Magnoliophyta, restinga vegetation, state of Ceará, Brazil

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INTRODUCTION

Restinga vegetation is composed of the communities of plants that grow on Quaternary Neosols (Suguio and Tessler 1984; Rizzini 1997; Marques et al. 2004). Restingas can have different physiognomies that vary from grasslands to shrublands or forests (Silva and Britez 2005), and they occur along the entire Brazilian coast (Oliveira-Filho 1993).

The coastal band of northeastern Brazil can be divided in two sectors: an eastern super-humid region comprising the coastal areas of the states of Bahia, Sergipe, Alagoas, Pernambuco, Paraíba and Rio Grande do Norte; and a northern semi-arid region comprising coastal areas of the states of Rio Grande do Norte, Ceará, Piauí and Maranhão (Suguio and Tessler 1984; Villwock et al. 2005).

Among the northeastern states, more floristic and structural studies of restinga ecosystems have been undertaken in Pernambuco, Bahia and Piauí, with only scattered information being available for the other states.

Ceará state has 578 km of coastline that is predominantly composed of sea cliffs of the Barreiras Formation and quaternary quartz sand deposits. Restinga vegetation occupying dunes and inter-dune regions can be found along the entire coast of this state.

Despite this extensive coastline, only one scientific paper (Matias and Nunes 2001) and one technical report (Matias and Silva 2001) have been published with data referring to restinga vegetation in Ceará. In an effort to fill this gap, we present here a checklist of the phanerogamic species found along the coast of Ceará that was compiled from surveys and collections found at the EAC herbarium (Fortaleza, Ceará). A total of 391 species distributed among 208 genera and 41 families were identified. The families with the greatest numbers of species were Fabaceae, Poaceae, and Malvaceae (12), representing over 78.77% of the species collected.

RESULTS AND DISCUSSION

All of the herbarium samples collected along the coast of Ceará state were examined. The final list of phanerogam species reported for restinga areas in Ceará state totaled 391 species, distributed among 208 genera and 41 families (Table 1). The families with the greatest numbers of species...
were: Fabaceae sensu lato (130), Cyperaceae (51), Poaceae (47), Rubiaceae (27), Euphorbiaceae (19), Asteraceae (13), Bignoniaceae (11) and Malvaceae (10), which correspond to 78.77% of the total number of species; 41.46% of the families had only one species.

Fabaceae, Poaceae, Cyperaceae, Rubiaceae and Euphorbiaceae are the families most cited in floristic surveys in Brazilian restingas (Rambo, 1954; Pereira and Araújo, 2000; Kersten and Silva, 2005). A checklist prepared by Zickel et al. (2007) for Pernambuco state likewise noted high frequencies for the families Fabaceae (67 spp.), Poaceae (39 spp.), Cyperaceae (26 spp.) and Euphorbiaceae (25 spp.). In a recent floristic survey carried out in Piauí state that included part of the upper northeastern coast (F.S. Santos-Filho personal communication), the families Fabaceae, Poaceae, Cyperaceae and Euphorbiaceae were likewise found to have the highest number of species. These same families, together with the Orchidaceae, Bromeliaceae and Sapotaceae (Araújo and Henriques 1984; Assis et al. 2004; Martins et al. 2008) are well represented in restinga areas in southeastern Brazil.

The most representative genera in the present survey were Cyperus (14 spp.), Eleocharis (12), Mimosa (10), Chamaecrista (10), Aeschynomene (8), Paspalum (7), Croton (7), Rhynchospora (6), Senna (6), Sida (6), Caesalpinia (5), Centrosema (5) and Fimbristylis (5), representing 25.83% of all of the species recorded. In spite of the fact that these genera occur in many other areas of restinga, specific localities tend to have their own flora due to environmental factors that influence species composition (Barros 2009).

