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*Full Length Research Paper*

# Biodiversity and conservation of plant genetic resources in Field Genebank of the National Centre for Genetic Resources and Biotechnology, Ibadan, Nigeria

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**This study was conducted to determine the biodiversity of the plant collections at the National Field Genebank at the National Centre for Genetic Resources and Biotechnology (NACGRAB), with the view of evaluating the conservation strategy of the *ex situ* conservation of recalciterant crops in the genebank for effective conservation and sustainable utilization. The results reveal that three hundred and sixty-one plants were identified in the field gene bank, spread across ninety-six plant families. The studies further show that the family Caesalpiniaceae has the highest number (20) of represented plant species; followed by Euphorbiaceae and Rubiaceae, each having nineteen representative plant species each. The location of the National Field Genebank at NACGRAB in Ibadan, on the latitude 7° 22' North of the equator and longitude 3° 50' East of the Greenwich Meridian, was found to have a positive effect on the adaptability of the plants collected from various different ecological and geographical zones of the country, since it was observed that Ibadan has a somewhat transitory climate between the moist tropical forests and the dry savanna regions of the country, both extreme zones being the natural habitats of some of the plant germplasms in the Field Genebank. The advantage of *ex situ* live collections over *in situ* conservation in terms of protection of the collections in Nigeria was also stressed. The need to establish more *ex situ* live collections in the different climatic zones of the Country to facilitate more conservation activities is also emphasized. Some of the endangered and endemic plant species yet to be collected and conserved are enumerated, so as to receive attention from conservation scientists in Nigeria.**

**Key words:** Biodiversity, conservation, NACGRAB, Ibadan.

## INTRODUCTION

Biological diversity or biodiversity refers to the variability among living organisms from all sources including, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part. It encompasses the variety of all forms of life on earth, which provides the building blocks for human existence and our ability to adapt to environmental changes in the future (FEPA, 2003).

Biological diversity involves genetic, species and ecosystem diversity. Genetic diversity denotes the variation within species in the functional units of heredity present in any plant or animal, microbial or other origin of living things. Species diversity encompasses the variety of species -whether wild or domesticated, within a geographical area. Estimates of the total number of species (defined as a population of organisms which are able to interbreed freely under natural conditions) range from 5 million to 100 million globally; though less than 1.7 million have actually been described (FEPA, 2003).

Species diversity remains central to the evaluation of diversity at other levels, and is a constant point of reference in biodiversity conservation. Ecosystem diversity refers to the variety of life forms in a given territory or area and the ecological processes that make them function. Ecosystem diversity is often evaluated through

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measures of the diversity of the component species, the relative abundance of different species as well as consideration of the types of species. Biodiversity is critical to the maintenance of a healthy environment. Its role in meeting human needs directly while maintaining the ecological process upon which our survival depends is enormous. Biodiversity not only provides direct benefits such as food, medicines and energy; it also affords us a "life support system." Biodiversity is required for the recycling of essential elements, such as carbon, oxygen, and nitrogen. It is also responsible for mitigating pollution, protecting watersheds and combating soil erosion. Because biodiversity acts as a buffer against excessive variations in weather and climate, it protects us from catastrophic events beyond human control. In a fundamental sense, experiencing and increasing our knowledge about biodiversity transforms our values and beliefs. Knowledge about biodiversity is valuable in stimulating technological innovation and providing the framework for sustainable development (FEPA, 2003).

Nigeria, as one of the most populous countries in Africa, has a landmass of over 923,768 square kilometers including about 13,000 square kilometers of water; enclosed within latitudes 4° 16´North and 13° 52´North of the equator and between longitudes 2°49´E and 14°37´East of Greenwich Meridian with a population of 140,003,542 and a population growth rate of 3.2% annually (NBS, 2007).

Associated with the varied ecological zones is an array of floral and fauna species. There are 7,895 plant species from 338 families and 2,215 genera that have been identified in Nigeria (FGN, 2006). About 1,489 species of micro-organisms have also been identified. Of these, 205 are endemic, the ninth highest number among 42 African countries. The northern region, with Sudanian affinities, has 39 endemic species, western and central region 38, and the eastern region 128 endemic species. Nigerian moist forests are rich in epiphytic ferns and orchids, and contain over 560 species of trees which attain heights of at least 12 metres and girth of 60 centimetres. The Biodiversity Country Study estimated that there are 3,423 fungi species in Nigeria, 134 plankton species, more than 500 virus species and 55 bacteria species in Nigeria (USAID, 2008).

According to the 1992 country study (FEPA, 1992), more than 848 algal species have been identified in the marine and fresh water habitats and a little less than 200 lower plant species have been identified, although the number of these plants is most definitely higher. The great diversity of plant species found in Nigeria cannot be unconnected with the diversity of ecosystems and habitats as well as the tropical climate in the country. There are 22, 000 vertebrates and invertebrates species. These species include about 20, 000 insects, about 1, 000 birds, about 1, 000 fishes, 247 mammals and 123 reptiles. Of these animals about 0.14% is threatened while 0.22% is endangered. About 1, 489 species of microorganisms have also been identified (FMEnv, 2006). Due to the relatively large number of plant species identified in Nigeria, Nigeria has been ranked the 11th in biodiversity in Africa. In addition, the West African Forests is one of the 25 biodiversity hotspots of global significance for conservation priorities (Myers et al., 2000) and the Nigerian tropical rainforests form a significant part of this.

However, despite the biological richness of Nigeria, these genetic resources are faced with threats and extinction. A number of factors are responsible for these threats and pressure on biological diversity in Nigeria, and they include agricultural activities, bush burning, fuel-wood collection, logging, grazing and gathering.

The massive rate of deforestation is a direct cause of biodiversity loss. According to the 2005 FAO Forest Resources Assessment Report, Nigeria has the highest rate of deforestation of primary forests between 2000 and 2005 (FAO, 2005). This is not unconnected with the fact that the demand for tropical hardwoods is increasing daily. Nigeria is the highest producer of timber in Africa, producing more than 100 million cubic metres annually as at 1998 (FAO, 2001) and Wood accounts for about 85% of domestic energy use in the country (FEPA, 2003). The survival of rural dwellers and urban poor depends on finding enough wood to cook their meals. At present, fuel wood constitutes the main source of fuel for cooking by over 76% of the Nigerian population. UNDP figures for 1993 showed Nigeria consuming 262,783 metric tonnes of fuel wood. Wood accounts for about 85% of domestic energy use in the country (FMEnv. 2006). Illegal logging and overexploitation has continued to pose serious threats to the country's forest resources and the environment.

The human population in the country is rapidly increasing. The current population of Nigeria is put at over 140 million, representing 20% of the entire African population. Currently, Nigeria has a total fertility rate (TFR) of 5.7 children per woman, child birth rate of 42 births per thousand and child death rate of 13 per thousand. All these indicate a high rate of population growth, thus putting more pressure on the environmental and genetic resources in the country.

Bush fires have become a major environmental hazard in most parts of Nigeria. Indiscriminate fire is caused by farmers, smokers and hunters. Through these avoidable practices, thousands of hectares of our forest are lost every year, especially in the dry season.

Worse still, invasive alien species, found in all taxonomic groups, from bacteria to mammals, are second only to habitat destruction as a threat to global biodiversity (Mooney and Hofgaard, 1999). Many factors can support the introduction and spread of invasive species, including land use changes, forest activities, economic intentions, tourism and trade among others. In Nigeria, several plants have been identified as invasive species: water hyacinth (*Eichhornia crassipes*), Typha grass (*Typha*

*dominguenesi*), Wild sunflower *(Tithonia diversifolia)* and Nipa palm (*Nypa fructicans*), which have grave effects on both water ecosystems and terrestrial biomes.

