de Altitude with Atlantic Forest influence in Ceará (Oliveira and Araújo, 2007; Silva and Figueiredo, 2013; Santos et al., 2014; Silveira et al., 2020a; Silveira et al., 2020b; Rebouças et al., 2021), are quite common, due to the importance of studies in these environments, since these areas have high endemism and also have species that are threatened with extinction either of fauna or flora, caused by anthropic actions.

Thus, it is necessary to conduct more floristic studies of these wet forest enclaves within Caatinga, in order to recognize the species of these fragmented environments and subsequently conserve them, in order to reduce the process of degradation of the natural landscape, especially the Maciço de Baturité vegetation. According to Jansen et al. (2021), these studies also contribute to greater knowledge of the local flora, stages of forest regeneration and the carbon and biomass stocks of these forests.

It is worth remembering that this remnant presents a high richness of species, with representatives of several Brazilian domains, even though it is located in the peri-urban space, in addition to presenting new occurrences for the state of Ceará. According to Negri (2023), carrying out studies in these spaces is extremely important to improve the understanding of the interactions between the urban and the rural, in addition to promoting the understanding of geographic space. Therefore, the objective of this work was to perform a floristic survey in the Experimental Campus for Environmental Education and Ecology in Pacoti, UECE, which is located in an urban area, in order to conserve it.

Material and methods

Study Area

The study area is located in the Experimental Campus of Environmental Education from Universidade Estadual do Ceará, in municipality Pacoti (4°13'36.8" - 38°55'21.9"/4°13'39.3" - 38°55'19.0"), Ceará state (Figure 1), located 130 km from the capital Fortaleza, with an area of 5,7 hectares. This space is a partnership between the State University of Ceará and the Deusmar Queirós Foundation, for the development of technical-scientific research for environmental defense and preservation. It is currently the headquarters of the Natural History Museum of Ceará Prof. Dias da Rocha (MHNCE) (UECE 2010; UECE 2021).

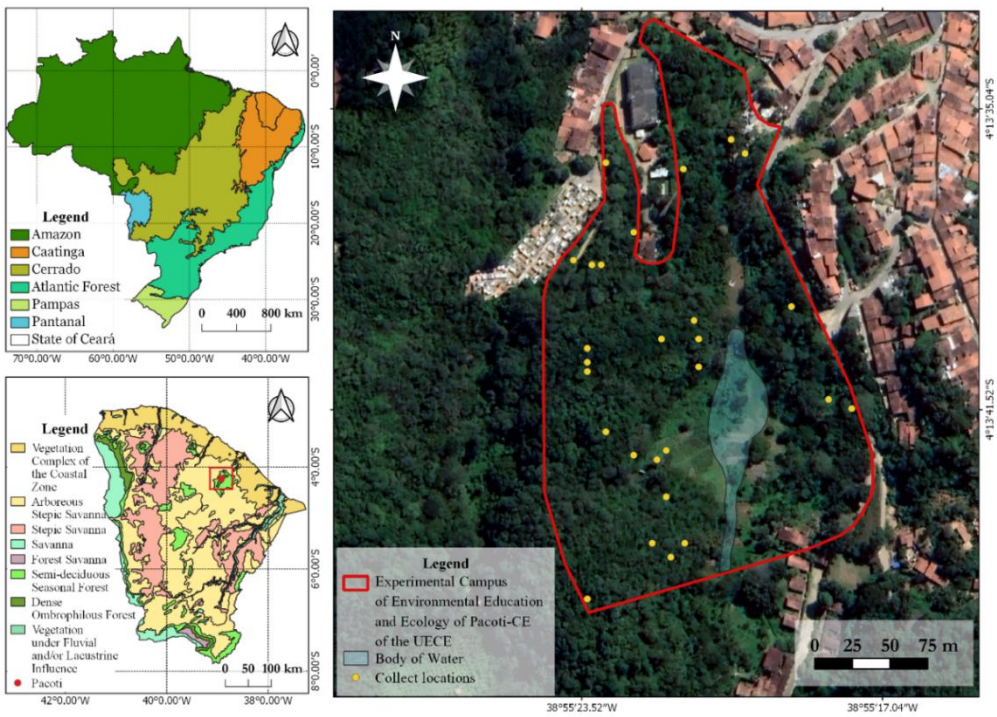

Figure 1 - Experimental Campus of Environmental Education and Ecology of the State University of Ceará, Pacoti-CE Location.

Pacoti is located in the northeast part of the state of Ceará, in the Massif Baturité, which has a Tropical Warm Humid and Tropical Warm Sub-humid climate, with temperatures ranging from 24

to 26°C, precipitation can reach more than 1,500 mm, relief of residual massifs and the soils is of the Red-Yellow Podzolic type. It has vegetation of the type Dense Shrubby Caatinga, Tropical Pluvial Subdeciduous Forest and Tropical Semi-Perenifolia Pluvial-Nebular Forest (IPECE, 2026), which are also classified as Arboreous Stepic Savanna, Semi-deciduous Seasonal Forest and Dense Ombrophilous Forest, respectively (Figueiredo, 1997; IBGE, 2012). The peri-urban area is a Dense Ombrophilous Forest, known as "Humid Forest" (Figueiredo, 1997; IBGE, 2012), with temperatures close to 25ºC, high rainfall and with only 60 days of drought. It has shrubs and trees that can reach 15 m in height, in addition to the presence of lianas and epiphytes (Campanilli and Prochnow, 2006).

The UECE Station has some open, degradade areas, with spaces used for ornamental plants, banana cultivation, and the presence of a small stream (Figure 2). Peri-urban areas represent transitional regions between urban and rural, where there is a mixture of urban and rural activities competing for land use, in addition to presenting a great connection, making it difficult to identify what is urban and what is rural. (Vale, 2005; Negri, 2023).

Figure 2 - UECE Experimental Campus of Environmental Education and Ecology in Pacoti-CE. a. The Natural History Museum of Ceará entrance and headquarters. b. Lookout. c-f. Dense Ombrophilous Forest Remnant. g-h. Anthropized part.

Twelve collections campaigns were carried out in the area throughout 2019, using the opportunistic method, through walking with random walks, along the study area, collecting all

the fertile species of angiosperms, those with flowers and/or fruits in the area (Filgueiras et al. 1994). The samples were herborized according to the usual botanic techniques Mori et al. (1989) and Gadelha-Neto et al. (2013) and deposited in the Herbarium of the Natural History Museum of Ceará, Professor Dias da Rocha (MHNCE-HER) of the State University of Ceará. Photographic records were also made to assist in the subsequent identification of specimens in the herbarium and production of images of the species. Identification keys, specialized bibliography and experts' consultation were used to identify the specimens. The classification system adopted followed the *Angiosperm Phylogeny Group IV* (APG, 2016), except for the family Turneraceae, considered independent of Passifloraceae, according to Souza and Lorenzi (2019).

The occurrence of each species in the Brazilian phytogeographic domains, origin, endemisms and vernacular name, was used the List of Species of Flora e Funga do Brasil (2023). To record new occurrences in the state of Ceará, species that did not occur in the List of Species of Flora e Funga do Brasil (2023) and in SpeciesLink (CRIA, 2023) were considered.

Author names are in accordance with IPNI (2021). To assess the conservation status of the species, the criteria of the International Union for Conservation of Nature (IUCN, 2020) and CNCFlora (2018) were used

Results and discussion

In the floristic survey, 225 species were inventoried, distributed in 163 genera and 69 families (Table 1). The most representative families were Asteraceae (31 spp.), Fabaceae (17 spp.), Malvaceae (14 spp.), Rubiaceae and Cyperaceae (10 spp. each), Amaranthaceae, Melastomataceae, Piperaceae, Poaceae, Solanaceae (eight spp., each), which together totaled 54.22% of the species surveyed. The other families had from one to six species (Figure 3). In the study carried out by Lima et al. (2024) in the Araripe National Forest, of the 48 families cataloged, four were represented by three species and 20 by a single species.

Table 1 − Floristic list of the Experimental Campus of Environmental Education and Ecology of Pacoti of UECE, Pacoti-CE species, presenting families/species, new occurrence for the state of Ceará (*), origin ((N) – Native; (NT) – Naturalized; (C) - Cultivated), habit (T - Tree; S - Shrub; SU - Subshrub; H - Herbaceous; C - Climbing), collector/collector number (C/N), Voucher number of the Herbarium of the Museum of Natural History of Ceará, Prof. Dias Rocha (MHNCE-HER), vernacular name (VN), conservation status (CS) (LC - Least Concern; NE - No Evaluated) and Phytogeographic Domains (PD) (AM - Amazônia; CAA - Caatinga, CER - Cerrado, AF - Atlantic Forest; PA - Pampas; PT - Pantanal).