The species Ipomoea asarifolia (Desr.) Roem. and Schult., Remirea maritima Aubl., Richardia grandiflora (Cham. and Schltdl.) Steud., Helietropium lanceolatum Ruiz and Pav., Blutaparon portulacoides (A. St.-Hil.) Mears, Sesuvium portulacastrum (L.) L., and Mollugo verticillata L. (in addition to many members of the Fabaceae, Poaceae and Cyperaceae families) are among the most common plants in the dune areas and along the coast of Ceará state (Matias and Nunes 2001). Species of the families Poaceae and Cyperaceae produce large numbers of seeds and have great capacities for adapting to and resisting adverse environments (Bove et al. 2003). The species composition observed reflects not only of the peculiarities of the restinga ecosystem (e.g., high salinity, low levels of soil nutrients) but also habitat degradation.

In comparisons made with other restingas in northeastern Brazil (Cabral-Freire and Monteiro 1994 - Maranhão; S.F. Santos-Filho personal communication – Piauí; Freire 1990; Almeida Jr. et al. 2006; Almeida Jr. and Zickel 2009 – Rio Grande do Norte; Carvalho and Oliveira-Filho 1993; Oliveira-Filho and Carvalho 1993; Pontes and Barbosa 2008 – Paraiba; Andrade-Lima 1951; 1960; 1979; J.R.R. Cantarelli personal communication; Leite and Andrade 2004; Sacramento et al. 2007; Zickel et al. 2007; Silva et al. 2008; Almeida Jr. et al. 2009 – Pernambuco; Esteves 1980 – Alagoas; and Pinto et al. 1984; Viana et al. 2006 - Bahia), 91% of the species listed for Ceará were also reported in other coastal areas of northeastern Brazil.
Brazil; the remaining 9% were recorded only in restingas in Ceará (including *Cryptostegia grandiflora* Roxb. ex R.Br., *Amaranthus viridis* L., *Pycreus macrostachyos* (Lam.) J. Raynal, *Sapium glandulatum* (L.) Morong, *Tanacetum vulgare* L. and *Tetracera willdenoviana* Steud.) (Table 1).

Our survey indicates that 46.54% of the species recorded for the coastal areas of Ceará state are herbaceous plants (Figure 2). This reflects the significant presence of pioneer species that rapidly colonize this environment (mainly dune areas typical of the Ceará coast), with low, open physiognomies of erect herbaceous species and creeping-psammophytes. The herbaceous species recorded in the present study can be found in frontal dunes or fixed dune zones along most of the Brazilian coast (Pinto *et al.*, 1984; Cordazzo and Costa, 1989).

Matias and Nunes (2001) reported that woody restinga species occur in open or closed islands of vegetation, with a marked presence of *Chrysobalanus icaco* L., *Abrus precatorius* L. *Anacardium occidentale* L., *Byronima crassijolia* Kunth and *Cereus jamacaru* A. DC. The authors also noted that these woody species represent a mixture of cerrado and caatinga plants.

In general, many species observed along in this region of northeastern coast (northern coast of northeastern Brazil) are also present in the cerrado and caatinga biomes. Santos-Filho (personal communication) analyzed the restinga flora of Piauí state and, in spite of its floristic similarity with cerrado and caatinga, a significant presence of Atlantic Forest species was also noted.

The data presented here indicate the importance of herbaceous species in the physiognomic composition of beach areas. However, it is quite possible that due to their immediate proximity to the ocean the restinga areas of Ceará state have been widely altered due to human utilization for leisure and tourism. As such, conservation efforts focusing on coastal plant communities must include quantitative studies and attempt to decelerate anthropogenic impacts.