As a result, it has been reported that there are 560 native tree species in Nigeria, 16 of which are critically endangered as listed in the IUCN Red list, 18 are endangered, while 138 are vulnerable. In addition, out of 4715 vascular plant species numbered in Nigeria, 205 are endemic, while 170 are threatened (IUCN, 2004). We simply do not know how to recreate a species once it has become extinct (Kimmlins, 1987), therefore the need for conservation of genetic resources of species and ecosystems has been stressed in the following studies: UNEP/FAO, 1975; Richardson, 1970; Herdberg and Herdberg, 1968; UNESCO, 1973 and particularly in Nigeria Charter, 1968; Roche, 1973; Okali, 1975; Ola-Adams and Iyamabo, 1977.

Conservation is defined as the management of human use of the biosphere so that it may yield the greatest sustainable benefit to present generations while maintaining its potential to meet needs and aspirations of future generations. Thus, conservation embraces preservation, maintenance, sustainable utilization and restoration, and enhancement of the natural environment (IUCN, UNEP, WWF, 1991). In another view, conservation has been defined as the management of human use of the biosphere so that it may yield to the greatest sustainable benefit to present generations, while maintaining its potentials to meet the needs and aspirations of the future generations (IUCN, 1980).

Conservation is the planned management of natural resources, to retain the natural balance, diversity and evolutionary change in the environment. It is a protective measure taken; a) To prevent the loss of genetic diversity of a species, b) To save a species from becoming extinct, and c) To protect an ecosystem from damage so as to promote its sustained utilization. Plant germplasm is a non-renewable natural resource indispensable for the sustenance of human life on this earth.

Conservation efforts in Nigeria involves the establishment and management of national parks, game reserves, forest reserves, biosphere reserves, strict nature reserves (SNRs) and relevant research institutes/ academic institutions, which establish and manage arboreta, botanical/zoological gardens and gene banks. In addition, biotechnological applications to conservation efforts in Nigeria have witnessed the introduction of tissue culture applications as a new method of plant conservation.

The Field Genebank is a live collection of plant germplasms maintained for conservation purposes. It usually involves collection of seed or living material from one location and its transfer and planting at second site (Hawkes et al., 2000). The Field Genebank is an *ex situ* conservation strategy used in preserving recalciterant plant species as a live or living collection. The Field Genebank is useful for characterization and evaluation of plants and makes utilization of the germplasms easy.

One of the institutional framework strategy for conservation in Nigeria was the establishment of National Centre for Genetic Resources and Biotechnology (NACGRAB), located in Ibadan, Nigeria; as the national focal point for the conservation of plant, animal and microbial genetic resources; with the mandate to conserve all genetic resources indigenous in Nigeria using all conservation methods possible, including biotechnological applications; and as well network with relevant national research institutes in germplasm exchange, conservation and management.

NACGRAB is located in Moor Plantation, Ibadan on the latitude 7° 22' north of the equator and longitude 3° 50' east of the Greenwich Meridian. NACGRAB has a short-term and long-term seed gene bank, a functional tissue culture laboratory and a field gene bank.

The Field Genebank of NACGRAB covers about 12 hectares land area, containing a large variety of plants with diverse growth forms. The climate is characterized by high temperature and a bimodal rainfall pattern. The annual total and mean rainfall is 1,435.8 and 99.87 mm respectively for year 2008, while there were 98 rainy days in the same year. Rainfall records show beginning of rains in February to December, with peak in September (289.9 mm), and November recording no rainfall. The mean annual minimum and maximum temperatures are 24.57 and 32.1°C respectively for 2008, while the relative humidity was lowest at 53% in January and highest at 92% in August. Agrometeorological records from 1979 to 2008 show insignificant difference in the data taken for rainfall, temperature and relative humidity.

The present study aims at the analysis of biodiversity of plant collections and as well evaluates the conservation strategy of the NACGRAB's field Gene bank.

#### MATERIALS AND METHODS

This study involves intensive survey and several visits to the Field Genebank for a plant identification and enumeration exercise. Samples were collected, dried, poisoned, mounted, registered, documented and deposited at the NACGRAB's herbarium. The poisoning was done using 100% ethanol, 2 g of mercuric chloride and 1 ml of phenol (concentrated carbonic acid).

## RESULTS

A total of three hundred and sixty-one (361) plant species, representing ninety-six (96) families were identified as constituting the major vegetation of the site (Table 1). The *Caesalpiniaceae* has the highest number of represented species (twenty), followed by *Euphorbiaceae* and *Rubiaceae*, each having nineteen species (Table 2). Families *Papilionoideae*, *Poaceae* and *Mimosaceae* also have very large species representatives on the field. This results show a similar trend with the findings of Soladoye et al. (2005) on Olabisi Onabanjo University Permanent site, a few miles away from NACGRAB Field Genebank,

**Table 1.** Table showing the list of plants and their growth habit.

| S/N | Botanical name | Family | Habit |
|---|---|---|---|
| 1 | *Abrus precatorius* L. | Papilionoideae | Vine |
| 2 | *Acacia albida* Del. | Mimosaceae | Tree |
| 3 | *Acacia auriculiformis* A. Cunn ex Benth. | Mimosaceae | Tree |
| 4 | *Acacia nilotica* (Linn.) Willd. Ex Del. | Mimosaceae | Tree |
| 5 | *Acalypha ciliata* Forsk | Euphorbiaceae | Shrub |
| 6 | *Acalypha wilkesiana* Mull-Arg. | Euphorbiaceae | Shrub |
| 7 | *Acanthospermum hispidum* DC. | Asteraceae | Herb |
| 8 | *Adansonia digitata* Linn. | Bombacaceae | Tree |
| 9 | *Aerangis biloba* L. Schultr | Orchidaceae | Herb |
| 10 | *Aframomum melegueta* (Rosc.) K. Schum | Zingiberaceae | Herb |
| 11 | *Aframomum sceptrum* (Oliv. Et. Hamb.) K. Schum | Zingiberaceae | Herb |
| 12 | *Afzelia africana* Smith | Caesalpiniaceae | Tree |
| 13 | *Agave sp* | Agavaceae | Shrub |
| 14 | *Ageratum conyzoides* Linn. | Asteraceae | Herb |
| 15 | *Albizia adianthifolia* (Schum) W.F Wight | Mimosaceae | Tree |
| 16 | *Albizia glaberrima* (Schum. and Thonn.) Benth. | Mimosaceae | Tree |
| 17 | *Albizia lebbeck* (Linn) Benth. | Mimosaceae | Tree |
| 18 | *Albizia odoratissima* (L.f.) Benth. | Mimosaceae | Tree |
| 19 | *Allamanda cathartica* Linn. | Apocynaceae | Shrub |
| 20 | *Allophylus africanus* P. Beauv. | Sapindaceae | Shrub |
| 21 | *Aloe barbadensis* Mill. | Liliaceae | Herb |
| 22 | *Aloe buettneri* A. Berger | Liliaceae | Shrub |
| 23 | *Alstonia boonei* De Wild. | Apocynaceae | Tree |
| 24 | *Alternanthera sessilis* (L.) DC | Amaranthaceae | Herb |
| 25 | *Amaranthus hybridus* Linn. | Amaranthaceae | Herb |
| 26 | *Anacardium occidentale* Linn. | Anacardiaceae | Tree |
| 27 | *Ananas comosus* (Linn.) Merrill | Bromeliaceae | Herb |
| 28 | *Andrographis paniculata* (Burm. f.) Wall ex Nees | Acanthaceae | Herb |
| 29 | *Annona senegalensis* Pers. | Annonaceae | Woody shrub |
| 30 | *Annona squamosa* Linn. | Annonaceae | Woody shrub |
| 31 | *Anogeissus leiocarpus* (DC.) Guill. and Perr. | Combretaceae | Tree |
| 32 | *Anthocleista vogelii* Planch. | Loganiaceae | Tree |
| 33 | *Anthonotha macrophylla* P. Beauv. | Caesalpiniaceae | Tree |
| 34 | *Anthurium andreanum* Lind. | Araceae | Shrub |
| 35 | *Antiaris toxicaria* var. africana | Moraceae | Tree |
| 36 | *Antigonum leptopus* Hook and Arm | Polygonaceae | Vine |
| 37 | *Artemisia annua* L. | Asteraceae | Herb |
| 38 | *Artocarpus altilis* (Parkinson) Fosberg | Moraceae | Tree |
| 39 | *Artocarpus heterophylla* Lam. | Moraceae | Tree |
| 40 | *Aspilia africana* (Pers.) C.D Adams | Asteraceae | Herb |
| 41 | *Asystasia gangetica* (Linn.) T. Anders | Acanthaceae | Vine |
| 42 | *Azadirachta indica* A. Juss. | Meliaceae | Tree |
| 43 | *Basella alba* Linn. | Basellaceae | Vine |
| 44 | *Bauhinia acuminata* L. | Caesalpiniaceae | Small tree |
| 45 | *Bauhinia monandra* Kurz | Caesalpiniaceae | Small tree |
| 46 | *Bauhinia rufescens* Lam. | Caesalpiniaceae | Small tree |
| 47 | *Begonia rex* Putz | Begoniaceae | Shrub |
| 48 | *Biophytum petersianum* Klotz | Oxalidaceae | Herb |
| 49 | *Bixa orellana* Linn. | Bixaceae | Small tree |
| 50 | *Blighia sapida* Konig | Sapindaceae | Tree |
| 51 | *Boerhavia coccinea* Mill Gard | Nyctaginaceae | Herb |