FAMILY/SPECIES	Habit	C/N	MHNCE-HER	VN	CS	PD
ACANTHACEAE						
Dicliptera ciliaris Juss. (N)	H	*E.M.P. Lucena 1047*	00519		NE	AM, CAA, CER, MA
Hygrophila costata Nees (N)	H	*E.M.P. Lucena 847*	000319		NE	AM, CAA, CER, MA, PA, PT
Ruellia bahiensis (Nees) Morong (N)	SU	*E.M.P. Lucena 755*	000227		NE	CAA
Ruellia geminiflora Kunth (N)	SU	*E.M.P. Lucena 969*	000441		NE	AM, CAA, CER, MA, PA, PT
Ruellia paniculata L. (N)	S	*E.M.P. Lucena 964*	000436		NE	CAA, CER, MA
Thunbergia alata Bojer ex Sims (NT)	C	*E.M.P. Lucena 774*	000246	Amarelinha	NE	AM, CAA, CER, MA, PA, PT
ALSTROEMERIACEAE						
Bomarea edulis (Tussac) Herb. (N)	C	*E.M.P. Lucena 769*	000241	Bico-de-nambu	NE	AM, CAA, CER, MA, PT
AMARANTHACEAE						
Alternanthera brasiliana (L.) Kuntze (N)	SU	*E.M.P. Lucena 719*	000191		NE	AM, CAA, CER, MA, PA, PT
Alternanthera tenella Colla (N)	SU	*E.M.P. Lucena 840*	000312		LC	AM, CAA, CER, MA, PA, PT
Amaranthus deflexus L. (NT)	H	*E.M.P. Lucena 974*	000446	Caruru-rasteiro	NE	CAA, CER, MA, PA
Amaranthus viridis L.(NT)	H	*E.M.P. Lucena 986*	000458	Caruru	NE	AM, CAA, CER, MA, PA
Chamissoa altissima (Jacq.) Kunth (N)	C	*E.M.P. Lucena 976*	000448	Mofungo-gigante	LC	AM, CAA, CER, MA, PA, PT
Cyathula achyranthoides (Kunth) Moq. (N)	SU	*E.M.P. Lucena 823*	000295		NE	AM, CAA, MA
Cyathula prostrata Blume (N)	SU	*E.M.P. Lucena 727*	000199		NE	AM, CER, MA
Gomphrena gardnerii Moq. (N)	SU	*E.M.P. Lucena 734*	000206		NE	CAA, CER
AMARYLLIDACEAE						
Urceolina amazonica (Linden) Christenh. & Byng (C)	H	*E.M.P. Lucena 818*	000290	Lírio-branco	NE	

ANACARDIACEAE						
Spondias mombin L. (N)	T	*E.M.P. Lucena 1044*	000516	Cajá	NE	AM, CER, MA
APIACEAE						
Eryngium foetidum L. (N)	H	*E.M.P. Lucena 709*	000181	Chicória	NE	AM
APOCYNACEAE						
Matelea denticulata (Vahl) Fontella & E.A.Schwarz (N)	C	*E.M.P. Lucena 922*	000394		NE	AM, CAA, CER, MA
AQUIFOLIACEAE						
Ilex sapotifolia Reissek (N)	T	*E.M.P. Lucena 959*	000431	Maçaranduba-branca	NE	MA
ARACEAE						
Philodendron acutatum Schott (N)	H	*E.M.P. Lucena 784*	000256	Imbé	NE	AM, CAA, CER, MA
Philodendron pedatum (Hook.) Kunth (N)	H	*E.M.P. Lucena 960*	000432		NE	AM, CAA, CER, MA
Xanthosoma sagittifolium (L.) Schott (N)	H	*E.M.P. Lucena 870*	000342		NE	
ARALIACEAE						
Hydrocotyle leucocephala Cham. & Schltdl. (N)	H	*E.M.P. Lucena 722*	000194		NE	CER, MA, PA
ASTERACEAE						
Acanthospermum hispidum DC. (N)	H	*E.M.P. Lucena 715*	000187	Carrapicho	NE	AM, CAA, CER, MA, PA, PT
Acmella ciliata (Kunth) Cass. (N)	H	*E.M.P. Lucena 695*	000167	Jambú	NE	AM, CAA, CER, MA
Acmella uliginosa (Sw.) Cass. (N)	H	*E.M.P. Lucena 805*	000277		NE	AM, CAA, CER, MA
Ageratum conyzoides L. (N)	SU	*E.M.P. Lucena 710*	000182	Mentrasto	NE	AM, CAA, CER, MA, PA, PT
Aspilia cearensis J.U.Santos (N)	H	*E.M.P. Lucena 820*	000292		NE	CAA
Bidens pilosa L. (NT)	H	*E.M.P. Lucena 702*	000174	Fura-capa	NE	AM, CAA, CER, MA, PA, PT
Bidens sp. 1	H	*E.M.P. Lucena 824*	000296			
Bidens sp. 2	H	*E.M.P. Lucena 881*	000353			
Brickellia diffusa (Vahl) A.Gray (N)	H	*E.M.P. Lucena 1032*	000504		NE	CER
Chaptalia nutans (L.) Pol. (N)	H	*E.M.P. Lucena 806*	000278	Fumo-do-mato	NE	AM, CAA, CER, MA, PA
Cyanthillium cinereum (L.) H.Rob.(NT)	H	*E.M.P. Lucena 708*	000180		NE	AM, CAA, CER, MA
Cyrtocymura scorpioides (Lam.) H.Rob. (N)	SU	*E.M.P. Lucena 1041*	000513		NE	AM, CAA, CER, MA, PA, PT
Delilia biflora (L.) Kuntze (N)	H	*E.M.P. Lucena 720*	000192		NE	CAA, CER, MA
Elephantopus mollis Kunth (N)	H	*E.M.P. Lucena 878*	000350		NE	AM, CAA, CER, MA, PA, PT
Emilia abyssinica (Sch. Bip. ex A. Rich.) C. Jeffrey (N)	H	*E.M.P. Lucena 705*	000177			
Emilia fosbergii Nicolson (NT)	H	*E.M.P. Lucena 692*	000164	Pincel-de-estudante	NE	AM, CAA, CER, MA, PA, PT
Emilia sonchifolia (L.) DC. (NT)	H	*E.M.P. Lucena 696*	000168	Serrralhinha	NE	área antrópica
Erechtites hieracifolius (L.) Raf. ex DC. (N)	H	*E.M.P. Lucena 760*	000232	Caruru-amargoso	NE	AM, CAA, CER, MA, PA, PT
Fleischmannia microstemon (Cass.) R.M.King & H.Rob.(N)	H	*E.M.P. Lucena 802*	000274		NE	MA
Galinsoga parviflora Cav. (NT)	H	*E.M.P. Lucena 716*	000188	Botão-de-ouro	NE	MA
Gamochaeta pensylvanica (Willd.) Cabrera (N)	H	*E.M.P. Lucena 844*	000316		NE	AM, CAA, CER, MA, PA, PT
Lepidaploa araripensis (Gardner) H.Rob. (N)	SU	*E.M.P. Lucena 737*	000209		NE	CER
Pluchea sagittalis (Lam.) Cabrera (N)	SU	*E.M.P. Lucena 1024*	000496	Macela	NE	AM, CAA, CER, MA, PA
Praxelis clematidea (Griseb.) R.M.King & H.Rob. (N)	H	*E.M.P. Lucena 834*	000306		NE	AM, CAA, CER, MA, PA, PT
Sonchus oleraceus L. (N)	H	*E.M.P. Lucena 919*	000391		NE	
Sphaereupatorium scandens (Gardner) R.M.King & H.Rob. (N)	H	*E.M.P. Lucena 1049*	000521		NE	CER, MA
Synedrella nodiflora (L.) Gaertn. (N)	H	*E.M.P. Lucena 711*	000183		NE	AM, CAA
Tilesia baccata (L.) Pruski (NT)	S	*E.M.P. Lucena 771*	000243		NE	AM, CAA, CER, MA
Tithonia diversifolia (Hemsl.) A.Gray (NT)	S	*E.M.P. Lucena 872*	000344	Girassol-mexicano	NE	AM, CER, MA
Vernonanthura brasiliana (L.) H.Rob. (N)	S	*E.M.P. Lucena 966*	000438		NE	AM, CAA, CER
Youngia japonica (L.) DC. (NT)	H	*E.M.P. Lucena 694*	000166		NE	CER, MA, PA

