

Flora of Apid Island, Inopacan, Leyte, Philippines

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ABSTRACT

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The study was conducted to determine the floristic composition of Apid Island and describe the plants' growth habits and life forms. Three ecological "sub-units" were identified and compared using the Index of Similarity.

A total of 105 plant species representing 39 families was found but only 89 were identified to the species level. Most of the plants were therophytes (herbs and grasses) and phanerophytes (trees and shrubs). Ten species adapted to karst or limestone substrates, which is typical in the island, were identified. Commonness of species between sub-units is not remarkable.

Keywords: Apid Island. diversity. flora. growth habit. life form. similarity index.

INTRODUCTION

The world is losing plants at a faster rate than ever before in geological history. Trees, which were at one time important components of forests, are disappearing. Shrubs and herbs unique to a particular region are reduced by habitat destruction. The continuing process of habitat

destruction is mainly due to the destructive influence of logging (licensed or illegal) and land-use practices such as kaingin farming, fire-maintained pasture and harvesting of non-timber forest products (Mallari *et al.*, 2000). Too much pressure on the environment is driven by the demands of the growing human population, widespread poverty, and the political economy of lowland agriculture. Clearly, if natural resources exploitation and exhaustion continue, the situation will lead to an irreversible loss of biodiversity and species extinction.

The small islands, which constitute a world of treasure within the Southeast Asian archipelago, are no exemption to this alarming pressure. These specialized environments, which were once rich in natural resources, are also exploited and exhausted. No matter how small these islands may be, they can house a variety of plant and animal species.

Apid Island is one of the Cuatro Islas- a group of small islands in the Camotes Sea, west of Inopacan, Leyte. It has a total land area of only about 35 hectares. The island is characterized by vegetation found over karst or limestone substrates with poor water holding capacity and poor nutrient availability. Apid as well as the other two islands, Mahaba and Digyo, is part of the Small Islands Environmental Rehabilitation and Livelihood Program, a ViSCA-gtz program that promotes environmental protection and rehabilitation, and biodiversity conservation. However, the program focused mainly on marine resources of the island.

The main objective of the study conducted was to generate baseline information on the floristic composition of the island, which is important for its management. Specifically, it aimed to identify the existing species of plants and describe them in terms of growth habits and life forms; and determine the commonness of species in different ecological 'sub-units' identified.

MATERIALS AND METHODS

Transect walks were conducted around the island to identify and define different ecological 'sub-units'. Data collections were made in the three ecological sub-units identified. The first sub-unit is a limestone area characterized by a rocky substrate on the hilly portion of the island. The second

sub-unit, on the other hand, is the patches of cultivated land characterized by the dominance of agricultural crops and secondary growth forest vegetation on shallow soils in the middle of the island. Finally, the third sub-unit is the sandy beach along the coast.

Species of plants in each ecological sub-unit were collected and identified. The index of similarity by Jaccard, as cited by Mueller-Dombois and Ellenberg (1974), was calculated to determine the commonness of species in the three areas. The number of occurrence of plant species per sub-unit, however, was not considered.

The growth habit of individual plant species was determined. Furthermore, each plant was classified according to its life form. The classification of plants by life form (therophytes, phanerophytes, cryptophytes, hemicryptophytes, chamaephytes) was based on the criteria presented by Raunkiaer (1937), as cited by Ricklefs (1990). The following literatures were also consulted for plant identification: Baertels (1993), De Guzman *et al.* (1986), Editorial Committee of the Flora of Taiwan (1993), Haefliger & Scholz (1980, 1981 & 1982), Henderson (1954), Holttum (1966), Keung (1990), Merrill (1967), Rehm & Espig (1991), Salvosa (1963), Sauerborn & Sauerborn (1984), and Van Steenis (1978).

RESULTS AND DISCUSSION

Species composition and index of similarity

Altogether, 105 different species of plants belonging to 39 families were found in the study site. Only 89, however, were identified to species level (Appendix A). The most represented families are Poaceae, Euporbiaceae and Fabaceae.