**Table 1.** Contd.

| | | | |
|---|---|---|---|
| 52 | *Boerhavia diffusa* L. | Nyctaginaceae | Herb |
| 53 | *Bombax buonopozense* P. Beauv. | Bombacaceae | Tree |
| 54 | *Bombax glabrum* (Pasq.) A. Robyns | Bombacaceae | Tree |
| 55 | *Borreria natalensis* (Hochst)ex. S. Moore | Rubiaceae | Shrub |
| 56 | *Borreria princeae* K. Schum | Rubiaceae | Herb |
| 57 | *Brachiara comata* Stapf | Poaceae | Herb |
| 58 | *Brachiara lata* (Trin) Griseb | Poaceae | Herb |
| 59 | *Brachiara villosa* (Lam.) A. Camis | Poaceae | Herb |
| 60 | *Brachystegia nigerica* Hoyle and A.P.D Jones | Caesalpiniaceae | Tree |
| 61 | *Brassica hirta* Moench | Cruciferae | Annual herb |
| 62 | *Brassica juncea* (Linn.) Coss | Cruciferae | Annual herb |
| 63 | *Bridelia ferruginea* Benth. | Euphorbiaceae | Tree |
| 64 | *Brillantaisia nitens* Lindau | Acanthaceae | Herb |
| 65 | *Brunfelsia calycina* Benth | Solanaceae | Shrub |
| 66 | *Bryophyllum pinnatum* (Lam.) Oken | Crassulaceae | Herb |
| 67 | *Buchholzia coriacea* Engl. | Capparaceae | Tree |
| 68 | *Caesalpinia bonduc* (L.) Roxb | Caesalpiniaceae | Vine |
| 69 | *Caesalpinia pulcherrima* L. | Caesalpiniaceae | Shrub |
| 70 | *Cajanus cajan* L. (Millsp.) | Papilionoideae | Shrub |
| 71 | *Caladium bicolor* Vent. | Araceae | Herb |
| 72 | *Calliandra haematocephala* Benth | Mimosaceae | Shrub |
| 73 | *Calophyllum inophyllum* Linn. | Guttiferae | Tree |
| 74 | *Calotropis procera* (Ait.) Ait. f. | Asclepiadaceae | Herb |
| 75 | *Canna indica* Linn. | Cannaceae | Herb |
| 76 | *Carica papaya* Linn. | Caricaceae | Small tree |
| 77 | *Caryota mitis* Lour | Arecaceae | Small tree |
| 78 | *Cassia auriculiformis* A. Cunn | Mimosaceae | Tree |
| 79 | *Cassia fistula* Linn. | Caesalpiniaceae | Tree |
| 80 | *Cassia occidentalis* Linn. | Caesalpiniaceae | Shrub |
| 81 | *Cassia surattensis* Burm. f. | Caesalpiniaceae | Tree |
| 82 | *Casuarina equisetifolia* Forst. | Casuarinaceae | Tree |
| 83 | *Cedrela odorata* L. | Meliaceae | Tree |
| 84 | *Ceiba petandra* (Linn.) Gaertn. | Bombacaceae | Tree |
| 85 | *Celosia argentea* Linn | Amaranthaceae | Herb |
| 86 | *Celosia leptostachya* Benth | Amaranthaceae | Herb |
| 87 | *Centrosema pubescens* Benth | Papilionoideae | Herb |
| 88 | *Chamaecrista rotundifolia* (Pers) Greene | Caesalpiniaceae | Annual herb |
| 89 | *Chasmanthera dependens* Hochst | Menispermaceae | Vine |
| 90 | *Chassalia kolly* (Schumaech) Hepper | Rubiaceae | Herb |
| 91 | *Chromolaena odorata* (Linn.) King and Robinson | Asteraceae | Herb |
| 92 | *Chrysophyllum albidum* G. Don | Sapotaceae | Tree |
| 93 | *Cissus argueta* Hook. f. | Vitaceae | Herb |
| 94 | *Cissus caesia* Afzel | Vitaceae | Herb |
| 95 | *Cissus* quadrangularis L. | Vitaceae | Shrub |
| 96 | *Citrus paradisi* Macfad | Rutaceae | Tree |
| 97 | *Citrus aurantium* Swingle | Rutaceae | Tree |
| 98 | *Citrus sinensis* (L.) Osbeck | Rutaceae | Tree |
| 99 | *Cleistopholis patens* (Benth.) Engl. and Diels | Annonaceae | Tree |
| 100 | *Cleome ciliata* Shum and Thonn | Capparidaceae | Herb |
| 101 | *Cleopatra mandarin* syn. *Citrus reshni* Hort. Ex Tan | Rutaceae | Tree |
| 102 | *Cocos nucifera* L. | Arecaceae | Tree |