BEGONIACEAE						
Begonia humilis Aiton (N)	H	*E.M.P. Lucena 723*	000195		NE	AM
BIGNONIACEAE						
Fridericia erubescens (DC.) L.G.Lohmann (N)	C	*E.M.P. Lucena 944*	000416		NE	CAA, CER, MA
Pyrostegia venusta (Ker Gawl.) Miers (N)	C	*E.M.P. Lucena 939*	000411	Cipó-de-São-João	NE	AM, CAA, CER, MA, PA, PT
BROMELIACEAE						
Aechmea aquilega (Salisb.) Griseb. (N)	H	*E.M.P. Lucena 750*	000222		NE	AM, CAA, CER, MA
Aechmea bromeliifolia (Rudge) Baker (N)	H	*E.M.P. Lucena 790*	000262		LC	AM, CAA, CER, MA
BURSERACEAE						
Protium heptaphyllum (Aubl.) Marchand (N)	T	*E.M.P. Lucena 958*	000430		DD	AM, CAA, CER, MA
CAMPANULACEAE						
Centropogon cornutus (L.) Druce (N)	S	*E.M.P. Lucena 869*	000341	Aninga	NE	AM, CAA, CER, MA, PT
CANABACEAE						
Trema micranthum (L.) Blume (N)	T	*E.M.P. Lucena 956*	000428	Crindiúva	NE	AM, CAA, CER, MA, PA, PT
CANNACEAE						
Canna indica L. (N)	H	*E.M.P. Lucena 848*	000320	Pariri	NE	AM, CAA, CER, MA, PA, PT
CARYOPHYLLACEAE						
Drymaria cordata (L.) Willd. ex Roem. & Schult. (NT)	H	*E.M.P. Lucena 721*	000193	Pega-pinto	NE	AM, CAA, MA, PA
CLUSIACEAE						
Clusia nemorosa G.Mey. (N)	T	*E.M.P. Lucena 747*	000219	Orelha-de-burro	NE	AM, CAA, CER, MA
COMMELINACEAE						
Commelina diffusa Burm.f. (NT)	H	*E.M.P. Lucena 822*	000294	Capoeraba	NE	AM, CAA, CER, MA, PA, PT
CONVOLVULACEAE						
Camonea umbellata (L.) A.R. Simões & Staples (N)	C	*E.M.P. Lucena 962*	000434		NE	AM, CAA, CER, MA, PT
Evolvulus nummularius (L.) L. (N)	H	*E.M.P. Lucena 731*	000203	Confete	NE	AM, CAA, CER, MA
Ipomoea alba L. (N)	C	*E.M.P. Lucena 975*	000447	Batata-brava	NE	AM, CAA, CER, MA, PA, PT
Ipomoea incarnata (Vahl) Choisy (N)	C	*E.M.P. Lucena 813*	000285		NE	CAA, MA
COSTACEAE						
Costus spiralis (Jacq.) Roscoe (N)	H	*E.M.P. Lucena 704*	000176		NE	AM, CAA, CER, MA, PT
CUCURBITACEAE						
Momordica charantia L. (NT)	C	*E.M.P. Lucena 841*	000313	Melão-São-Caetano	NE	AM, CAA, CER, MA, PT
Sicyos martii Cogn. (N)	C	*E.M.P. Lucena 859*	000331		NE	CAA, CER, MA
CYPERACEAE						
Cyperus digitatus Roxb. (N)	H	*E.M.P. Lucena 867*	000339		NE	AM, CAA, CER, MA, PT
Cyperus distans L. (N)	H	*E.M.P. Lucena 838*	000310		NE	AM, CAA, CER, MA, PA, PT
Cyperus laxus Lam. (N)	H	*E.M.P. Lucena 763*	000235		NE	AM, CAA, CER, MA, PT
Cyperus luzulae (L.) Retz. (N)	H	*E.M.P. Lucena 836*	000308		NE	AM, CAA, CER, MA, PA, PT
Cyperus obtusatus (J.Presl & C.Presl) Mattf. & Kük. (N)	H	*E.M.P. Lucena 837*	000309		NE	AM, CAA, CER, MA, PA, PT
Cyperus odoratus L. (N)	H	*E.M.P. Lucena 830*	000302		NE	AM, CAA, CER, MA, PA, PT
Cyperus surinamensis Rottb. (N)	H	*E.M.P. Lucena 741*	000213		NE	AM, CAA, CER, MA, PA, PT
Fimbristylis littoralis Gaudich. (N)	H	*E.M.P. Lucena 831*	000303		NE	AM, CAA, CER, MA, PA, PT
Rhynchospora cephalotes (L.) Vahl (N)	H	*E.M.P. Lucena 748*	000220		NE	AM, CAA, CER, MA
Scleria gaertneri Raddi (N)	H	*E.M.P. Lucena 764*	000236		NE	AM, CAA, CER, MA, PA, PT
DILLENIACEAE						
Doliocarpus dentatus (Aubl.) Standl. (N)	C	*E.M.P. Lucena 949*	000421		NE	AM, CAA, CER, MA, PT
ERYTHROXYLACEAE						
Erythroxylum citrifolium A.St.-Hil. (N)	T	*E.M.P. Lucena 795*	000267	Pimentinha	NE	AM, CER, MA

EUPHORBIACEAE						
Astraea surinamensis (Miq.) O.L.M. Silva & Cordeiro (N)	H	*E.M.P. Lucena 984*	000456	Cabeça-de-formiga	NE	AM, CAA, CER, MA, PA, PT
Croton jacobinensis Baill. (N)	S	*E.M.P. Lucena 948*	000420	Marmeleiro-do-brejo	NE	CAA
Euphorbia heterophylla L. (N)	H	*E.M.P. Lucena 865*	000337	Amendoim-bravo	NE	AM, CAA
Euphorbia hirta L. (N)	H	*E.M.P. Lucena 921*	000393	Erva-de-Santa-Luzia	NE	AM, CAA, CER, MA, PA
Euphorbia insulana Vell. (N)	H	*E.M.P. Lucena 756*	000228		NE	MA
Manihot glaziovii Müll.Arg. (N)	T	*E.M.P. Lucena 778*	000250		NE	MA
FABACEAE						
Albizia polycephala (Benth.) Killip ex Record (N)	T	*E.M.P. Lucena 1059*	000531	Monzê	NE	CAA, CER, MA
Calliandra fernandesii Barneby (N)	S	*E.M.P. Lucena 782*	000254		NE	CAA
Copaifera duckei Dwyer (N)	T	*E.M.P. Lucena 877*	000349	Copaíba	NE	AM, CER, MA
Crotalaria incana L. (N)	SU	*E.M.P. Lucena 978*	000450	Chocalho-de-cascavel	NE	AM, CAA, CER, MA, PA, PT
Crotalaria retusa L. (NT)	H	*E.M.P. Lucena 977*	000449		NE	AM, CAA, CER, MA, PA
Desmodium incanum (Sw.) DC. (NT)	SU	*E.M.P. Lucena 858*	000330	Trevo-do-campo	NE	AM, CAA, CER, MA, PA, PT
Dioclea virgata (Rich.) Amshoff (N)	C	*E.M.P. Lucena 776*	000248		NE	AM, CAA, CER, MA
Hymenaea stigonocarpa Mart. ex Hayne (N)	T	*E.M.P. Lucena 1060*	000532		NE	AM, CAA, CER, PT
Indigofera suffruticosa Mill. (N)	S	*E.M.P. Lucena 931*	000403		NE	AM, CAA, CER, MA, PA
Inga ingoides (Rich.) Willd. (N)	T	*E.M.P. Lucena 758*	000230	Ingá	NE	AM, CER, MA
Machaerium hirtum (Vell.) Stellfeld (N)	T	*E.M.P. Lucena 1038*	000510	Jacarandá-de-espinho	NE	AM, CAA, CER, MA, PT
Mimosa diplotricha C.Wright ex Sauvalle (N)	H	*E.M.P. Lucena 832*	000304		NE	AM, CAA, CER, MA, PA
Mimosa pigra L. (N)	S	*E.M.P. Lucena 982*	000454		NE	AM, CAA, CER, MA, PT
Piptadenia retusa (Jacq.) P.G.Ribeiro, Seigler & Ebinger (N)	T	*E.M.P. Lucena 786*	000258	Unha-de-gato	NE	CAA
Rhynchosia melanocarpa Grear (N)	C	*E.M.P. Lucena 968*	000440		NE	CAA, CER, MA
Senna quinquangulata (Rich.) H.S.Irwin & Barneby (N)	S	*E.M.P. Lucena 770*	000242	Ingá-de-morcêgo	NE	AM, CAA, CER, MA
Senna splendida (Vogel) H.S.Irwin & Barneby (N)	S	*E.M.P. Lucena 942*	000414		NE	CAA, CER, MA, PT
GENTIANACEAE						
Schultesia guianensis (Aubl.) Malme (N)	H	*E.M.P. Lucena 833*	000305		LC	AM, CAA, CER, MA
GERNERIACEAE						
Gloxinia perennis (L.) Fritsch (N)	H	*E.M.P. Lucena 724*	000196		NE	AM, CER
HELICONIACEAE						
Heliconia psittacorum L.f. (N)	H	*E.M.P. Lucena 753*	000225		NE	AM, CAA, CER, MA, PT
HYPERICACEAE						
Vismia guianensis (Aubl.) Choisy (N)	S	*E.M.P. Lucena 937*	000409	Lacre	NE	AM, CAA, CER, MA
LAMIACEAE						
Cantinoa mutabilis (Rich.) Harley & J.F.B.Pastore (N)	H	*E.M.P. Lucena 991*	000463		NE	AM, CAA, CER, MA, PA, PT
Hyptis lanceolata Poir. (N)	H	*E.M.P. Lucena 971*	000443		NE	AM, CAA, CER, MA
Marsypianthes chamaedrys (Vahl) Kuntze (N)	H	*E.M.P. Lucena 972*	000444		NE	AM, CAA, CER, MA, PT
Mesosphaerum pectinatum (L.) Kuntze (N)	SU	*E.M.P. Lucena 767*	000239	Hortelã-gigante	NE	AM, CAA, CER, MA
LECYTHIDACEAE						
Gustavia augusta L. (N)	T	*E.M.P. Lucena 876*	000348	Jeniparana	NE	AM, MA
LINDERNIACEAE						
Lindernia crustacea (L.) F.Muell. (N)	H	*E.M.P. Lucena 726*	000198		NE	AM, CAA, CER, MA, PA
Lindernia rotundifolia (L.) Alston (N)	H	*E.M.P. Lucena 729*	000201		NE	AM, CAA, CER, MA
LORANTHACEAE						
Struthanthus syringifolius (Mart.) Mart. (N)	H	*E.M.P. Lucena 787*	000259		NE	AM, CAA, CER, MA
LYTHRACEAE						
Cuphea carthagenensis (Jacq.) J.F.Macbr. (N)	H	*E.M.P. Lucena 973*	000445		NE	AM, CAA, CER, MA, PA, PT