Among the three ecological sub-units studied, the second is found the most diverse. It contains 48 different species of plants, 32 of which are exclusively noted in that sub-unit (Appendix B). This is because the area contains remnants of the original forest cover, species of the early successional stage, as well as the cultivated crops and their associated

weeds, an indication that the area is disturbed. Cultivated plants include *Ananas comusus*, *Anona squamosa*, *Artocarpus altilis*, *A. heterophylla*, *Carica papaya*, *Cocos nucifera*, *Cucurbita maxima*, *Dioscorea alata*, *Manihot esculenta*, *Moringa oleifera*, *Morinda citrifolia*, *Musa x paradisiaca*, *Pandanus* sp., and *Psidium guajava*. The least diverse sub-unit, on the other hand, is the first sub-unit wherein only 26 species were found (Appendix C). Yet 11 exclusively found species in the area, including a tree that dominates natural forests over limestone, *Vitex parviflora*, were found. The rocky substrate in this sub-unit explains why there were only few species found.

There were only four species common to all sub-units (Appendix B-D). These are *Morinda citrifolia*, *Acalpha indica*, *Passiflora foetida* and *Phyllanthus amarus*. This implies that they can thrive in a wider range of habitat than the rest. The presence of *M. citrifolia* in all sub-units, however, may be attributed to its cultivation. Local people usually grow *M. citrifolia* and sell the fruit, which is believed to cure cancer.

In a personal communication with Dr. J. Quimio of the Vegetation Science of the Department of Forestry in ViSCA, he identified ten species well adapted to karst or limestone substrate. These are *Chloris barbata*, *Chromolaena odorata*, *Cynodon dactylon*, *Tridax procumbens*, *Euphorbia heterophylla*, *Ipomea pes-caprae*, *V. parviflora*, *M. citrifolia*, *Biophytum sensitivum* and *Kalanchoe integra*. These plants were also observed in other limestone areas in Leyte characterized by soil of poor water holding capacity and nutrients availability.

Table 1 shows the index of similarity calculated for the species found in the three ecological units. The similarity index is based on the presence-absence relationship between the number of species common to two areas or sub-units and the total number of species found. Results shows that

Table 1. Index of similarity for plant species found in the three ecological sub- units

Ecological Sub-Unit	Index of Similarity
1 and 2	9.0
1 and 3	6.6
2 and 3	13.0

units 2 and 3 are the most similar in terms of species composition. The least similarity, on the other hand, was observed in units 1 and 3.

Growth habit and life form

Figure 1 shows that most plants are herbaceous (27%). Trees and shrubs only constitute 19% and 12%, respectively. Since trees and shrubs are usually of low stature and scattered around the island, closed canopy is not formed. Thus, the soils are generally exposed to the sun and only those drought resistant plants are usually found. Grasses also dominate representing 12% of the plants found. Only a small proportion of climbers (10%), creepers (4%) and other