**Table 1.** Contd.

| | | | |
|---|---|---|---|
| 103 | *Cochlospermum reliogosum* Linn. Alston | Cochlospermaceae | Tree |
| 104 | *Codiaeum variegatum* A. Juss | Euphorbiaceae | Shrub |
| 105 | *Coix lacryma-jobi* L. | Poaceae | Herb |
| 106 | *Cola gigantea* A. Chev. | Sterculiaceae | Tree |
| 107 | *Cola millenii* K. Schum | Sterculiaceae | Small tree |
| 108 | *Cola nitida* (Vente) Schott and Endl | Sterculiaceae | Tree |
| 109 | *Commelina africana* Linn. | Commelinaceae | Vine |
| 110 | *Corchorus aestuans* Linn. | Tiliaceae | Herb |
| 111 | *Costus afer* Ker-Gawl. | Zingiberaceae | Herb |
| 112 | *Costus lucanusianus* J. Braun and K. Schum | Zingiberaceae | Herb |
| 113 | *Crassocephalum rubens* (Juss ex Jacq.) S. Moore | Asteraceae | Herb |
| 114 | *Crataegus williamsii* Egglest | Rosaceae | Shrub |
| 115 | *Craterispermum cerinanthum* Hiern. | Rubiaceae | Herb |
| 116 | *Crescentia cujete* Linn. | Bignoniaceae | Tree |
| 117 | *Crinum jagus* (J. Thompson) Dandy | Amaryllidaceae | Shrub |
| 118 | *Crotalaria retusa* L. | Papilionoideae | Herb |
| 119 | *Croton zambesicus* Muell. Arg. | Euphorbiaceae | Small tree |
| 120 | *Culcasia saxatilis* A. Chev. | Arecaceae | Vine |
| 121 | *Cycas circinalis* Linn. | Cycadaceae | Small tree |
| 122 | *Cymbopogon citratus* (DC) Stapf | Poaceae | Herb |
| 123 | *Cyperus distans* Linn. f. | Cyperaceae | Herb |
| 124 | *Cyphostemma adenocaule* (Steud ex Rich) Desc. Ex Wild | Vitaceae | Herb |
| 125 | *Dacryodes edulis* (G. Don) H.J Lam | Burseraceae | Tree |
| 126 | *Dactyladenia barteri* Hook F. ex. Olive | Chrysobalanaceae | Shrub |
| 127 | *Dalbergia latifolia* Roxb. | Papilionoideae | Small tree |
| 128 | *Dalbergia sissoo* Roxb. | Papilionoideae | Small tree |
| 129 | *Daniella ogea* L. | Caesalpiniaceae | Tree |
| 130 | *Delonix regia* (Boj. Ex Hook.) Raf. | Caesalpiniaceae | Tree |
| 131 | *Dennettia tripetala* Bak. f. | Annonaceae | Small tree |
| 132 | *Desmodium scorpionis* (SW) Desv | Papilinioideae | Herb |
| 133 | *Desmodium tortuosum* (SW) DC | Papilinioideae | Herb |
| 134 | *Desplatsia dewevrei* (De Wild and Th. Dur.) | Tiliaceae | Tree |
| 135 | *Dichapetalum madagascariense* Poir. | Dichapetalaceae | Tree |
| 136 | *Dioclea reflexa* Hook. F. | Papilinioideae | Vine |
| 137 | *Dioscorea alata* L. | Dioscoreaceae | Vine |
| 138 | *Dioscorea bulbifera* L. | Dioscoreaceae | Vine |
| 139 | *Dioscorea dumetorum* (Kunth) Pax | Dioscoreaceae | Vine |
| 140 | *Dioscorea rotundata* Poir | Dioscoreaceae | Vine |
| 141 | *Diospyros monbuttensis* Gurke | Ebenaceae | Tree |
| 142 | *Dracaena arborea* Link | Agavaceae | Shrub |
| 143 | *Durantha repens* L. | Verbenaceae | Shrub |
| 144 | *Elaeis guineensis* Jacq. | Arecaceae | Tree |
| 145 | *Eleusine indica* Gaertner | Poaceae | Herb |
| 146 | *Eleutheranthera ruderalies* P. Beauv. | Asteraceae | Herb |
| 147 | *Encephalartos barteri* Carnth | Cycadaceae | Herb |
| 148 | *Entanda gigas* (L.) Fawcett and Rendle | Mimosaceae | Tree |
| 149 | *Entandrophagma cylindricum* (Sprague) Sprague | Meliaceae | Tree |
| 150 | *Erythrina senegalensis* DC | Papilionadeae | Tree |
| 151 | *Erythrina tholloniana* Hua | Papilionadeae | Small tree |
| 152 | *Erythrophleum suaveolens* (Guill. and Perr.) Brenan | Caesalpiniaceae | Tree |
| 153 | *Euadenia trifoliolata* (Schum. and Thonn.) Oliv. | Capparaceae | Tree |

**Table 1.** Contd.

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|---|---|---|---|
| 154 | *Eucalyptus camaldulensis* Dehnh. | Myrtaceae | Tree |
| 155 | *Eugenia uniflora* L. | Myrtaceae | Tree |
| 156 | *Euphorbia glaucophylla* Poir | Euphorbiaceae | Herb |
| 157 | *Euphorbia heterophylla* Linn | Euphorbiaceae | Herb |
| 158 | *Euphorbia hirta* Burn. | Euphorbiaceae | Herb |
| 159 | *Fagara zanthoxyloides* (L.) Sarg. Syn: *Zanthoxyllum zanthoxyloides* (L.) Sarg. | Rutaceae | Shrub |
| 160 | *Ficus benjamina* L. | Moraceae | Small tree |
| 161 | *Ficus elastica* Roxb. | Moraceae | Shrub |
| 162 | *Ficus exasperata* Vahl | Moraceae | Tree |
| 163 | *Ficus iteophylla* Miq. | Moraceae | Tree |
| 164 | *Ficus thonningii* Blume | Moraceae | Tree |
| 165 | *Ficus mucoso* Welw. Ex Ficalho | Moraceae | Tree |
| 166 | *Ficus umbellata* Vahl. | Moraceae | Tree |
| 167 | *Ficus vogelii* (Miq.) Miq. | Moraceae | Tree |
| 168 | *Funtumia elastica* (P. Preuss) Stapf | Apocynaceae | Tree |
| 169 | *Garcinia kola* Heckel | Guttiferae | Tree |
| 170 | *Gliricidia sepium* (Jacq.) Walp | Papilionoideae | Small tree |
| 171 | *Gloriosa superba* Linn. | Liliaceae | Vine |
| 172 | *Glyphaea brevis* (Spreng) Monachino | Tiliaceae | Small tree |
| 173 | *Gmelina arborea* Roxb | Verbenaceae | Tree |
| 174 | *Gomphrena celosioides* Mart | Amaranthaceae | Herb |
| 175 | *Gossypium arboretum* Linn. | Malvaceae | Shrub |
| 176 | *Gossypium barbadense* Linn | Malvaceae | Shrub |
| 177 | *Griffonia simplicifolia* Vahl. DC | Caesalpiniaceae | Shrub |
| 178 | *Harrisonia abyssinica* Oliv. | Simaroubaceae | Tree |
| 179 | *Henisia crinita* (Afzel.) G. Taylor | Rubiaceae | Small tree |
| 180 | *Hevea brasiliensis* (Kunth) Muell. Arg. | Euphorbiaceae | Tree |
| 181 | *Hewittia sublobata* (Linn. f.) O. Ktze | Convolvulaceae | Vine |
| 182 | *Hibiscus rosa-sinensis* L. | Malvaceae | Shrub |
| 183 | *Hibiscus sabdariffa* Linn. | Malvaceae | Shrub |
| 184 | *Hippocratea indica* Willd | Celastraceae | Herb |
| 185 | *Holarrhena floribunda* (G. Don) Dur. and Schinz | Apocynaceae | Tree |
| 186 | *Hura crepitans* Linn. | Euphorbiaceae | Tree |
| 187 | *Imperata cylindrica* Rausch | Poaceae | Herb |
| 188 | *Ipomea acanthocarpa* (Choisy) Asch. and Schweinf. | Convolvulaceae | Vine |
| 189 | *Ipomoea hederacea* (Burm) Hallier F. | Convolvulaceae | Vine |
| 190 | *Ipomoea nil* (Linn.) Roth | Convolvulaceae | Vine |
| 191 | *Irvingia gabonensis* (Aubry-Lecomte ex O' Rorke) Baill | Irvingiaceae | Tree |
| 192 | *Irvingia wombulu* (O' Rorted) Baill | Irvingiaceae | Tree |
| 193 | *Ixora bauchiensis* Hutch and Dalz | Rubiaceae | Shrub |
| 194 | *Ixora coccinea* Linn. | Rubiaceae | Shrub |
| 195 | *Jatropha curcas* L. | Euphorbiaceae | Shrub |
| 196 | *Jatropha gossypifolia* Linn. | Euphorbiaceae | Shrub |
| 197 | *Jussiaea leptocarpa* (Nutt.) | Onagraceae | Herb |
| 198 | *Khaya grandifoliola* C. DC. | Meliaceae | Tree |
| 199 | *Khaya ivorensis* A. Chev. | Meliaceae | Tree |
| 200 | *Khaya senegalensis* (Desr.) A. Juss. | Meliaceae | Tree |
| 201 | *Kigelia africana* (Lam.) Benth. | Bignoniaceae | Tree |
| 202 | *Lagenaria breviflora* (Benth.) Roberty | Cucurbitaceae | Shrub |
| 203 | *Lagerstroemia indica* L. | Lythraceae | Shrub |