Cuphea impatientifolia A.St.-Hil. (N)	SU	*E.M.P. Lucena 804*	000276		NE	CAA, MA
MALPIGHIACEAE						
Byrsonima crispa A.Juss. (N)	T	*E.M.P. Lucena 800*	000272	Murici	NE	AM, MA
Byrsonima sericea DC. (N)	T	*E.M.P. Lucena 882*	000354		NE	AM, CAA, CER, MA
MALVACEAE						
Ceiba pentandra (L.) Gaertn. (N)	T	*E.M.P. Lucena 1043*	000515	Sumaúma	NE	AM
Guazuma ulmifolia Lam. (N)	T	*E.M.P. Lucena 1039*	000511	Mutamba	NE	AM, CAA, CER, MA, PA, PT
Melochia nodiflora Sw. (N)	SU	*E.M.P. Lucena 835*	000307		NE	CAA, MA
Melochia pyramidata L. (N)	SU	*E.M.P. Lucena 843*	000315		NE	AM, CAA, CER, MA
Pachira aquatica Aubl. (N)	T	*E.M.P. Lucena 868*	000340		NE	AM
Pavonia malacophylla (Link & Otto) Garcke (N)	S	*E.M.P. Lucena 751*	000223		NE	AM, CAA, CER, MA
Pavonia paniculata Cav. (N)	SU	*E.M.P. Lucena 808*	000280		NE	CER
Sida acuta Burm.f. (N)	SU	*E.M.P. Lucena 781*	000253	Relógio	NE	AM, CAA, CER, MA
Sida jussiaeana DC. (N)	SU	*E.M.P. Lucena 1026*	000498		NE	CAA, CER
Sida rhombifolia L. (N)	H	*E.M.P. Lucena 761*	000233		NE	AM, CAA, CER, MA, PA, PT
Sida urens L. (N)	SU	*E.M.P. Lucena 809*	000281		NE	AM, CER, MA, PA, PT
Sidastrum micranthum (A.St.-Hil.) Fryxell (N)	SU	*E.M.P. Lucena 846*	000318		NE	CAA, CER, MA, PT
Triumfetta semitriloba Jacq. (N)	SU	*E.M.P. Lucena 768*	000240	Carrapicho	NE	AM, CAA, CER, MA
Waltheria indica L. (N)	H	*E.M.P. Lucena 983*	000455		NE	AM, CAA, CER, MA, PA, PT
MELASTOMATACEAE						
Aciotis acuminifolia (Mart. ex DC.) Triana* (N)	H	*E.M.P. Lucena 880*	000352		NE	AM, CER, MA
Clidemia debilis Crueg. (N)	S	*E.M.P. Lucena 697*	000169		NE	AM, CAA, MA
Clidemia hirta (L.) D.Don (N)	S	*E.M.P. Lucena 698*	000170		NE	AM, CAA, CER, MA, PA, PT
Miconia alata (Aubl.) DC. (N)	S	*E.M.P. Lucena 707*	000179		NE	AM, CAA
Miconia minutiflora (Bonpl.) DC. (N)	S	*E.M.P. Lucena 691*	000163	Lacre-branco	NE	AM, CAA, CER, MA
Miconia prasina (Sw.) DC. (N)	T	*E.M.P. Lucena 950*	000422	Canela-de-veado	NE	AM, CAA, CER, MA
Pleroma heteromallum (D.Don) D.Don (N)	S	*E.M.P. Lucena 955*	000427	Quaresmeira	NE	CER, MA
Pterolepis trichotoma (Rottb.) Cogn. (N)	H	*E.M.P. Lucena 879*	000351		NE	AM, CAA, CER, MA
MELIACEAE						
Guarea guidonia (L.) Sleumer (N)	T	*E.M.P. Lucena 1061*	000533	Gitó	NE	AM, CAA, CER, MA
Guarea macrophylla Vahl (N)	T	*E.M.P. Lucena 796*	000268	Café-bravo	NE	AM, CAA, CER, MA, PA
MENISPERMACEAE						
Cissampelos glaberrima A.St.-Hil. (N)	C	*E.M.P. Lucena 779*	000251		NE	AM, CAA, CER, MA, PT
MYRTACEAE						
Eugenia punicifolia (Kunth) DC. (N)	S	*E.M.P. Lucena 759*	000231		NE	AM, CAA, CER, MA, PT
Myrcia splendens (Sw.) DC. (N)	T	*E.M.P. Lucena 943*	000415		NE	AM, CAA, CER, MA, PT
Myrcia tomentosa (Aubl.) DC. (N)	S	*E.M.P. Lucena 941*	000413		NE	AM, CAA, CER, MA
Syzygium aqueum (Burm.f.) Alston (NT)	T	*E.M.P. Lucena 885*	000357		NE	MA
NYCTAGINACEAE						
Mirabilis jalapa L. (NT)	SU	*E.M.P. Lucena 714*	000186	Bonina	NE	AM, CAA, CER, MA, PA
OCHNACEAE						
Ouratea cf parvifolia (A.St.-Hil.) Engl. (N)	S	*E.M.P. Lucena 947*	000419	Fruta-de-tucano	NE	CAA, CER
ONAGRACEAE						
Ludwigia erecta (L.) H.Hara (N)	S	*E.M.P. Lucena 826*	000298		NE	AM, CAA, CER, MA
Ludwigia octovalvis (Jacq.) P.H.Raven (N)	SU	*E.M.P. Lucena 825*	000297	Pimenta-d'água	NE	AM, CAA, CER, MA, PT
ORCHIDACEAE						
Campylocentrum micranthum (Lindl.) Rolfe (N)	H	*E.M.P. Lucena 757*	000229		NE	AM, MA
Gomesa barbata (Lindl.) M.W.Chase & N.H.Williams (N)	H	*E.M.P. Lucena 957*	000429	Chita	NE	CAA, CER

Oeceoclades maculata (Lindl.) Lindl. (NT)	H	*E.M.P. Lucena 811*	000283		NE	AM, CAA, CER, MA
Prescottia stachyodes (Sw.) Lindl. (N)	H	*E.M.P. Lucena 815*	000287		NE	AM, CAA, CER, MA, PA
Rodriguezia bracteata (Vell.) Hoehne (N)	H	*E.M.P. Lucena 980*	000452		NE	CAA, MA
OXALIDACEAE						
Oxalis alstonii Lourteig (N)	H	*E.M.P. Lucena 884*	000356		NE	CER, MA
Oxalis corniculata L. (NT)	H	*E.M.P. Lucena 855*	000327	Três-corações	NE	AM, CAA, CER, MA, PA, PT
Oxalis cratensis Oliv. ex Hook. (N)	H	*E.M.P. Lucena 821*	000293	Herva-imbú	LC	AM, CAA, CER, MA, PT
Oxalis debilis Kunth (N)	H	*E.M.P. Lucena 852*	000324		NE	AM, CAA, CER, MA, PA
PHYLLANTHACEAE						
Phyllanthus amarus Schumach. & Thonn. (N)	H	*E.M.P. Lucena 706*	000178	Erva-pombinha	NE	AM, CAA, CER, MA, PA, PT
Phyllanthus stipulatus (Raf.) G.L.Webster (N)	H	*E.M.P. Lucena 857*	000329	Quebra-pedra	NE	AM, CER, MA
Phyllanthus tenellus Roxb. (N)	H	*E.M.P. Lucena 736*	000208		NE	AM, CAA, CER, MA, PA
PIPERACEAE						
Peperomia glabella (Sw.) A.Dietr. (N)	H	*E.M.P. Lucena 772*	000244		NE	AM, MA
Peperomia pellucida (L.) Kunth (N)	H	*E.M.P. Lucena 845*	000317	Erva-de-jaboti	LC	AM, CAA, CER, MA
Piper arboreum Aubl. (N)	S	*E.M.P. Lucena 754*	000226		NE	AM, CAA, CER, MA
Piper crassinervium Kunth (N)	S	*E.M.P. Lucena 985*	000457		NE	AM, CAA, CER, MA
Piper mollicomum Kunth (N)	S	*E.M.P. Lucena 871*	000343		NE	AM, CAA, CER, MA
Piper ovatum Vahl (N)	S	*E.M.P. Lucena 801*	000273		NE	CER, MA
Piper tuberculatum Jacq. (N)	S	*E.M.P. Lucena 889*	000361	Pimenta-longa	NE	AM, CAA, CER, MA, PT
Piper umbellatum L. (N)	SU	*E.M.P. Lucena 725*	000197	Caapeba	NE	AM, CER, MA
PLANTAGINACEAE						
Scoparia dulcis L. (N)	H	*E.M.P. Lucena 970*	000442	Vassorinha	NE	AM, CAA, CER, MA, PA, PT
POACEAE						
Coix lacryma-jobi L. (NT)	H	*E.M.P. Lucena 963*	000435	Capim-rosário	NE	AM, CAA, CER, MA, PT
Eleusine indica (L.) Gaertn. (NT)	H	*E.M.P. Lucena 742*	000214	Capim-pé-de-galinha	NE	AM, CAA, CER, MA, PA, PT
Eragrostis tenella (L.) P.Beauv. ex Roem. & Schult. (NT)	H	*E.M.P. Lucena 738*	000210		NE	AM, CAA, CER, MA, PT
Hymenachne condensata (Bertol.) Chase (N)	H	*E.M.P. Lucena 780*	000252		NE	AM, CER, MA
Lasiacis ligulata Hitchc. & Chase (N)	H	*E.M.P. Lucena 701*	000173	Taquari	NE	AM, CAA, CER, MA
Oplismenus burmannii (Retz.) P.Beauv. (N)	H	*E.M.P. Lucena 773*	000245		NE	AM, CAA, CER, MA
Paspalum clavuliferum C.Wright (N)	H	*E.M.P. Lucena 888*	000360		NE	AM, CAA, CER, MA
Sporobolus tenuissimus (Schrank) Kuntze (N)	H	*E.M.P. Lucena 1029*	000501		NE	AM, CAA, CER, MA
POLYGALACEAE						
Securidaca lanceolata A.St.-Hil. & Moq. (N)	C	*E.M.P. Lucena 953*	000425		NE	CAA, MA
POLYGONACEAE						
Triplaris gardneriana Wedd. (N)	T	*E.M.P. Lucena 1019*	000491	Pajeú	NE	AM, CAA, CER, MA
PONTEDERIACEAE						
Eichhornia paniculata (Spreng.) Solms (N)	H	*E.M.P. Lucena 828*	000300	Baronesa	NE	CAA, CER, MA
RHAMNACEAE						
Colubrina glandulosa Perkins (N)	T	*E.M.P. Lucena 886*	000358		LC	AM, CER, MA
RUBIACEAE						
Palicourea colorata (Willd. ex Roem. & Schult.) Delprete & J.H.Kirkbr. (N)	S	*E.M.P. Lucena 745*	000217		NE	AM, CAA, CER, MA
Palicourea guianensis Aubl. (N)	T	*E.M.P. Lucena 746*	000218		NE	AM, CAA, CER, MA
Palicourea hoffmannseggiana (Schult.) Borhidi (N)	S	*E.M.P. Lucena 744*	000216		NE	AM, CAA, CER, MA, PA, PT
Palicourea marcgravii A.St.-Hil. (N)	S	*E.M.P. Lucena 749*	000221		NE	AM, CAA, CER, MA
Psychotria bahiensis DC. (N)	S	*E.M.P. Lucena 752*	000224		NE	AM, CAA, CER, MA
Psychotria sp	SU	*E.M.P. Lucena 788*	000260			
Psychotria sp	SU	*E.M.P. Lucena 887*	000359			