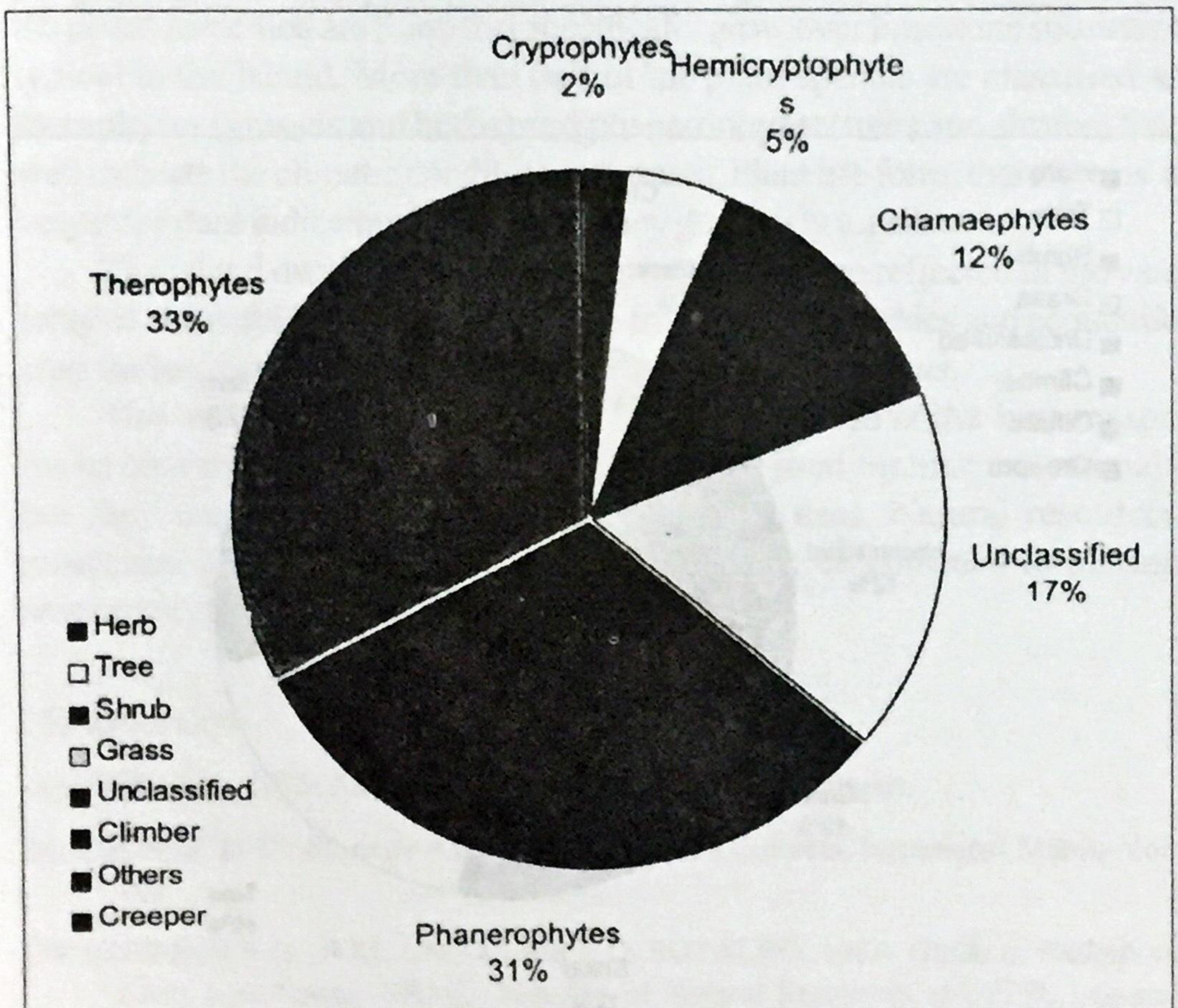


Figure 1. Growth habits of plants found in Apid Island

forms, i.e., strangler, palm, and fern (4%) were represented. There were also other plants (12%) whose growth habits are not identified.

Life form of plants is based on the position of their buds or regenerating parts which corresponds closely to climatic condition (Ricklefs, 1990). Therophytes, for instance, are those that die during unfavorable season of the year and do not have persistent buds. They are regenerated solely by seeds which resist extreme cold and drought. The therophyte form includes most annual plants. Phanerophytes, on the other hand, are those that carry their buds on the tips of the branches where they are exposed to extremes of climate. Most of them are trees and large shrubs. Chamaephytes comprise small shrubs and herbs that grow close to the ground and that proximity to the soil protects the bud. Results of the study show that most of the plants are therophytes,