**Table 1.** Contd.

| | | | |
|---|---|---|---|
| 204 | *Lagerstroemia speciosa* (L.) Pers. | Lythraceae | Tree |
| 205 | *Lantana camara* Linn. | Verbenaceae | Shrub |
| 206 | *Laportea aestuans* (L.) Miq. | Urticaceae | Herb |
| 207 | *Launaea taraxacifolia* (Willd.) Amin | Asteraceae | Herb |
| 208 | *Lawsonia inermis* L. | Lythraceae | Shrub |
| 209 | *Lecaniodiscus cupanioides* Planch. Ex Benth. | Sapindaceae | Tree |
| 210 | *Leptochloa uniflora* Pal. | Poaceae | Herb |
| 211 | *Leucaena leucocephala* Lam. | Mimosaceae | Small tree |
| 212 | *Licuala spinosa* Thunb | Arecaceae | Small tree |
| 213 | *Mallotus oppositifolius* (Geisel) Mull-Arg. | Euphorbiaceae | Herb |
| 214 | *Mangifera indica* Linn. | Anacardiaceae | Tree |
| 215 | *Manihot esculenta* Crantz | Euphorbiaceae | Shrub |
| 216 | *Manihot glaziovii* Muell Arg. | Euphorbiaceae | Tree |
| 217 | *Mansonia altissima* A. Chev. | Sterculiaceae | Tree |
| 218 | *Maranthochloa leucantha* (A. Rich) Munro | Marantaceae | Herb |
| 219 | *Maranthochloa purpurea* (Rid) Milne Redhe | Marantaceae | Herb |
| 220 | *Margaritaria discoidea* (Baill.) | Euphorbiaceae | Herb |
| 221 | *Mariscus alternifolius* Vahl | Cyperaceae | Herb |
| 222 | *Mariscus flabelliformis* Kunth | Cyperaceae | Herb |
| 223 | *Melia azedarach* Linn. | Meliaceae | Tree |
| 224 | *Milicisia excelsa* (Welw.) Benth. | Meliaceae | Tree |
| 225 | *Millettia griffoniana* Baillon | Papilionoideae | Tree |
| 226 | *Millettia thonningii* (Schum. and Thonn.) Bak. | Papilionoideae | Tree |
| 227 | *Mimosa pudica* DC | Mimosaceae | Herb |
| 228 | *Mitracarpus villosus* Zucc | Rubiaceae | Herb |
| 229 | *Momordica charantia* Linn. | Cucurbitaceae | Vine |
| 230 | *Monodora myristica* (Gaertn.) Dunal | Annonaceae | Tree |
| 231 | *Monstera deliciosa* var. Philodendron pertusum Liebm. | Arecaceae | Shrub |
| 232 | *Morinda citrifolia* L. | Rubiaceae | Shrub |
| 233 | *Morinda lucida* Benth | Rubiaceae | Tree |
| 234 | *Moringa oleifera* Lam | Moringaceae | Small tree |
| 235 | *Murraya exotica* L. | Rutaceae | Shrub |
| 236 | *Murraya koenigii* (L.) Spreugel | Rutaceae | Small tree |
| 237 | *Murraya paniculata* (L.) Jack | Rutaceae | Shrub |
| 238 | *Musa paradisiaca* Linn. Syn: Musa sapientum | Musaceae | Small tree |
| 239 | *Myristica fragrans* Houtt. | Myristicaceae | Tree |
| 240 | *Napoleona imperialis* P. Beauv. | Lecythidaceae | Small tree |
| 241 | *Nauclea diderrichii* (De Wild and Th. Dur.) Merrill | Rubiaceae | Tree |
| 242 | *Neanthe elegans* (Mart.) O.F Cook | Arecaceae | Tree |
| 243 | *Nephrolepis biserrata* (SW) Schott | Davalliaceae | Herb |
| 244 | Newbouldia laevis (P. Beauv.) Seeman ex Bureau | Bignoniaceae | Tree |
| 245 | *Nicotiana tabacum* SW. Afr. | Solanaceae | Shrub |
| 246 | *Nymphaea lotus* Linn. | Nymphaeaceae | Herb |
| 247 | *Ocimum basilicum* L. | Lamiaceae | Herb |
| 248 | *Ocimum canum* Sims | Lamiaceae | Herb |
| 249 | *Ocimum gratissimum* L. | Lamiaceae | Herb |
| 250 | *Oldenlandia lancifolia* (Schum) DC | Rubiaceae | Herb |
| 251 | *Opuntia bergeriana* F.A.C Weber ex. A. Berger | Cactaceae | Herb |
| 252 | *Oxytenanthera abyssinica* (A. Rich) Munro | Poaceae | Tree |
| 253 | *Pandiaka sp* | Amaranthaceae | Herb |
| 254 | *Panicum maximum* Jacq. | Poaceae | Herb |
| 255 | *Parkia biglobosa* (Jacq) R. Br. | Mimosaceae | Tree |