Rolandra fruticosa (L.) Kuntze (N)	SU	*E.M.P. Lucena 817*	000289		NE	AM, CAA
Spermacoce exilis (L.O.Williams) C.D.Adams (N)	H	*E.M.P. Lucena 699*	000171		NE	AM, MA
Spermacoce tenuior L. (N)	H	*E.M.P. Lucena 693*	000165		LC	
RUTACEAE						
Zanthoxylum rhoifolium Lam. (N)	T	*E.M.P. Lucena 777*	000249	Limãozinho	NE	AM, CAA, CER, MA, PA, PT
SALICACEAE						
Casearia grandiflora Cambess. (N)	T	*E.M.P. Lucena 988*	000460		NE	AM, CAA, CER, MA
SANTALACEAE						
Phoradendron crassifolium (Pohl ex DC.) Eichler (N)	H	*E.M.P. Lucena 938*	000410		NE	AM, CAA, CER, MA, PT
Phoradendron quadrangulare (Kunth) Griseb. (N)	H	*E.M.P. Lucena 846*	000318		NE	AM, CAA, CER, MA, PA, PT
SAPINDACEAE						
Talisia esculenta (Cambess.) Radlk. (N)	T	*E.M.P. Lucena 951*	000423	Pitomba	NE	AM, CAA, CER, MA
Cupania impressinervia Acev.-Rodr. (N)	T	*E.M.P. Lucena 799*	000271		NE	MA
SAPOTACEAE						
Manilkara bidentata (A.DC.) A.Chev. subsp. *Bidentata**(N)	T	*E.M.P. Lucena 789*	000261	Maparajuba	NE	AM
SIPARUNACEAE						
Siparuna guianensis Aubl. (N)	S	*E.M.P. Lucena 961*	000433	Caápitiú	NE	AM, CAA, CER, MA, PT
SOLANACEAE						
Brunfelsia uniflora (Pohl) D.Don (N)	S	*E.M.P. Lucena 783*	000255		NE	AM, CAA, CER, MA
Cestrum latifolium Lam. (N)	S	*E.M.P. Lucena 765*	000237	Sabão-de-soldado	NE	AM, CAA, CER
Physalis angulata L. (NT)	H	*E.M.P. Lucena 713*	000185	Camapú	NE	AM, CAA, CER, MA, PA, PT
Solanum acerifolium Dunal (N)	SU	*E.M.P. Lucena 807*	000279		NE	AM, CAA, CER, MA
Solanum americanum Mill. (N)	H	*E.M.P. Lucena 732*	000204	Maria-pretinha	NE	AM, CAA, CER, MA, PA, PT
Solanum caavurana Vell. (N)	S	*E.M.P. Lucena 965*	000437		NE	CAA, CER, MA
Solanum paniculatum L. (N)	S	*E.M.P. Lucena 979*	000451		NE	AM, CAA, CER, MA, PA
Solanum rhytidoandrum Sendtn. (N)	S	*E.M.P. Lucena 819*	000291		NE	AM, CAA, CER
TURNERACEAE						
Turnera subulata Sm. (N)	H	*E.M.P. Lucena 1008*	000480	Chanana	NE	AM, CAA, CER, MA
URTICACEAE						
Cecropia pachystachya Trécul (N)	T	*E.M.P. Lucena 954*	000426	Embaúba	NE	AM, CAA, CER, MA, PA, PT
Pilea hyalina Fenzl (N)	H	*E.M.P. Lucena 850*	000322		NE	CAA, CER, MA
Pilea microphylla (L.) Liebm. (N)	H	*E.M.P. Lucena 875*	000347	Brilhantina	NE	AM, CAA, CER, MA
VERBENACEAE						
Lantana camara L. (NT)	S	*E.M.P. Lucena 766*	000238	Camara	NE	AM, CAA, CER, MA, PA, PT
Priva bahiensis A.DC. (N)	H	*E.M.P. Lucena 923*	000395	Carrapicho	NE	CAA, MA
Stachytarpheta cayennensis (Rich.) Vahl (N)	H	*E.M.P. Lucena 730*	000202	Rincão	NE	AM, CAA, CER, MA, PA, PT
VITACEAE						
Cissus verticillata (L.) Nicolson & C.E.Jarvis (N)	C	*E.M.P. Lucena 967*	000439		NE	AM, CAA, CER, MA, PA, PT

The Asteraceae family present in this survey as the majority one, may be related to the place where they were collected. Representatives of this family are usually cosmopolitan and ruderal, growing in places that have suffered anthropic actions, such as deforestation, or in open areas (Pereira et al., 2013). Cyperaceae, on the other hand, has a preference for open sites, flooded areas and forest edges (Souza and Lorenzi 2019), being collected near the stream. According to Calgaro et al. (2015) the species richness of Euphorbiaceae, Asteraceae and Poaceae, is uncommon in this phytophysiognomy. This shows that the anthropization of the areas interferes with floristic richness. Silva and Figueiredo (2013), in Serra da Meruoca-CE, an Atlantic Forest remnant, catalogued 100 species distributed in 88 genera and 39 families, with Fabaceae (19%), Poaceae (8%) and Rubiaceae (8%) being the richest.