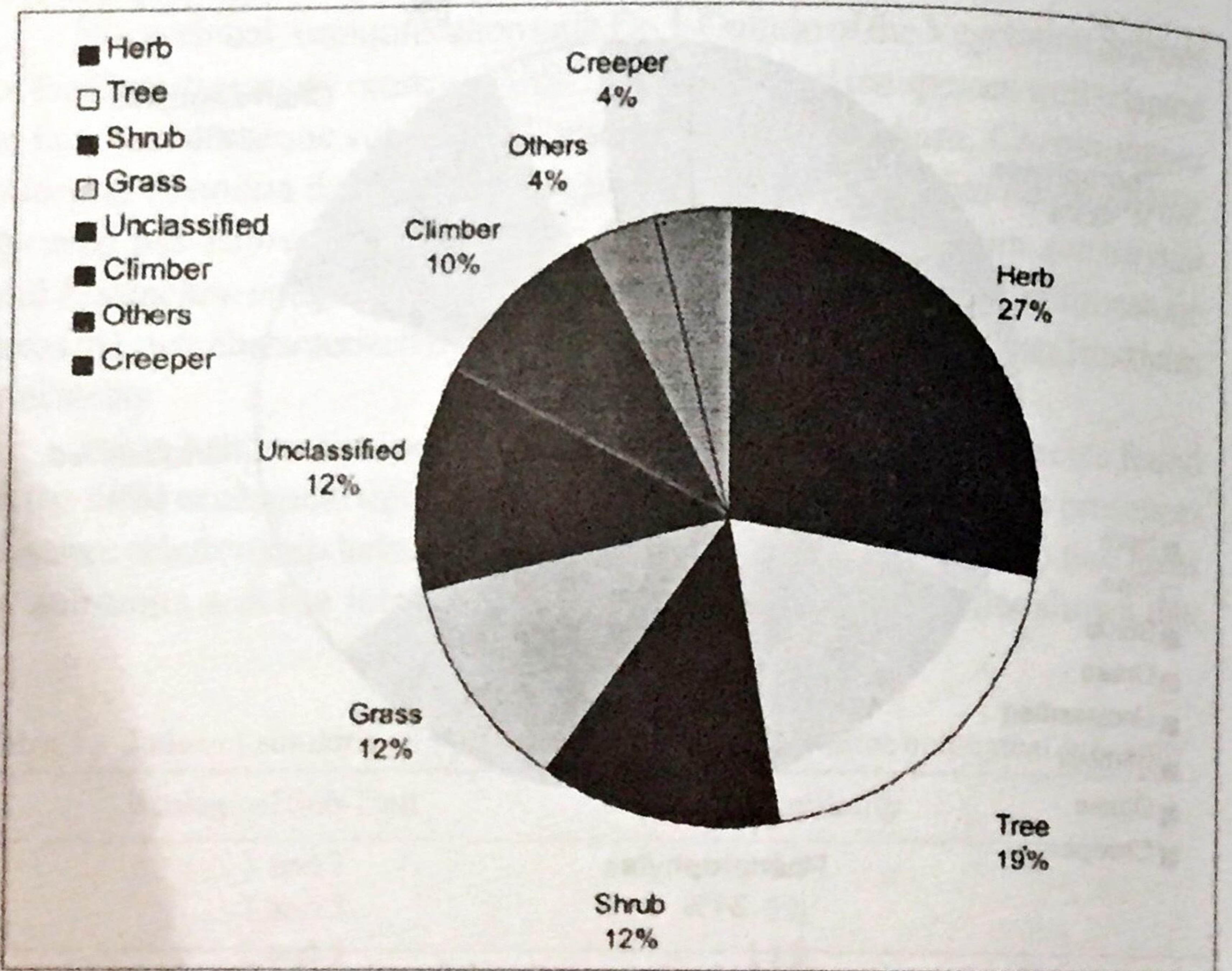


Figure 2. Life forms of plants found in Apid Island

33% and phanerophytes, 31% (Figure 2). Unfortunately, 17% of the plants are still unclassified. Chamaephytes (12%), hemicryptophytes (5%) and cryptophytes (2%), however, were not common, a condition typical in tropical regions. Growth habits and life forms of plants found in Apid Island are summarized in Appendix E.

CONCLUSION

The flora of Apid Island is not as diverse as the flora of the mainland. The island roughly contains three species of plants in a hectare of land. However, high endemism of plants is remarkable because of the distinct type of vegetation in the island. Like in most limestone areas, some of the plants identified are those that specifically grow over limestone substrates typical in the island. More than half of the plant species are classified as therophytes (grasses and herbs) and phanerophytes (trees and shrubs) that well indicate the climatic condition in the area. Plant life form, therefore, is a very important indicator of climate for they go closely together.