**Table 1.** List of phanerogamic species of restinga areas of the state of Ceará.

| FAMILIES / SPECIES                  | HABIT       |
|------------------------------------|-------------|
| Acanthaceae                        |             |
| *Avicennia germinans* (L.) L.      | Tree        |
| *Avicennia schauertiana* Stap and Leechm. ex Moldenke | Tree |
| Aizoaceae                          |             |
| *Sesuvium portulacastrum* (L.) L.  | Herb       |
| Amarantaceae                       |             |
| *Alternanthera brasiliana* (L.) Kuntze | Herb |
| *Alternanthera littoralis* P. Beauv. | Herb |
| *Alternanthera littoralis var. maritima* (Mart.) Pedersen | Herb |
| *Amaranthus viridis* L.            | Herb       |
| Blutaparon portulacoides (A.St.-Hil.) Mears | Herb |
| Froelichia humboldtiana (Roem. and Schult.) Seub. | Herb |
| Gomphrena demissa Mart.            | Herb       |
| Anacardiaceae                      |             |
| *Anacardium occidentale* L.        | Tree        |
| Apocynaceae                        |             |
| *Allamanda blanchetii* A.D.C.      | Shrub      |
| *Aspidosperma pyrifolium* Mart.    | Shrub      |
| Calotropis procera (Alton) W.T.Aiton | Shrub |
| Cryptostegia grandiflora Roxb. ex R. Br. | Shrub |
| Hancornia speciosa Gomes           | Tree        |
| Himatanthus drasticus (Mart.) Plumel | Tree |
| Matelea maritima subsp. ganglinosa (Vell.) Fontella (Figure 3A) | Creeper |
| Tabernaemontana catharinensis A.D.C. | Subshrub |
| Araceae                            |             |
| *Montrichardia linifera* (Arruda) Schott | Shrub |
| *Philodendron imbe* Schott ex Endl. | Shrub |
| Areceae                            |             |
| *Copernicia prunifera* (Mill.) H.E. Moore | Tree |
| Asteraceae                         |             |
| *Acmella oleacea* (L.) R.K. Jansen | Herb |
| Centratherum punctatum Cass.        | Herb       |

**Figure 2.** Frequency distribution of individuals in relation to life form of the species from coastal areas of Ceará state, Brazil.