**Table 1.** Contd.

| | | | |
|---|---|---|---|
| 256 | *Paspalum orbiculare* L. | Poaceae | Herb |
| 257 | *Passiflora edulis* Sims | Passifloraceae | Vine |
| 258 | *Paullinia pinnata* L. | Sapindaceae | Vine |
| 259 | *Pausinystalia johimbe* (K. Schum.) Pierre ex Beille | Rubiaceae | Tree |
| 260 | *Peltophorum macrocarpum* (DC) Baker | Caesalpiniaceae | Tree |
| 261 | *Peltophorum pterocarpum* DC | Caesalpiniaceae | Tree |
| 262 | *Pennisetum polystachion* L. | Poaceae | Herb |
| 263 | *Pennisetum purpureum* Schum | Poaceae | Herb |
| 264 | *Pentaclethra macrophylla* Benth | Mimosaceae | Tree |
| 265 | *Peperomia pellucida* L. | Piperaceae | Herb |
| 266 | *Pergularia daemia* (Forssk.) Chiov | Asclepiadaceae | Herb |
| 267 | *Persea americana* Mill | Lauraceae | Tree |
| 268 | *Petiveria alliacea* L. | Phytolacaceae | Herb |
| 269 | *Phoenix dactylifera* L. | Arecaceae | Small tree |
| 270 | *Phyllanthus amarus* Schum and Thonn | Euphorbiaceae | Herb |
| 271 | *Phyllanthus odontadenius* Mull Arg. | Euphorbiaceae | Herb |
| 272 | *Phymatodes scolopendria* (Burm) Ching | Davalliaceae | Herb |
| 273 | *Picralima nitida* (Stapf) Th. and H. Dur. | Apocynaceae | Tree |
| 274 | *Pinus carribea* Morelet | Pinaceae | Tree |
| 275 | *Pithecelobium dulce* (Roxb) Benth | Mimosaceae | Tree |
| 276 | *Pityrogramma calomelanos* (L.) Linn. | Adianthaceae | Herb |
| 277 | *Platostoma africanum* P. Beauv. | Labiatae | Herb |
| 278 | *Plumeria rubra* Linn. | Apocynaceae | Small tree |
| 279 | *Poga oleosa* Pierre | Rhizophoraceae | Tree |
| 280 | *Pollia condensata* C. B. Cl. | Commelinaceae | Shrub |
| 281 | *Polyalthia longiflora* (Sonn) Thwaites | Annonaceae | Tree |
| 282 | *Polystia fruticosa* (L.) Hans | Araliaceae | Shrub |
| 283 | *Pouteria campechiana* (Kunth) Boehni | Sapotaceae | Tree |
| 284 | *Pouzolzia guineensis* Benth | Urticaceae | Herb |
| 285 | *Psidium guajava* L. | Myrtaceae | Small tree |
| 286 | *Pterocarpus mildbraedii* Harms | Papilionaceae | Tree |
| 287 | *Pterocarpus osun* Craib | Papilionoideae | Tree |
| 288 | *Pterocarpus santalinoides* L' Her | Papilionoideae | Tree |
| 289 | *Pterygota macrocarpa* K. Schum | Sterculiaceae | Tree |
| 290 | *Punica granatum* Linn. | Punicaceae | Shrub |
| 291 | *Pycanthus angolensis* (Welw) Warb | Myristicaceae | Tree |
| 292 | *Rauvolfia vomitoria* Afzel | Apocynaceae | Shrub |
| 293 | *Ravenalla madagascariensis* Sonn. Engl. | Sterelitziaceae | Small tree |
| 294 | *Rhektophyllum mirabile* N. E. Br. | Araceae | Shrub |
| 295 | *Rhynchelytrum repens* Willd | Poaceae | Herb |
| 296 | *Richardia brasiliensis* Gomez | Rubiaceae | Herb |
| 297 | *Ricinus communis* L. | Euphorbiaceae | Herb |
| 298 | *Rothmannia urcelliformis* (Schweinf. Ex Hiern) Bullock ex Robyns | Rubiaceae | Small tree |
| 299 | *Rubus fruticosus* L. | Rosaceae | Tree |
| 300 | *Ruthalicia eglandulosa* (Hook. f.) C. Jeffrey | Cucurbitaceae | Vine |
| 301 | *Saccharum officinarum* L. | Poaceae | Shrub |
| 302 | *Samanea saman* (Jacq.) Merrill | Mimosoideae | Tree |
| 303 | *Sansevieria trifasciata laurentii* | Ruscaceae | Herb |
| 304 | *Sansevieria trifasciata* Prain. | Ruscaceae | Herb |
| 305 | *Schwenkia leptocarpa* DC | Mimosaceae | Herb |
| 306 | *Sclerocarpus africanus* Jacq ex Mur | Asteraceae | Herb |
| 307 | *Senna alata* L. Roxburgh | Caesalpiniaceae | Herb |

**Table 1.** Contd.

| | | | |
|---|---|---|---|
| 308 | *Setaria barbata* (Lam) Kunth | Poaceae | Herb |
| 309 | *Shorea roxburghii* G. Don | Dipterocarpaceae | Tree |
| 310 | *Sida acuta* Burm. | Malvaceae | Herb |
| 311 | *Sida corymbosa* Foies | Malvaceae | Herb |
| 312 | *Sida rhombifolia* Linn. | Malvaceae | Herb |
| 313 | *Sida scabrida* Wight and Arn | Malvaceae | Herb |
| 314 | *Solanum macrocarpum* (Maxim) Koidz | Solanaceae | Shrub |
| 315 | *Solanum tuberosum* L. | Solanaceae | Vine |
| 316 | *Solenostemon monostachyus* P. Beauv. | Lamiaceae | Herb |
| 317 | *Sparganophorus sparganophora* Linn | Asteraceae | Herb |
| 318 | *Spermacoce ocymoides* Burm F. | Rubiaceae | Herb |
| 319 | *Spermacoce spermacocina* (K.Schum) Bridson and Puff | Rubiaceae | Herb |
| 320 | *Sphenocentrum jollyanum* Pierre | Menispermaceae | Shrub |
| 321 | *Spondias mombin* Linn. | Anacardiaceae | Tree |
| 322 | *Stachytarpheta anguistifolia* (Mill) Enum | Verbenaceae | Shrub |
| 323 | *Stachytarpheta cayennensis* Vahl. | Verbenaceae | Herb |
| 324 | *Sterculia tragacantha* Lindl. | Sterculiaceae | Tree |
| 325 | *Syngonium podophyllum* Schott. | Arecaceae | Herb |
| 326 | *Synsepalum dulcificum* Schum and Thonn | Sapotaceae | Small tree |
| 327 | *Syzygium zamaragensis* | Myrtaceae | Tree |
| 328 | *Tabebuia rosea* (Bertol.) DC. | Bignoniaceae | Tree |
| 329 | *Tacca leontopetaloides* (L.) Kuntze | Taccaceae | Herb |
| 330 | *Talinum triangulare* (Jacq.) Wild | Portulaceae | Herb |
| 331 | *Tamarindus indica* Linn. | Caesalpiniaceae | Tree |
| 332 | *Tecoma stans* Linn. H.B. and K. | Bignoniaceae | Small tree |
| 333 | *Tectona grandis* Linn.f. | Verbenaceae | Tree |
| 334 | *Telfariea occidentalis* Hook. f. | Cucurbitaceae | Vine |
| 335 | *Terminalia catappa* Linn. | Combretaceae | Tree |
| 336 | *Terminalia ivorensis* A. Chev. | Combretaceae | Tree |
| 337 | *Terminalia randii* G. Baker | Combretaceae | Tree |
| 338 | *Terminalia superba* Engl. and Diels | Combretaceae | Tree |
| 339 | *Tetrapleura tetraptera* (Schum and Thonn) Taub | Mimosaceae | Tree |
| 340 | *Thaumatococcus danielli* (Benn.) Benth | Marantaceae | Herb |
| 341 | *Tridax procumbens* Linn. | Asteraceae | Herb |
| 342 | *Theobroma cacao* Linn. | Sterculiaceae | Tree |
| 343 | *Thevetia neriifolia* Juss. | Apocynaceae | Shrub |
| 344 | *Thunbergia fasciculata* Lindau | Acanthaceae | Vine |
| 345 | *Tithonia diversifolia* (Hemsl.) A. Gray | Asteraceae | Shrub |
| 346 | *Treculia africana* Decne | Moraceae | Tree |
| 347 | *Trilepsium madagascariensis* DC. | Moraceae | Tree |
| 348 | *Triplochiton scleroxylon* K. Schum | Sterculiaceae | Tree |
| 349 | *Triumfetta rhomboidea* (Jacq) | Tiliaceae | Vine |
| 350 | *Vernonia amygdalina* Del. | Asteraceae | Herb |
| 351 | *Vernonia cinerea* (Linn.) Less. | Asteraceae | Herb |
| 352 | *Vigna subterranean* (L.) Verdc. | Papilionoideae | Herb |
| 353 | *Vinca rosea* Linn. | Apocynaceae | Herb |
| 354 | *Vitellaria paradoxa* (Gaertn. f.) | Sapotaceae | Tree |
| 355 | *Vitis vinifera* L. | Vitaceae | Vine |
| 356 | *Voacanga africana* Stapf | Apocynaceae | Small tree |
| 357 | *Widdringtonia sp.* | Cupressaceae | Tree |
| 358 | *Xanthosoma sagittifolium* (L.) (Schott.) | Araceae | Herb |
| 359 | *Zea mays* L. | Poaceae | Annual herb |