The island dwellers' interest in agriculture is also reflected in the vast array of crops cultivated. These include fruit trees, vegetables and economic crop for handicraft (mats and bags) production as *Pandanus*.

The unique vegetation type of this small island is the best reason for its conservation. Plants do not only provide food for man and animals but they may also carry along other essential uses. Natural resources protection and rehabilitation, hence, should not be confined to marine resources alone.

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Appendix A. Floral species found in Apid Island.

- Annonaceae: *Annona squamosa* L., *Annona squamosa* L.
 Apocynaceae: *Plumeria rubra* L.
 Arecaceae: *Cocos nucifera* L.
 Asteraceae: *Chromolaena odorata* (L.); *Mikania micrantha* H.B.K.; *Synedrella nodiflora* R.Br.; *Tridax procumbens* L.; *Vernonia cinerea* L.; *Wedelia trilobata* Juss.
 Bromeliaceae: *Ananas comosus* (L.) Merr.
 Caricaceae: *Carica papaya* L.
 Combretaceae: *Terminalia catappa* (Jacq.)
 Convolvulaceae: *Ipomoea pes-capre* (L.);
 Crassulaceae: *Kalanchoe integra* (Medik).
 Cucurbitaceae: *Cucurbita maxima* Duch.; *Momordica charantia* L.
 Cyperaceae: *Cyperus* sp.; *Scleria lithosperma* (L.)
 Dioscoreaceae: *Dioscorea alata* (L.)
 Euphorbiaceae: *Acalypha indica* L.; *Breynia* sp.; *Euphorbia Glomerifera* (Millsp.)
E. hirta L.; *Glochidion cf. Rubrum* Blume; *Macaranga tanarius* (L.) MA; *Manihot esculenta* Crantz; *Phyllanthus amarus* Sch.Thon.
 Fabaceae: *Abrus precatorius* L.; *Cassia occidentalis* L.; *Centrosema pubescens* Bth; *Crotalaria* sp.; *Crotalaria* sp.; *Derris* sp.; *Desmodium* sp.; *Glyricidia sepium* (Jacq); *Leucaena leucocephala* (Lamarck)
 Goodeniaceae: *Scaevola taccada* (Gaerthn.)
 Lauraceae: *Cassytha* sp.
 Lecythidaceae: *Barryngtonia asiatica* (L) Kwz.
 Malvaceae: *Sida acuta* Burm.; *S. cordifolia* L. Sp. Pl.; *S. rhombifolia* L.
 Meliaceae: *Melia dubia* Cav.
 Moraceae: *Artocarpus altilis* (Park) Fosb.; *A. heterophylla* Lmk.; *Ficus* spp.; *Ficus ulmifolia* Lawk
 Moringaceae: *Moringa oleifera* Blco.
 Musaceae: *Musa x paradisiaca* L.
 Myrtaceae: *Psidium guajava* L.
 Orchidaceae: *Geodora cf. Nutans*
 Oxalidaceae: *Biophytum sensitivum* (L.) DC
 Pandanaceae: *Pandanus* sp.
 Passifloraceae: *Passiflora foetida* L.
 Piperaceae: *Piperomia* sp.; *Peperonia* sp.
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Appendix A. cont.