**Figure 3.** Flowers and fruits of species from the restings of Ceará state, Brazil. A - *Matelea maritima* subsp. *ganglinosa* (Vell.) Fontella; B - *Ipomoea asarifolia* (Desr.) Roem. and Schult.; C - *Cnidoscolus urens* (L.) Arthur; D - *Bowdichia virgilioides* Kunth; E - *Copaifera lutzelsburgii* Harms; F - *Mimosa somnians* Humb. and Bonpl. ex Willd. G - *Stigmaphyllon viscosa* (L.) Sw; H - *Stigmaphyllon paralia* A. Juss.; I - *Ximenia americana* L.; J - *Passiflora foetida* L.; K - *Coutarea hexandra* (Jacq.) K. Schum.; L - *Lantana camara* L.
| FAMILIES / SPECIES       | HABIT  |
|--------------------------|--------|
| Delilila biflora (L.) Kuntze | Herb  |
| Eclipta alba (L.) Haenk. | Herb  |
| Elytris viscosea (L.) Les.s. | Herb  |
| Elephantopus hirtiflorus DC. | Herb  |
| Elephantopus mollis Kunth | Herb  |
| Mikania micrantha Kunth | Herb  |
| Stipnopappus trichosiphoides Mart. ex DC. | Herb  |
| Tanacetum vulgare L. | Herb  |
| Tilia baccata (L.) Pauksi | Herb  |
| Vernonia chalybaea Mart. ex DC. | Subshrub |
| Wedelia scaberrima Benth. | Herb  |
| **Bataceae**             |        |
| Batis maritima L. | Subshrub |
| **Bignoniaceae**         |        |
| Adenocalymma pedunculatum (Vell.) L. Lohmann | Herb  |
| Cassiparia argentea (Wawra) Sandwith | Creeper |
| Fridericia dispar (Bureau ex K. Schum.) L. Lohmann | Creeper |
| Fridericia platyphylla (Cham.) L.G. Lohmann | Creeper |
| Fridericia subverticillata (Bureau and K. Schum.) L.G. Lohmann | Creeper |
| Handroanthus impetiginosus Mattos | Tree  |
| Jacaranda brasiliana (Lam.) Pers. | Tree  |
| Jacaranda cuspidifolia Mart. | Tree  |
| Lundia cordata (Vell.) A. DC. | Creeper |
| Nejoibertia candelanea (Mart. ex DC.) Bureaus and K.Schum. | Creeper |
| Tabebuia roseoalba (Ridl.) Sandwith | Tree  |
| **Boraginaceae**         |        |
| Cordia oncocalyx Allemão | Tree  |
| Cordia rufescens A. DC. | Tree  |
| Heliotropium polyphyllum Lehmann | Subshrub |
| Varronia leucomalloides (Taroda) J.S. Mill. | Tree  |
| Varronia polycelopha Lam. | Subshrub |
| **Cactaceae**            |        |
| Cereus jamacaru DC. | Shrub  |
| **Capparaceae**          |        |
| Capparis flexuosa (L.) L. | Shrub  |
| **Chrysobalanaceae**     |        |
| Chrysobalanus icaco L. | Shrub  |
| Hirtella ciliata Mart. and Zucc. | Shrub  |
| Hirtella racemosa Lam. | Shrub  |
| **Combretaceae**         |        |
| Conocarpus erectus L. | Shrub  |
| **Commelinaceae**        |        |
| Commelina diffusa Burn.f. | Herb  |
| **Convolvulaceae**       |        |
| Cuscuta racemosa Mart. | Herb  |
| Evolvulus ovatus Fernald | Herb  |
| Ipomoea asarifolia (Desr.) Roem. and Schult. (Figure 3B) | Creeper |
| Ipomoea carnea Jacq. | Shrub  |
| Ipomoea pes-caprae (L.) R. Br. | Creeper |
| Jacquemontia sphaerostigma (Cav.) Rusby | Herb  |
| Merremia aegyptia (L.) Urb. | Herb  |
| **Cyperaceae**           |        |
| Bulbostylis capitallis (L.) C.B. Clarke | Herb  |
| Bulbostylis hirta (Thunb.) Svensson | Herb  |
| Bulbostylis junceiformis (Kunth) C.B. Clarke | Herb  |
| Bulbostylis juncoideus (Vahl) Kük. | Herb  |
| Cyperus aggregatus (Willd.) Endl. | Herb  |
| Cyperus amabilis Vahl | Herb  |
| **Euphorbiaceae**        |        |
| Acalypha villosa Jacq. | Herb  |
| Astraea lobata (L.) Klotzsch | Subshrub |
| Chamaesyce chamaeacaule (Weath.) Millsp. | Herb  |
| Cnidoscolus urens (L.) Arthur (Figure 3C) | Shrub  |
| Croton anisodontus Müll. Arg. | Shrub  |
| Croton glandulosus L. | Subshrub |
| Croton heliotropifolius Kunth | Shrub  |
| Croton jacobinensis Baill. | Shrub  |
| Croton nepetifolius Baill. | Shrub  |
| Croton pedicellatus Kunth | Subshrub |
Table 1. Continued.