**Table 1.** Contd.

| | | | |
|---|---|---|---|
| 360 | *Zingiber officinale* (Roscoe) | Zingiberaceae | Herb |
| 361 | *Ziziphus spina-christii* Willd | Rhamnaceae | Tree |

**Table 2.** Family distribution of the dominant plant species.

| Dominant plant families | Species population |
|---|---|
| Caesalpiniaceae | 20 |
| Apocynaceae | 19 |
| Euphorbiaceae | 19 |
| Mimosaceae | 18 |
| Papilionoideae | 18 |
| Poaceae | 17 |
| Rubiaceae | 17 |
| Asteraceae | 14 |
| Moraceae | 13 |
| Arecaceae | 9 |

**Table 3.** Summary of the growth habit of the identified plants in the Field Genebank.

| Growth habit | Total number | Percentage |
|---|---|---|
| Vine | 27 | 7.2 |
| Herb/Annual herb | 119 | 32.9 |
| Shrub/Woody shrub | 55 | 15.2 |
| Tree/Small tree | 160 | 44.3 |
| **Total** | 361 | 100.0 |

Ibadan, on coordinate longitude 3° 55' east of the Greenwich Meridian and latitude 6° 56' north of the equator; while that of NACGRAB is on the latitude 7° 22' north of the equator and longitude 3° 50' east of the Greenwich Meridian. This could be hanged on the fact that there is similitude in the climatic and soil conditions of the two areas, which favours the growth and dominance of some plant species and families. Of the 361 plants identified and collected, 160 of them, representing 44.3% of the whole total are trees, thereby indicating tree domination in the vegetation. Herbs comprise 119 (32.9%) of the floral composition, shrubs are 55 (15.2%), while the vines are just 27, representing 7.2% of the whole plants (Tables 2 and 3, Figure 1). In addition, more than half of the plants identified were dicotyledonous. 292 of the plants are dicotyledonous, representing 80.9% of the whole population, while 62 (17.2%) are monocotyledonous. Three (3) gymnosperms and four (4) pteridophytes were also identified (Tables 2 and 4, Figure 2). Some of the plants were collected from various ecological zones of the country and even outside the resources too, and also need to be conserved. It should be noted that the growth habit classified as 'tree' also include small trees or understorey trees; shrubs include woody shrubs; herbs include all grasses, sedges and forbs; while vines include all creepers, climbers, lianas, epiphytes and woody climbers.

Table 2 presents the list of ten dominant plant families of the plants identified, collected and registered from the Field Genebank of NACGRAB during the study.

The following tables express the summary of the plants identified and collected (Tables 3 and 4)

It should also be noted that some of the plants identified are still in juvenile stage, some are already well established; some young and others are well matured. As observed, some of the plants identified and established in the Field Genebank are endangered economic tree crops such as *Melicia excelsa*, *Triplichoton scleroxylon*, *Ceiba petandra*, *Entandrophagma cylindricum*, *Erythrina* country, purposely for conservation purposes. However, some were established as ornamental species for landscaping, however they are also plant genetic *senegalensis*, *Pausinystalia johimbe*, *Khaya* sp., *Thaumatococcus danielli* etc. Some of them are highly medicinal, such as *Picralima nitida*, *Voacanga africana*, *Vinca rosea*, *Cajanus cajan*, *Aframomum melegueta*, *Dennettia tripetala*, *Ageratum conyzoides*, *Abrus precatorius*, *Starchytarpheta cayenensis*, *Alstonia boonei*, *Erythophleum*

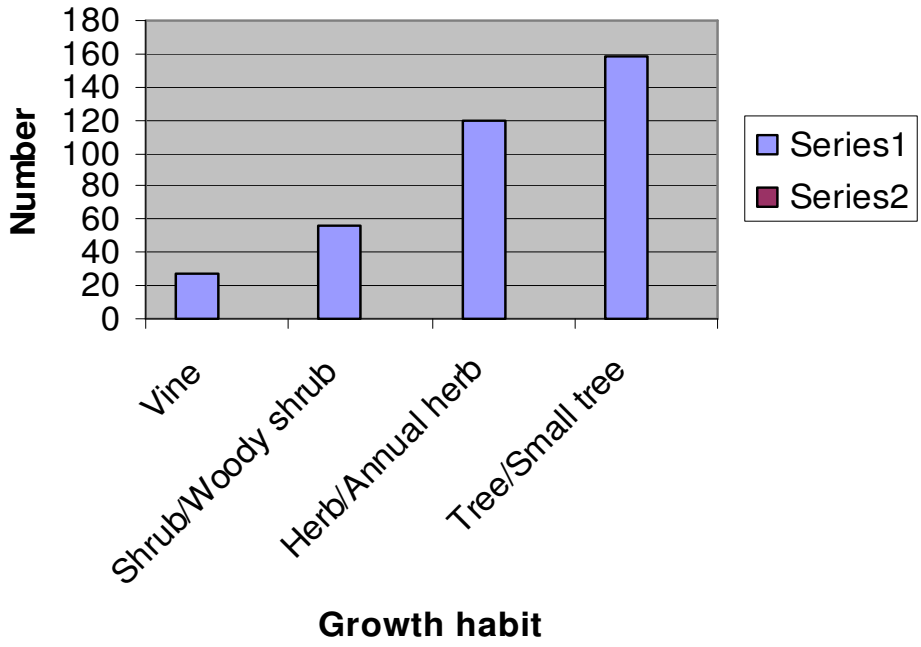


**Figure 1.** Species distribution by growth habit.

**Table 4.** Summary of the cotyledons' presence in the identified plants in the field genebank.

| S/N | Cotyledons | Total number | Percentage |
|---|---|---|---|
| 1 | Monocotyledonous | 62 | 17.2% |
| 2 | Dicotyledonous | 292 | 80.9% |
| 3 | Pteridophyte | 4 | 1.1% |
| 4 | Gymnosperm | 3 | 0.8% |
| | Total | 361 | 100.0% |

*suaveolens etc.* Some of them are useful economic crops for biofuel, such as *Jatropha curcas*, *Ricinus communis* and *Saccharum officinarum*. Weeds, invasive species and sedges are also considered as important genetic resources, even if their usefulness is still unknown for now: *Lantana camara*, *Ruthalicia egalandulosa etc.* Underutilized crops are also represented on the field, such as *Caesalpinia bonduc*, *Crinum jagus*, *Tacca leontopetaloides*, *Jatropha gossypifolia*, *Dioclea reflexa etc.* Fruits and vegetables are very prominent, such as *Mangifera indica*, *Spondias mombin*, *Persea americana*, *Passiflora edulis*, *Basella alba*, *Telfariea occidentalis etc.* The Figures 1 and 2 show the bar charts showing the distribution of the identified species into their respective growth habits and the presence of cotyledons.