Poaceae:	<i>Axonopus compressus</i> (Sw); <i>Brachiaria reptans</i> (L); <i>Cenchrus echinatus</i> L.; <i>Chloris barbata</i> Sw.; <i>Cyanodon dactylon</i> (L) Pers; <i>Digitaria setigera</i> Roem Schult; <i>D. ternata</i> (Rich) Staph; <i>Eleusine indica</i> (L) Gaertn.; <i>Eragrostis aspera</i> (Jacq) Mees; <i>Imperata cylindrica</i> L. Raeusch.
Polygonaceae:	<i>Talinum triangulare</i> (L.) Gaertn.
Polypodiaceae:	<i>Phymatosorus longissima</i> (Bl.)
Rubiaceae:	<i>Hedyotis biflora</i> Ioxa cf. <i>Granflora</i> Ker.; <i>Morinda citrifolia</i> L.; <i>Psychotria</i> sp.; <i>Spermacoce alata</i> Aubd.; <i>S. assurgens</i> R. & P.
Rutaceae:	<i>Triphasia</i> sp.
Solanaceae:	<i>Datura stramonium</i> L.; <i>Physalis angulata</i> L.
Sterculiaceae:	<i>Sterculia cf stipularis</i>
Tiliaceae:	<i>Triumfetta bartramia</i>
Ulmaceae:	<i>Celtis philippensis</i> Blco.
Urticaceae:	<i>Pilea microphylla</i> (L.) Liebm
Verbenaceae:	<i>Premna cf odorata</i> (Blco.) L.; <i>Stachytarpheta jamaicensis</i> (L.) <i>Vitex parviflora</i> (L.) Less.

Appendix B. Plant species found in sub-unit 2.

<i>Acalypha indica</i>	<i>Glochidion rubrum</i>
<i>Ananas comusus</i> **	<i>Imperata cylindrica</i>
<i>Annona squamosa</i> **	<i>Kalanchoe integra</i>
<i>Artocarpus altilis</i>	<i>Leucaena leucocephala</i>
<i>Artocarpus heterophylla</i> **	<i>Manihot esculenta</i> **
<i>Axonopus compressus</i> **	<i>Melia dubia</i> **
<i>Biophytum sensitivum</i> **	<i>Mikania micrantha</i> **
<i>Breynia</i> sp.**	<i>Momordica charantia</i> **
<i>Carica papaya</i>	<i>Morinda citrifolia</i>
<i>Centrosema pubescens</i>	<i>Musa x paradisiaca</i> **
<i>Chloris barbata</i> **	<i>Pandanus</i> sp.
<i>Chromolaena odorata</i> **	<i>Passiflora foetida</i>
<i>Cocos nucifera</i>	<i>Phyllanthus amarus</i>
<i>Crotalaria</i> sp.**	<i>Physalis angulata</i> **
<i>Cyperus</i> sp.**	<i>Psidium guajava</i> **
<i>Derris</i> sp.**	<i>Sida acuta</i> **
<i>Desmodium</i> sp.**	<i>Spermacoce alata</i> **

Appendix B. cont.

<i>Digitaria setigera</i> **	<i>Spermacoce assurgens</i>
<i>Digetaria ternata</i>	<i>Stachytarpheta jamaicensis</i> **
<i>Dioscorea alata</i> **	<i>Synedrella nodiflora</i> **
<i>Eragrostis aspera</i> **	<i>Talinum traingulare</i> **
<i>Euphorbia heterophylla</i>	<i>Tridax procumbens</i>
<i>Euphorbia hirta</i>	<i>Triumfetta bartramia</i> **
<i>Geodora cf nutans</i>	<i>Vernonia cinerea</i> **

** Exclusively found in sub-unit 2

Appendix C. Plant species found in sub-unit 1.

<i>Abrus precatorius</i> *	<i>Ixora cf grandiflora</i> *
<i>Acalypha indica</i>	<i>Kalanchoe integra</i>
<i>Artocarpus altilis</i>	<i>Macaranga tanarius</i> *
<i>Celtis philippensis</i> *	<i>Morinda citrifolia</i>
<i>Cocos nucifera</i>	<i>Passiflora foetida</i>
<i>Ficus</i> sp. (1)	<i>Peperomia</i> sp.*
<i>Ficus</i> sp. (2)	<i>Phyllanthus amarus</i>
<i>Ficus</i> sp. (3)	<i>Phymatosorus longissima</i> *
<i>Ficus</i> sp. (4)	<i>Pilea microphylla</i> *
<i>Ficus</i> sp. (5)	<i>Plumeria rubra</i> *
<i>Ficus ulmifolia</i> *	<i>Psychotria</i> sp.*
<i>Glochidion cf. Rubrum</i>	<i>Triphasia</i> sp.*
<i>Imperata cylindrica</i>	<i>Vitex parviflora</i> *