| FAMILIES / SPECIES                          | HABIT     |
|--------------------------------------------|-----------|
| **Fabaceae**                               |           |
| Abrus precatorius L.                       | Creeper   |
| Aeschynomene brevipes Benth.               | Subshrub  |
| Aeschynomene evan in C. Wright ex Sauvalle| Subshrub  |
| Aeschynomene filosa Mart.                  | Shrub     |
| Aeschynomene histris Poir.                 | Herb      |
| Aeschynomene marginata Benth.              | Herb      |
| Aeschynomene rudis Benth.                  | Subshrub  |
| Aeschynomene sensitiva Sw.                 | Shrub     |
| Aeschynomene viscidula Michx.              | Subshrub  |
| Albizia insundata (Mart.) Barneby and JW.G.|
| Amburana caerulensis (Allemão) A.CSm.      | Tree      |
| Anadenanthera colubrina (Vell.) Brenan     | Tree      |
| Andira humilis Mart. ex Benth.             | Tree      |
| Andira surinamensis (Bondt) Splbg ex Amshoff| Tree    |
| Apuleia leiocarpa (Vogel) J.F.Macr.        | Tree      |
| Bauhinia dubia G. Don                      | Shrub     |
| Bauhinia pentandra (Bong.) Vogel ex Steud.| Shrub     |
| Bauhinia ungualata L.                      | Shrub     |
| Bowdichia virgilioides Kunth (Figure 3D)   | Tree      |
| Caesalpinia bracteosa Tul.                 | Tree      |
| Caesalpinia echinata Lam.                  | Tree      |
| Caesalpinia ferrea Mart.                   | Tree      |
| Caesalpinia pulcherina (L.) Sw.            | Shrub     |
| Caesalpinia pyramidalis Tul.               | Shrub     |
| Calliandra depauperata Benth.              | Subshrub  |
| Calliandra sessilis Benth.                 | Tree      |
| Calliandra spinosa Ducke                   | Shrub     |
| Calopogonion caeruleum (Benth.) C. Wright  | Tree      |
| Calopogonion mucunooides Desv.             | Creeper   |
| Canavalia brasilensis Mart. ex Benth.      | Herb      |
| Canavalia rosea (Sw.) DC.                   | Herb      |
| Cassia grandis L. f.                       | Tree      |
| Centrosema basilianum (L.) Benth.          | Creeper   |
| Centrosema paschourum Mart. ex Benth.      | Herb      |
| Centrosema rotundifolium Mart. ex Benth.   | Creeper   |
| Centrosema sagittatum (Humb. and Bonpl. ex Willd.) | Herb   |
| Brandegee                                  | Herb      |
| Centrosema virginianum (L.) Benth.         | Creeper   |
| Chamaecrista calycoides (DC. ex Collad.) Greene | Herb |
| Chamaecrista desvauxii (Collad) Killip     | Herb      |
| Chamaecrista diphylla (L) Greene           | Subshrub  |
| Chamaecrista ensiformis (Vell.) H.S. Irwin and Barneby | Tree |
| Chamaecrista flexuosa (L) Greene           | Subshrub  |
| Chamaecrista hispidula (Vahl) H.S. Irwin and Barneby | Herb |
| Chamaecrista ramosa (Vogel) H.S. Irwin and Barneby | Herb |
| Chamaecrista rotundifolia (Pers.) Greene   | Subshrub  |
| Chamaecrista supplex (Mart. ex Benth.) Britton and Rose ex Britton and Killip | Herb |

Table 1. Continued.