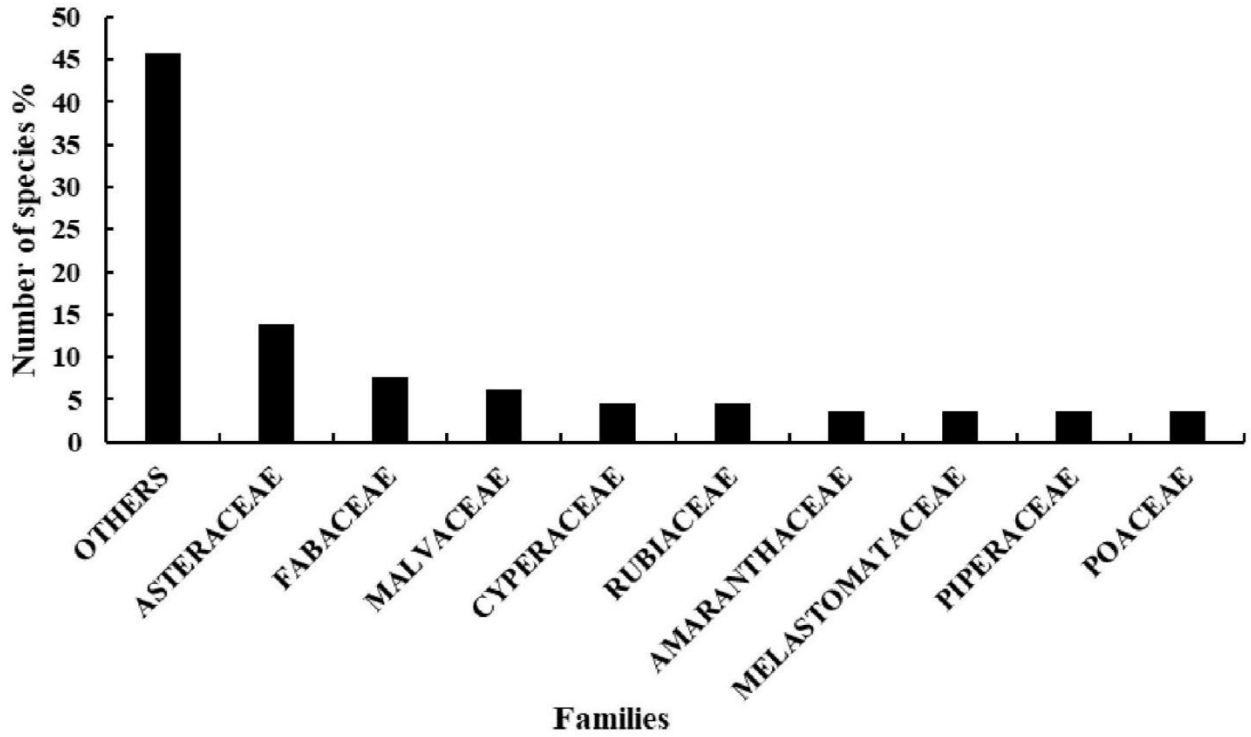

Figure 3 - Number of species per family found in the Experimental Campus of Environmental Education and Ecology of the UECE, in Pacoti, Ceará, Brazil.

In the study carried out by Santos et al. (2025) in Serra da Itacoatiara, Ceará, Asteraceae (30 spp.) was also considered the most representative, followed by Fabaceae (27 spp.). Silveira et al. (2020a) when analyzing the flora of Serra de Baturité recorded 400 species distributed in 92 families. The rates with the highest values were Myrtaceae (43 spp.), Fabaceae (38 spp.) and Euphorbiaceae (21 spp.). Silveira et al. (2020b), when carrying out a survey in the Ubajara National Park, another Humid Forest area in the state of Ceará, found that Fabaceae (64 spp.), Malvaceae (24 spp.) and Asteraceae (20 spp.) were the richest families, similar to the findings of this study, changing only the order of richness, which can be explained by the degree of anthropization of the área.

Regarding habits, herbs (47.55%), shrubs (16.88%) and trees (14.66%) were the most representative (Figure 4). The flora of Serra de Baturité according to Silveira et al. (2020a) is quite diverse and the most representative habits are trees (214 spp.), shrubs (84 spp.) and herbs (72 spp.), contrasting with the findings of this study. This may be linked to the degree of anthropization of the area, making the number of herbs more representative. The main growth forms found in the Serra de Itacoatiara, another "high-altitude wetland" region of Ceará, were herbs (82 spp.), shrubs (58 spp.) and subshrubs (57 spp.), evidencing the degree of anthropization of the area (Santos et al. 2025), corroborating the findings of this study.

The expressivity of herbs can be linked to the number of open areas in the study area, because, according to Martins-Ramos et al. (2011), this extract prefers areas of fields and forest edges, such as representatives of the Asteraceae family, which also showed the highest richness.

The diversity of herbs (167 spp.) in the Mata do Junco Wildlife Refuge fragment, Atlantic Forest area, Sergipe state, was also the habit that stood out the most, as can be observed in the study by Oliveira et al. (2016). According to the authors, this greater expressiveness of herbs may be related to the presence of open and disturbed areas, and different regeneration stages within the study area, corroborating with characteristics found in the area of this study, which, besides being in an urban area, also presents open areas, where the number of herbs is more expressive. In the study carried out by Santos et al. (2025), herbs were also the most representative habit, with 82 species.

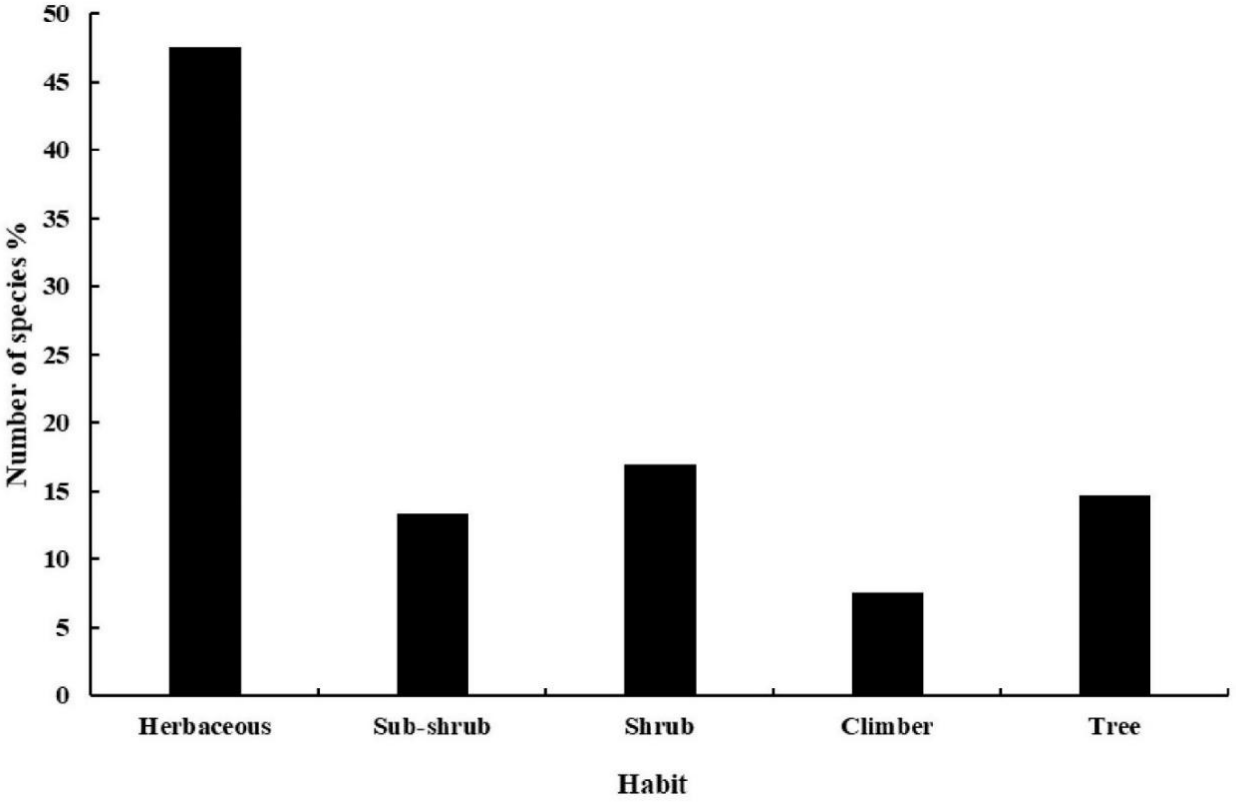

Figure 4 - Number of species per habit found in the Experimental Campus of Environmental Education and Ecology of the UECE, in Pacoti, Ceará, Brazil.

In many Northeastern region surveys, the tree extract was the most significant (Amazonas and Barbosa 2011; Nascimento et al., 2012; Silva and Figueiredo, 2013; Alves et al. Jansen et al. 2021; Benício et al. 2023; Nascimento et al. 2025). However, there are other phytophysiognomies that modify this relationship, as can be observed in the survey conducted at the Santo Inácio site, Serra da Meruoca-CE, in which the shrub layer was the one with the highest richness (Santos et al., 2014), since other factors may be related.

The most representative genera were *Cyperus* L. with seven species, *Piper* L., *Sida* L. with six species each, *Solanum* L. with five, *Oxalis* L. and *Palicourea* Aubl. with four species each. The others had from one to three species (Table 1). In a stretch of Humid Forest in the municipality of Ipu, Ibiapaba Plateau, Ceará (Nascimento et al., 2025), the genera *Ipomoea* L. (10 spp.), *Solanum* L. (seven spp.) and *Piper* L. (four spp.) are among the genera with the greatest species richness. In the study by Silveira et al. (2020b) in the Ubajara-CE National Park, the richest genera were *Erythroxylum* P. Browne (nine spp.), *Croton* L. and *Passiflora* L. (seven spp. each) and *Combretum* Loefl. with six species.

In our study site, we have found 27 species (11.89% of the total flora) that are endemic to Brazil (Figure 5 and 6). Most species present in our study site are native to Brazil, totaling 191 species (BFG, 2022). At the Coqueiros site, Ceará, most species (335 spp.) are considered native to Brazil, 79 are endemic, and 17 have a distribution restricted to the Northeast region (Nascimento et al., 2025).

The naturalized species are *Thunbergia alata* Bojer ex Sims, *Amaranthus deflexus* L., *Amaranthus viridis* L., *Bidens pilosa* L., *Cyanthillium cinereum* (L.) H.Rob., *Emilia fosbergii* Nicolson, *Emilia sonchifolia* (L.) DC., *Galinsoga parviflora* Cav., *Tilesia baccata* (L.) Pruski, *Tithonia diversifolia* (Hemsl.) A.Gray, *Youngia japonica* (L.) DC., *Drymaria cordata* (L.) Willd. ex Roem. & Schult., *Commelina diffusa* Burm.f., *Momordica charantia* L., *Crotalaria retusa* L., *Desmodium incanum* (Sw.) DC., *Syzygium aqueum* (Burm.f.) Alston, *Mirabilis jalapa* L., *Oeceoclades maculata* (Lindl.) Lindl., *Oxalis corniculata* L., *Coix lacryma-jobi* L., *Eleusine indica* (L.) Gaertn., *Eragrostis tenella* (L.) P.Beauv. ex Roem. & Schult., *Physalis angulata* L., *Pilea microphylla* (L.) Liebm., *Lantana camara* L.