* Exclusively found in sub-unit 1

Appendix D. Plant species found in sub-unit 3

<i>Acalypha indica</i>	<i>Leucaena leucocephala</i>
<i>Barringtonia asiatica</i> ***	<i>Morinda citrifolia</i>
<i>Brachiaria reptans</i> ***	<i>Moringa oleifera</i> ***
<i>Carica papaya</i>	<i>Pandanus sp.</i>
<i>Cassia occidentalis</i> ***	<i>Passiflora foetida</i>
<i>Cassytha sp.</i> ***	<i>Phyllanthus amarus</i>
<i>Cenchrus echinatus</i> ***	<i>Premna cf odorata</i> ***
<i>Cucurbita maxima</i> ***	<i>Scaevola taccada</i> ***
<i>Cynodon dactylon</i> ***	<i>Scleria lithosperma</i> ***
<i>Datura stramonium</i> ***	<i>Sida cordifolia</i> ***
<i>Eleusine indica</i> ***	<i>Sida rhombifolia</i> ***
<i>Euphorbia glomerifera</i> ***	<i>Spermacoce assurgens</i>
<i>Euphorbia heterophylla</i>	<i>Stachytapheta jamaicensis</i> ***
<i>Euphorbia hirta</i>	<i>Sterculia cf stipularis</i> ***
<i>Ficus sp. (6)</i>	<i>Terminalia catappa</i> ***
<i>Glyricidia sepium</i> ***	<i>Tridax procumbens</i>
<i>Hedyotis beflora</i> ***	<i>Wedelia trilobata</i> ***
<i>Ipomea pes-caprae</i> ***	

* Exclusively found in sub-unit 1

Appendix E. Growth habits and life forms of plants found in Apid Island

Species	Growth habit	Life form
1. <i>Abrus precatoris</i>	climber	Chamaephyte
2. <i>Acalypha indica</i>	herb	Therophyte
3. <i>Ananas comusus</i>	herb	Hemicryptophyte
4. <i>Annona squamosa</i>	tree	Phanerophyte
5. <i>Artocarpus altilis</i>	tree	Phanerophyte
6. <i>Artocarpus heterophylla</i>	tree	Phanerophyte
7. <i>Anoxopus compressus</i>	grass	Therophyte
8. <i>Barringtonia asiatica</i>	tree	Phanerophyte
9. <i>Biophytum sensitivum</i>	herb	Hemicryptophyte
10. <i>Brachiaria reptans</i>	grass	Therophyte
11. <i>Breynia sp.</i>	herb	-
12. <i>Carica papaya</i>	tree	Phanerophyte
13. <i>Cassia occidentalis</i>	shrub	Phanerophyte
14. <i>Cassytha sp.</i>	climber	Chamaephyte
15. <i>Celtis philippeninsis</i>	tree	Phanerophyte
16. <i>Cenchrus echinatus</i>	grass	Therophyte

Appendix E. cont.