| FAMILIES / SPECIES                          | HABIT     |
|--------------------------------------------|-----------|
| Chamaecrista trichopoda (Benth.) Britton and Rose ex Britton and Killip | Herb |
| Chloroleucon accoides (Ducke) Barneby and JW.G. | Tree |
| Clistoria farcellidadina R.A. Howard       | Tree      |
| Clistoria laurefalia Poir.                 | Shrub     |
| Copaifera arenicola (Ducke) J.Costa and L. Queiroz | Tree |
| Copaifera lutezollburgii Harms (Figure 3E) | Shrub     |
| Crotalaria argentea (Desv.) Kuntze         | Shrub     |
| Crotalaria incana L.                       | Herb      |
| Crotalaria pallida Alton                   | Herb      |
| Crotalaria retusa L.                       | Shrub     |
| Crotalaria stipularia Desv.                | Herb      |
| Dalbergia caereensis Ducke                 | Shrub     |
| Dalbergia castastphilum (L.) Taub.         | Shrub     |
| Dalbergia frutescens (Vell.) Britton       | Tree      |
| Desmodium barbatum (L.) Benth.             | Herb      |
| Desmodium triforum (L.) DC.                | Herb      |
| Dioclea laesiophylla Mart. ex Benth.       | Subshrub  |
| Dioclea scheracarpa Ducke                  | Creeper   |
| Dioclea violacea Mart. ex Benth.           | Shrub     |
| Enterolobium contortisiliquim (Vell) Morong| Tree      |
| Galactia striata (Jacq.) Urb.              | Creeper   |
| Geoffroea spinosa Jacq.                    | Tree      |
| Guilandina bonduc L.                       | Shrub     |
| Hymenaea courbaril L.                      | Tree      |
| Hymenaea martiana Hayne                    | Shrub     |
| Indigofera hirsuta L.                      | Shrub     |
| Indigofera microcarpa Desv.                | Subshrub  |
| Indigofera suffraticosa Mill.              | Shrub     |
| Inga ingoides (Rich.) Willd.               | Tree      |
| Inga vera Willd.                           | Tree      |
| Leptolobium dasycarpum Vogel               | Tree      |
| Leptolobium parvifolium (Harms) Sch.Rodr. and A.M.G. | Tree |
| Azevedo                                    | Tree      |
| Lonchocarpus araripensis Benth.            | Tree      |
| Luetzelburgia auriculata (Allemão) Ducke   | Tree      |
| Macroptilium lathyroides (L.) Urb.         | Subshrub  |
| Macroptilium panduratum (Mart. ex Benth.) Maréchal and Baudet | Herb |
| Mimosa acutistipula (Mart.) Benth.         | Tree      |
| Mimosa arenosa (Willd.) Poir.              | Shrub     |
| Mimosa caesalpinifolia Benth.              | Shrub     |
| Mimosa camporum Benth.                     | Shrub     |
| Mimosa hirsutissimo Mart.                  | Shrub     |
| Mimosa misera Benth.                       | Subshrub  |
| Mimosa paraibana Barneby                   | Shrub     |
| Mimosa pigra L.                            | Shrub     |
| Mimosa somnians Humb. and Bonpl. ex Willd. (Figure 3F) | Subshrub |
| Mimosa tenusflora (Willd.) Poir.           | Shrub     |
| Macuna sloanei Fawc. and Rendle            | Herb      |
| Neptunia oleracea Lour.                    | Subshrub  |
| Neptunia plena (L.) Benth.                 | Subshrub  |
| Parkinsonia aculeata L.                    | Tree      |
| Piptadenia stipulacea (Benth.) Ducke       | Shrub     |
| Piptadenia viridiata (Kunth) Benth.        | Shrub     |
| Pithecolobium diversifolium Benth.         | Shrub     |
| Pithecolobium dulce (Roxb.) Benth.         | Tree      |
| Pityrocarpa moniliformis (Benth.) Luckow and R.W.  | Shrub |
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### Table 1. Continued.