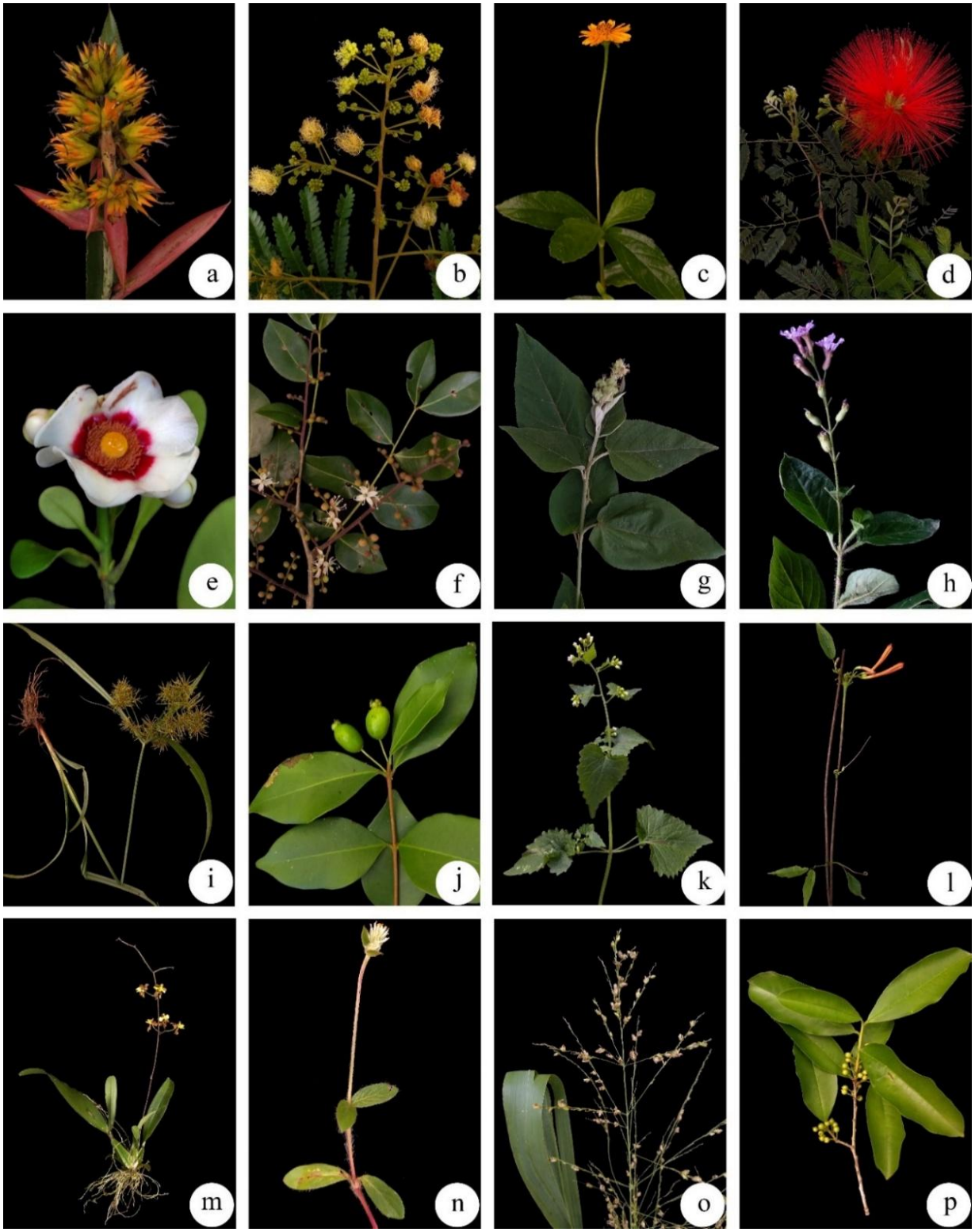

Figure 5 - Species endemic to Brazil that occur in the Experimental Campus for Environmental Education and Ecology of the UECE, in Pacoti, Ceará, Brazil – Part 1. a. *Aechmea aquilega* (Salisb.) Griseb. (Bromeliaceae); b. *Albizia polycephala* (Benth.) Killip ex Record (Fabaceae); c. *Aspilia cearensis* J.U.Santos (Asteraceae); d. *Calliandra fernandesii* Barneby (Fabaceae); e. *Clusia nemorosa* G.Mey. (Clusiaceae); f. *Copaifera duckei* Dwyer (Fabaceae); g. *Croton jacobinensis* Baill. (Euphorbiaceae); h. *Cuphea impatientifolia* A.St.-Hil. (Lythraceae); i. *Cyperus odoratus* L. (Cyperaceae); j. *Eugenia punicifolia* (Kunth) DC. (Myrtaceae); k. *Fleischmannia microstemon* (Cass.) R.M.King & H.Rob. (Asteraceae); l. *Fridericia erubescens* (DC.) L.G.Lohmann (Bignoniaceae); m. *Gomesa barbata* (Lindl.) M.W.Chase & N.H.Williams (Orchidaceae); n. *Gomphrena gardneri* Moq. (Amaranthaceae); o. *Hymenachne condensata* (Bertol.) Chase (Poaceae); p. *Ilex sapotifolia* Reissek (Aquifoliaceae).

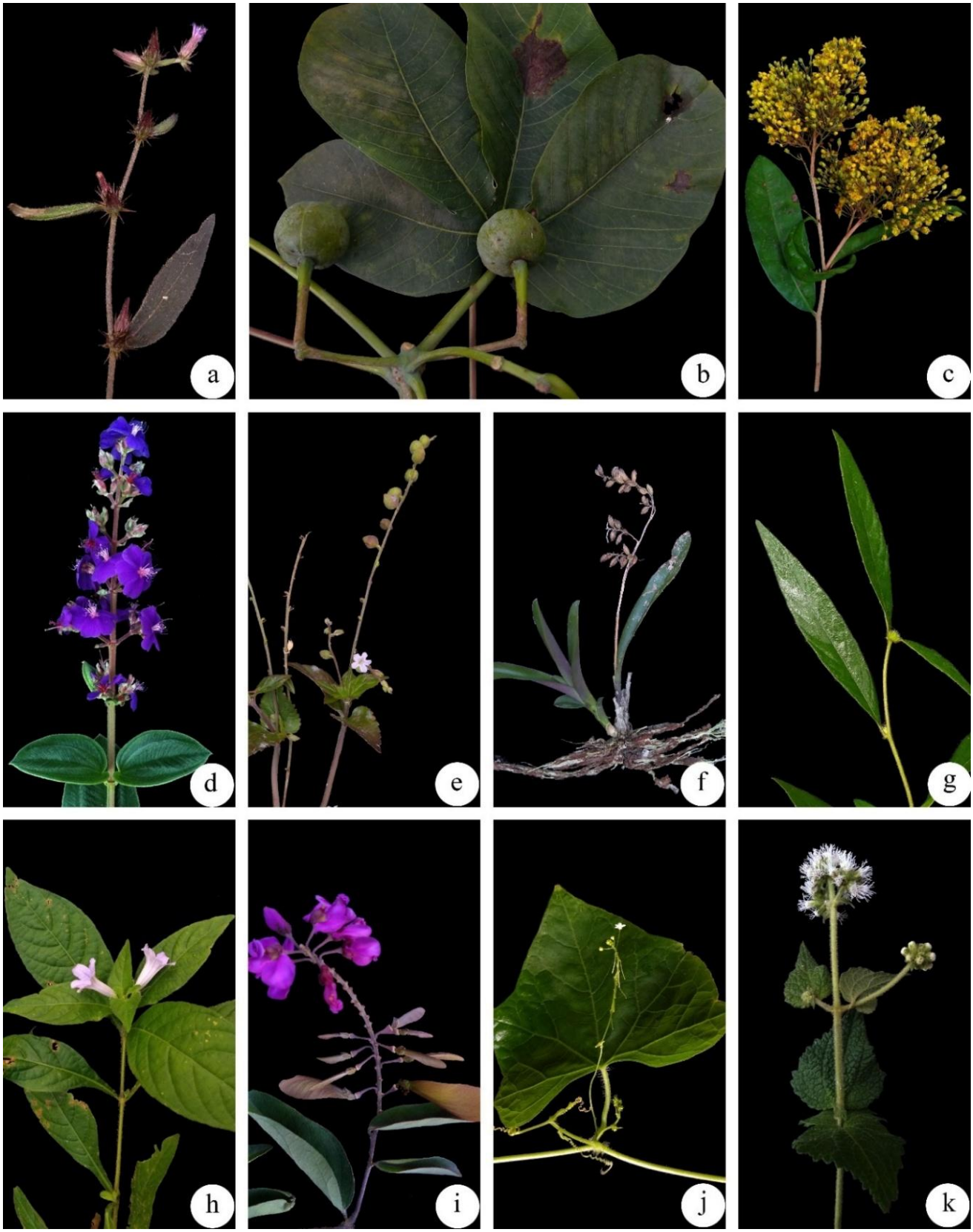

Figure 6 - Species endemic to Brazil that occur in the Experimental Campus for Environmental Education and Ecology of the UECE, in Pacoti, Ceará, Brazil – Part 2. a. *Lepidaploa araripensis* (Gardner) H.Rob. (Asteraceae); b. *Manihot glaziovii* Müll.Arg. (Euphorbiaceae); c. *Ouratea parviflora* (A.DC.) Baill. (Ochnaceae); d. *Pleroma heteromallum* (D.Don) D.Don (Melastomaceae); e. *Priva bahiensis* A.DC. (Verbenaceae); f. *Rodriguezia bracteata* (Vell.) Hoehne (Orchidaceae); g. *Rolandra fruticosa* (L.) Kuntze (Asteraceae); h. *Ruellia bahiensis* (Nees) Morong (Acanthaceae); i. *Securidaca lanceolata* A.St.-Hil. & Moq. (Polygalaceae); j. *Sicyos martii* Cogn. (Cucurbitaceae); k. *Sphaereupatorium scandens* (Gardner) R.M.King & H.Rob. (Asteraceae).