17. <i>Centrosema pubesens</i>	climber	Chamaephyte
18. <i>Chloris barabata</i>	grass	Throphyte
19. <i>Chromolaena odorata</i>	herb	Therophyte
20. <i>Cocos nucifera</i>	palm	Phanerophyte
21. <i>Crotalaria sp.</i>	herb	Therophyte
22. <i>Cucurbita maxima</i>	creeper	Chamaephyte
23. <i>Cynodon dactylon</i>	grass	Cyptophyte
24. <i>Cyperus sp.</i>	grass	Therophyte
25. <i>Datura stramonium</i>	shrub	Phanerophyte
26. <i>Derris sp.</i>	climber	Chamaephyte
27. <i>Desmodium sp.</i>	climber	Therophyte
28. <i>Digitaria setigera</i>	grass	Therophyte
29. <i>Digitaria ternata</i>	grass	Therophyte
30. <i>Diocorea alata</i>	climber	Therophyte
31. <i>Eleusine indica</i>	grass	Therophyte
32. <i>Eragrostis aspera</i>	grass	Therophyte
33. <i>Euphorbia glomerifera</i>	herb	Therophyte
34. <i>Euphorbia heterophylla</i>	herb	Therophyte
35. <i>Euphorbia hirta</i>	herb	Therophyte
36. <i>Ficus sp. (1)</i>	tree	Phanerophyte
37. <i>Ficus sp. (2)</i>	strangler	Phanerophyte
38. <i>Ficus sp. (3)</i>	tree	Phanerophyte
39. <i>Ficus sp. (4)</i>	-	Phanerophyte
40. <i>Ficus sp. (5)</i>	-	Phanerophyte
41. <i>Ficus sp. (6)</i>	-	Phanerophyte
42. <i>Ficus olmifolia</i>	shrub	Phanerophyte
43. <i>Geodora cf. Nutans</i>	herb	Cryptophytes
44. <i>Glochidon cf. Rubrum</i>	shrub	Phanerophyte
45. <i>Glyricidia sepium</i>	shrub	Phanerophyte
46. <i>Hedyotis beflora</i>	herb	Therophyte
47. <i>Imperata cylindrica</i>	grass	Hemicryptophyte
48. <i>Ipomea pes caprae</i>	creeper	Chamaephyte
49. <i>Oxora cf. Grandiflora</i>	-	Phanerophyte
50. <i>Kalanchoe integra</i>	herb	Chamaephyte
51. <i>Leucaena leucocephala</i>	tree	Phanerophyte
52. <i>Macaranga tanarius</i>	tree	Phanerophyte
53. <i>Manihot esculenta</i>	shrub	Chamaephyte
54. <i>Melia dubia</i>	tree	Phanerophyte
55. <i>Mikania micrantha</i>	climber	Chamaephyte

Appendix E. cont.

56. <i>Momordica charantia</i>	climber	Chamaephyte
57. <i>Morinda citrifolia</i>	tree	Phanerophyte
58. <i>Moringa oleifera</i>	tree/shrub	Phanerophyte
59. <i>Musa x paradisisaca</i>	tree-like shrub	Hemicryptophyte
60. <i>Pandanus sp.</i>	tuft tree	Chamaephyte
61. <i>Passiflora foetida</i>	climber	Chamaephyte
62. <i>Peperomia sp.</i>	herb	Therophyte
63. <i>Phyllanthus amarus</i>	herb	Therophyte
64. <i>Phymatosorus longissima</i>	fern	Hemicryptophyte
65. <i>Physalis angulata</i>	herb	Therophyte
66. <i>Pilea microphylla</i>	herb	Therophyte
67. <i>Plumeria rubra</i>	tree	Phanerophyte
68. <i>Premna cf odorata</i>	tree	Phanerophyte
69. <i>Psidium guajava</i>	tree	Phanerophyte
70. <i>Psychotria sp.</i>	shrub	Phanerophyte
71. <i>Scaevola taccada</i>	tree/shrub	Phanerophyte
72. <i>Scleria lithosperma</i>	grass	Therophyte
73. <i>Sida acuta</i>	herb	Therophyte
74. <i>Sida cordifolia</i>	herb	Therophyte
75. <i>Sida rhombifolia</i>	herb	Therophyte
76. <i>Spermacoce aiata</i>	herb	Therophyte
77. <i>Spermacocoe assurgens</i>	herb	Therophyte
78. <i>Stachytarpheta jamaicensis</i>	herb	Therophyte
79. <i>Sterculia cf. stipularis</i>	tree	Therophyte
80. <i>Synedrella nodiflora</i>	herb	Therophyte
81. <i>Talinum triangulare</i>	herb	Therophyte
82. <i>Terminalia catappa</i>	tree	Phanerophyte
83. <i>Tridax procumbens</i>	herb	Therophyte
84. <i>Triphasia sp.</i>	tree	Therophyte
85. <i>Triumfetta bartramia</i>	herb	Phanerophyte
86. <i>Vernonia cinerea</i>	herb	Chamaephyte
87. <i>Vitex parviflora</i>	tree	-
88. <i>Wedelia trilobata</i>	creeper	Phanerophyte
		Therophyte