| FAMILIES / SPECIES | HABIT |
|--------------------|-------|
| **Families / Species** | **Habit** |
| Platythamnia reticulata Benth. | Tree |
| Platythamnia floribunda Vogel | Tree |
| Pappoipogon procera C. Presl | Tree |
| Pterogyne nitens Tul | Tree |
| Rhyzochnos phaseoloides (Sw.) DC. | Creeper |
| Senegalia polyphylla (DC.) Britton and Rose | Tree |
| Senna alata (L.) Rosb. | Shrub |
| Senna macranthera (DC. ex Collad.) H.S. Irwin and Barneby | Tree |
| Senna obtusifolia (L.) H.S. Irwin and Barneby | Herb |
| Senna occidentalis (L.) Link | Herb |
| Senna rizzinii H.S. Irwin and Barneby | Tree |
| Senna splendida (Vogel) H.S. Irwin and Barneby | Shrub |
| Sesbania exasperata Kunth | Shrub |
| Sophora tomentosa L. | Shrub |
| Stylosanthes angustifolia Vogel | Subshrub |
| Stylosanthes capitata Vogel | Subshrub |
| Stylosanthes scabra Vogel | Subshrub |
| Stylosanthes viscosa (L.) Sw. (Figure 3G) | Subshrub |
| Tephrosia cinerea (Benth.) Ducke | Tree |
| Vigna peduncularis (Kunth) Fawc. and Rendle | Creeper |
| Zapoteca portoricensis Jacq. | Subshrub |
| Zornia orbiculata | Herb |
| Zornia latifolia Sm. | Herb |
| Zornia cearensis | Herb |
| Zornia exasperata | Shrub |
| Lamiales |
| Aegiphila verticillata Vell. | Shrub |
| Morsipiana chamaedryx (Vahl) Kuntze | Herb |
| Vitex flavens Kunth | Tree |
| Lythraceae |
| Cuphea compestris Koehne | Herb |
| Malpighiaceae |
| Byrsonima crassifolia (L.) Kunth | Shrub |
| Byrsonima gardneriana A. Juss. | Tree |
| Byrsonima sericea DC. | Tree |
| Byrsonima verbascifolia (L.) DC. | Shrub |
| Stigmaphyllon bannisteroides (L.) C.E. Anderson | Herb |
| Stigmaphyllon paralias (L.) Kunth | Subshrub |
| Malvaceae |
| Luehea candicans Mart. and Zucc. | Tree |
| Pavia cancelata (L.) Cav. | Herb |
| Pavia varians Moric. | Herb |
| Peltophorum pterocarpum (C. Presl) Krapov.Cristóbal. | Subshrub |
| Sida angustissima Miq. | Herb |
| Sida ciliaris L. | Herb |
| Sida galheiensis Ulbr. | Herb |
| Sida glomerata Cav. | Herb |
| Sida rhombifolia L. | Subshrub |
| Sida tuberculata R.E.Fr. | Herb |
| Melastomataceae |
| Mouriri ceranesis Huber | Tree |
| Mouriri guianensis Aubl | Tree |
| Molluginaceae |
| Mollugo verticillata L. | Herb |
| Moraceae |
| Macrura tinctoria (L.) D. Don ex Steud. | Tree |
| Myrtaceae |
| Eugenia laschmanniana (O. Berg) Klotzsch ex B. D. Jacks. | Shrub |
| Eugenia tapacumensis O. Berg | Shrub |
| Myrcia guianensis (Aubl.) DC. | Shrub |
| Myrcia multiflora (Lam.) DC. | Tree |
| Psidium guyanense Pers. | Shrub |
| Olacaceae |
| Ximenia americana L. (Figure 3I) | Shrub |
| Passifloraceae |
| Passiflora cincinnata Mast. | Creeper |
| Passiflora foetida L. (Figure 3J) | Creeper |
| Passiflora subrubrota Mast. | Creeper |
| Phyllanthaceae |
| Phyllanthus tenellus Rosb. | Herb |
| Poaceae |
| Andropogon bicornis L. | Herb |
| Andropogon fastigiatus Sw. | Herb |
| Andropogon leucostachyus Kunth | Herb |
| Andropogon selloanus (Hack.) Hack | Herb |
| Anthephora hermaphroditae (L.) Kuntze | Herb |
| Aristida adscensionis | Herb |
| Aristida longifolia Trin. | Herb |
| Aristida setifolia Kunth | Herb |
| Axonopus capillaris (Lam.) Chase | Shrub |
| Axonopus marginatus (Trin.) Chase | Shrub |
| Cenchrus ciliaris | Herb |
| Cenchrus echinatus | Herb |
| Chaetium festucoides | Nees |
| Chloris barbata Sw. | Herb |
| Chloris virgata Sw. | Herb |
| Cyphonanthus discrepans (Döll) Zuloaga and Morrone | Herb |