In the study carried out by Nascimento et al. (2025), 18 naturalized species and two cultivated species were cataloged. Santos et al. (2014) stated that the presence of naturalized species is an indication that the area is anthropized, because they are often used for other purposes, such as ornamentation, which ends up escaping into the natural area. The presence of native and endemic species of Brazil reinforces the importance of conservation of green areas, especially those found in urban areas.

The *Urceolina amazonica* species (Linden) Christenh. & Byng is considered cultivated (BFG, 2022). This shows that part of this area is anthropized. The occurrence of this species may be related because it was collected near a body of water that passes within the study area. This species may have been carried by water from a nearby residence.

According to Conama (1994), in analyzing the parameters of Atlantic Forest areas regeneration, the area is represented by an initial regeneration stage because it has a high richness of herbaceous species, the presence of herbaceous creepers, a thin layer of leaf litter, besides few tree species, and may also have representatives of other regeneration stages, since they are the ones that make contact with more conserved areas. The aforementioned work also has species that indicate anthropization, such as *Brunfelsia uniflora* (Pohl) D.Don and *Palicourea colorata* (Willd. ex Roem. & Schult.) Delprete & J.H.Kirkbr, which also occur in the present research.

Two new occurrences were collected for Ceará: *Aciotis acuminifolia* (Mart. ex DC.) Triana e *Manilkara bidentata* (A.DC.) A.Chev. *subsp. bidentata*. The species: *Ilex sapotifolia* Reissek, *Piptadenia retusa* P.G.Ribeiro, *Manihot glaziovii* Müll.Arg, *Priva bahiensis* A.DC. and *Rolandra fruticosa* (L.) Kuntze, occur in the state of Ceará, but have not yet been updated on the Flora e Funga do Brasil website (BFG, 2022), so no new records were considered for the state.

Most species occur in all domains of Brazil (Table 1). Atlantic Forest (190 spp.), Cerrado (179 spp.), and Caatinga (176 spp.), were the domains that presented the highest species richness (BFG, 2022). It is worth noting that the sum of species does not total in the number of catalogued species, since the same species can occur in more than one domain.

This high number of Atlantic Forest species may be related to the similarity that it has with the Maciço de Baturité, since it has a strong influence of this domain, mainly by climatic conditions (Moro et al., 2015). In the Araripe National Forest, 17 species occur exclusively in the Caatinga Phytogeographic Domain. Approximately 60 species are widely distributed among the following domains: Amazon, Caatinga, Cerrado, and Atlantic Forest (Lima et al., 2024). Oliveira et al. (2023), when analyzing the floristic composition of different phytophysiognomies of Ceará do Piauí, observed that most of the species also occurred in the Caatinga domain, since these two states are also included within this domain.

The *Aspilia cearensis* J.U.Santos, *Begonia humilis* Aiton, *Brickellia difusa* (Vahl) A.Gray, *Calliandra fernandesii* Barneby, *Ceiba pentandra* (L.) Gaertn., *Croton jacobinensis* Baill., *Euphorbia heterophylla* L., *Gomesa barbata* (Lindl.) M.W.Chase & N.H.Williams, *Gomphrena gardnerii* Moq., *Lepidaploa araripensis* (Gardner) H.Rob., *Manilkara bidentata subsp. bidentata*, *Miconia alata* (Aubl.) DC., *Pachira aquatica* Aubl., *Pavonia paniculata* Cav., *Piptadenia retusa*, *Rolandra fruticosa* (L.) Kuntze, *Sida jussiaeana* DC., *Solanum rhytidoandrum* Sendtn., *Synedrella nodiflora* (L.) Gaertn., *Vernonanthura brasiliana* (L.) H.Rob. species, are new records for the Atlantic Forest. The presence of the species *Pachira aquatica* Aubl., as a new record for the Atlantic Forest, is a detail that deserves attention, as it is an endemic species of the Amazon region that was brought and probably ended up naturalizing in the Serra de Baturité. According to Alves et al. (2023), this species is one of the ten most used plants in urban afforestation, and its seeds may have been brought by animals into the study area.

Whereas, *Cupania impressinervia* Acev.-Rodr., *Euphorbia insulana* Vell., *Fleischmannia microstemon* (Cass.) R.M.King & H.Rob., *Galinsoga parviflora* Cav. are endemic to the Atlantic Forest (BFG, 2022).

Regarding the conservation status of the species, 212 (93.39%) are in the category of not evaluated (NE) and eight are in the category of Least Concern (LC) (3.50%), as shown in Table 1. Most (279 spp.) of the species inventoried by Nascimento et al. (2025), in another area of northeastern Humid Forest, are also in the category of not evaluated. The importance of the conservation of peri-urban green areas with native forest, such as the Experimental Campus of the UECE, is necessary because it brings several environmental benefits, such as air pollution control, rainwater infiltration facilitation, temperature reduction, thus allowing better thermal comfort (Albuquerque and Lopes, 2016).

The environmental problems that can be found in the APA of Serra de Baturité are, for

example, hunting and capture of wild animals; burning and deforestation; use of pesticides; water pollution; lack of basic sanitation and activities related to tourism (SEMACE, 2020). These factors affect the speed of forest regeneration, slowing it down.

The green areas degradation has several environmental, social, and economic losses to humanity, factors that are linked to the urbanization process of cities, which altered the climate, the hydrological cycle, the fauna, and the vegetation (Silva et al., 2025). Many species are at risk of becoming extinct even before they are cataloged, and this is a major problem for the various Brazilian biomes (Sousa and Honório, 2020).

With the vegetation cover replacement, the heat island process intensifies, making temperatures higher than normal, in relation to their surroundings, due to buildings, thus generating a thermal discomfort (Oliveira Filho et al., 2013), a process that usually occurs in large metropolises. That is why it is important to have small fragments distributed throughout cities, however, these are the results of the interaction of society with the natural environment, where the natural environment is altered in many ways, such as the removal of native forest for monoculture planting and the green areas occupation (Furlan, 2013).

A fragmented environment becomes more susceptible to the entry of invasive species, mainly due to the lack of ecological filters that protect this remnant. The introduction of these species further harms ecological relationships and the harmony of the ecosystem, mainly due to competition for resources. Recent assessments highlight that invasive exotic species are among the main causes of biodiversity loss in Brazil, especially in fragmented landscapes, where native resilience is reduced, intensifying competition for resources and altering ecosystem services (Dechoum et al., 2024). Therefore, it is extremely important to create conservation actions for the remnant of Dense Ombrophylous Forest present in the Experimental Campus of Environmental Education and Ecology of Pacoti-CE of the UECE, because although part of the area shows signs of anthropization, has the presence of many species native to Brazil. Thus, if this area were not partially anthropized, we would probably have more expressive numbers of new occurrences for the Ceará state and for the Atlantic Forest Biome.

Therefore, carrying out floristic studies in areas of remnants of Humid Forest in Ceará is of great importance for the flora recognition of these environments, thus proving the endemism, discovery of new records and creating subsidies for the conservation of green areas, especially urban ones, besides helping to create strategies that help reduce the anthropization of the area.

Conclusion

The flora of the Experimental Campus for Environmental Education and Ecology of Pacoti at UECE revealed a high species richness, mainly composed of herbs and shrubs, besides presenting species native to Brazil, new records for Ceará and Atlantic Forest endemics. The area is in the process of environmental regeneration, as it presents some cultivated and ruderal species, with a wide distribution, including the great richness of herbs.

The area needs to have better management of its natural resources, especially its flora, through the help of public and private agents, so that it can reduce the degradation areas, through reforestation with native species. There must also be periodic inspections by the environmental agencies, to avoid the return of anthropization.

Therefore, the knowledge of the flora of this place brings subsidies for future conservation projects within this area, since it is an area located in the urban zone that suffers a lot with anthropic actions and the edge effect, besides being the headquarters of the Museum of Natural History of Ceará, a place where research is carried out for the management and maintenance of biodiversity. Thisstudy also highlights the importance of floristic studies, because they are considered pioneering studies for the knowledge of the flora of a certain place, and, based on them, others will be carried out.

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