| Dactyloloenium aegyptium (L.) Wild. | Herb |
| Dichanthelium sirotris (Trin.) Davidse | Herb |
| Digitaria aequilumis (Hack. and Arechav.) Parodi | Herb |
| Digitaria ciliaris (Retz.) Koeler | Herb |
| Digitaria horizontalis | Wild. |
| Eleusine indica (L.) Gaertn. | Herb |
| Eragrostis ciliaris (L.) B. Tr. | Herb |
| Eragrostis maypurensis (Kunth) Steud. | Herb |
| Eragrostis ruifescens Schrd. ex Schult. | Herb |
| Eragrostis scaliagera Salzm. ex Steud. | Herb |
| Eriochloa polyystachya Kunth | Herb |
| Eriochloa punctata (L.) D. Desv. ex Ham. | Herb |
| Gymnopogon foliosa (Wild.) Nees | Herb |
| Ischaemum rugosum Salisb. | Herb |
| Mesosetum loliiforme (Hochst. ex Steud.) Chase | Herb |
| Mesosetum pappophorum (Nees) Kuhlm. | Herb |
| Oplismenus burmannii (Retz.) P. Beauv. | Herb |
| Panicum aquaticum Poir. | Herb |
| Panicum trichoides Sw. | Herb |
| Paspalidium geminatum (Forsk.) Stapf | Herb |
| Paspalum claviferum C. Wright | Herb |
| Paspalum convexum Humb. and Bonpl. ex Flüggé | Herb |
| Paspalum densum Poir. | Herb |
| Paspalum maritimum Trin. | Herb |
| Paspalum pleistachyum Döll | Herb |
| Paspalum scutatum Nees ex Trin. | Herb |
| Paspalum vaginatum Sw. | Herb |
| Sporobolus virginicus (L.) Kunth | Herb |
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| Table 1. CONTINUED. |
|---------------------|
| **FAMILIES / SPECIES** | **HABIT** |
| Steiraechne diandra Ekman | Herb |
| Urochloa plantaginea (Link) R.D. Webster | Herb |
| Polygalaceae | |
| Polygala gracilis Kunth | Herb |
| Rhamnaceae | |
| Ziziphus joaazeiro Mart. | Tree |
| Rubiaceae | |
| Alibertia rigida K.Schum. | Subshrub |
| Alibertia edulis (Rich.) A. Rich. ex DC | Shrub |
| Alsie floribunda Schott | Tree |
| Borreria ocyoides (Burm.f.) DC | Herb |
| Borreria latifolia (Aubl.) K.Schum. | Herb |
| Borreria scabiosoides Cham. and Schltdl. | |
| Borreria verticillata (L) G.Mey. | |
| Chloccocca olbo (L) Hichc. | Shrub |
| Chloococca nitida Benth. | |
| Chomelia martiana Müll. Arg. | Tree |
| Chomelia obtusa Cham. and Schltdl. | Shrub |
| Coutarea hexandra (Jacq.) K.Schum. (Figure 3K). | Shrub |
| Diodella apiculata (Wild. ex Roem. and Schult.) Delprete | Herb |
| Diodella radula (Wild. ex Roem. and Schult.) Delprete | Herb |
| Diodella teres (Walter) Small | Herb |
| Faramea nitida Benth. | |
| Genipa americana L. | Tree |
| Guettarda platypoda DC. | Shrub |
| Guettarda viburnioides Cham. and Schltdl. | Shrub |
| Machaonia brasiliensis (Hoffmanns. ex Humb.) Cham. and Schltdl. | Shrub |
| Manettia cordifolia Mart. | Creeper |
| Margaritopsis carrascoana (Delprete and E.B.Souza) C.M.Taylor and E.B.Souza | Subshrub |
| Mitracarpus frigidus (Wild. ex Roem. and Schult.) K. Schum. | |
| Randia armata (Sw) DC | Shrub |
| Richardia grandiflora (Cham. and Schltdl) Steud. | Herb |
| Stangelia galoides DC. | Subshrub |
| Tocoyena sellowiana (Cham. and Schltdl.) K. Schum. | |
| Solanaceae | |
| Solanum paludosum Moric. | Shrub |
| Turneraceae | |
| Turneria calyptracarpa Urb. | Herb |
| Turneria diffusa Wild. ex. Schult. | Herb |
| Turneria melochioides Cambess | |
| Turneria subulata Sm. | Herb |
| Verbenaceae | |
| Lantana camara L. (Figure 3L) | Shrub |
| Lippia alba (Mill) N.E. Br. | |
| Stachyrapheta cayennensis (Rich.) Vahl | Subshrub |
| Violaceae | |
| Hybanthus calceolaria (L) Oken | Herb |
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