## DISCUSSIONS

The disappearance of many plants species due to human activities is depleting the world's genetic resources and is putting man's heritage of biodiversity under serious threat (Soladoye et al., 2005). There is therefore the urgent need to preserve genetic diversity including plant resources of known and unknown economic importance which will guarantee the availability of all potentials for use in the benefit of our children and grandchildren (Olowokudejo, 1987). Nigeria was adjudged to have the highest rate of deforestation of primary forests in the world (FAO, 2005). The use and implementation of the Environmental Impact Assessment (EIA) in any developmental or construction project has been neglected by almost all in the embarking of projects in the country. According to Eneobong (1997), the rapid diminishing rate of Africa's forests and bioresources have been variously attributed to civil war, conversion of land for agriculture, wild fires, poor management of available land, uncontrolled search for food, fuel wood, medicine, construction timber, overgrazing by cattle, displacement and loss of landraces, lower yielding varieties, pests and diseases, pollution (e.g. acid rain) and incomplete knowledge of the biology of many plants especially the propagation genetics

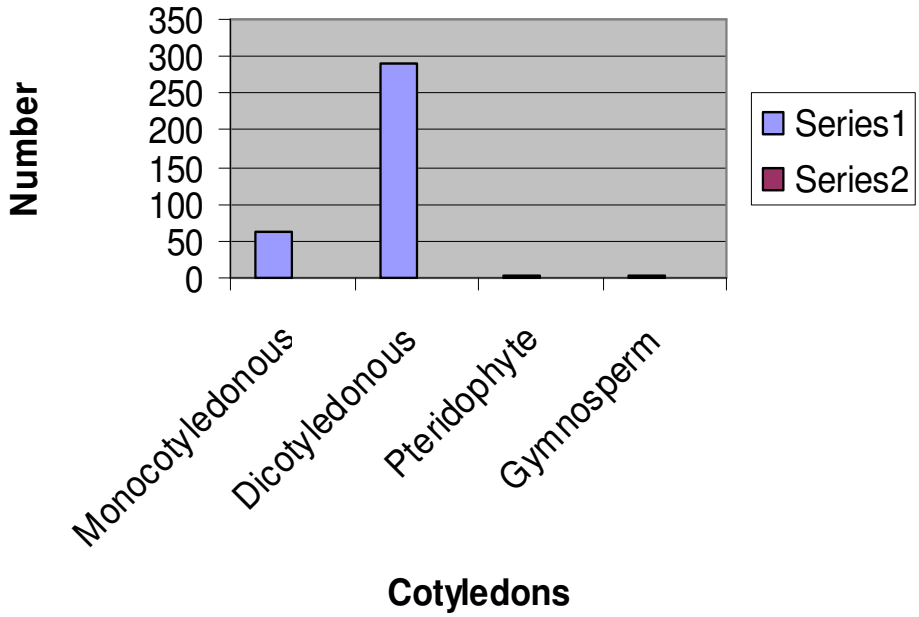


**Figure 2.** Species distribution by presence of cotyledons.

aspect and adaptability of many forest plants. The problem of deforestation in peculiar in developing countries, but it is made more pathetic in Nigeria due to an exploding population and unavailability, high cost and erratic supply of power and energy, thus a large segment of the Nigerian population depend on fuel wood for cooking.

The exploration and collection activities of germplasm in the southern part of the country by scientists from NACGRAB between 2006 and 2008 revealed that illegal farming activities - especially in the forest reserves - forest fires and unsustainable exploitation, accentuated by corrupt and selfish interests by the leaders and policy makers have contributed to the diminishing rate of Nigerian forests and bioresources. A visit to the Awi Forest reserve, Cross River state in early 2008 revealed a pathetic situation of disappearance of the forest, replaced by farming and cultivation of food crops. The forest observed in the same forest reserve in 2007 has disappered in January 2008. This is just one out of the hundreds of such cases in Nigerian forest reserves.

Since we cannot do without exploiting the available bioresources to our advantage, there has to be a balance between the uses of bioresources and their conservation (Uyoh et al., 2003) In this way, we would preserve an ecosystem, which although altered would still be rich in bioresources and at the same time would provide food and other needs as well as perform vital environmental functions on a long term basis (Uyoh et al., 2003). These plant genetic resources have a lot of ecological functions, such as the control of flood, soil erosion, landslides and hurricanes, maintenance of water quality, climate amelioration and checking desertification (Okoro, 1994). It is imperative to note that as the forest and plant genetic resources are destroyed, the habitat of the animals and wildlife is destroyed, thereby placing the animals at a risk of extinction.

Efficient conservation of plant genetic resources can best be achieved through an appropriate combination of *in situ* (in natural or original areas) and *ex situ* (in artificial habitat or habitat different from the original one) methods (IPGRI, 2001). However, the failure to maintain most of the forest reserves, game reserves and other *in situ* conservation sites in the Nigeria leaves no other option than the *ex situ* conservation method, of which the establishment of a Field Genebank is one.

The establishment and use of the Field Genebank for conservation of the recalciterant, tree, roots and tuber crops and medicinal plants in NACGRAB has proved very useful and there is protection and security for the plant germplasms, which is lacking in the *in situ* gene banks and reserves in various locations in the country.

The only challenge with establishment of Field Genebank is the adaptability of the plants to the new habitat which is different from their natural habitat. However, the location of the gene bank in Ibadan was a good choice in terms of climatic conditions. Plants that are well adapted to the savanna region can still do well under the environ-mental and climatic conditions obtainable in Ibadan, while plants collected from the down south with more moist climatic condition can also do well in Ibadan, since the climatic condition in Ibadan has a narrow variance with the climatic conditions in such areas. Observations from the plants collected from Cross River state and established on the field, such as *Poga*

tability in their 'new' habitat. Therefore, one could conclude that the climatic condition in Ibadan was more of a 'buffer' or transitory between the moist rainforest climate and the savanna climate, with respect to the adaptability of plants from various parts of the country. However, in order to increase and enhace the conservation efforts of NACGRAB and Nigeria at large, there is the need to establish *ex situ* live collection (field genebank) at all the different ecological zones of the country.

## Conclusion

The purpose of establishing the Field Genebank is to establish and conserve plant genetic resources, with more priority on the threatened and endangered and endemic plant species. As observed, some of the plants identified and established in the Field Genebank are endangered economic tree crops such as *Melicia excelsa*, *Triplochiton scleroxylon*, *Ceiba petandra*, *Entandrophagma cylindricum*, *Erythrina senegalensis*, *Pausinystalia johimbe*, *Khaya* sp., *Thaumatococcus danielli* and so on. There is still more to be done in the area of collection of the endangered plant species such as *Okoubakha aubrevillei*, *Lophira alata*, *Entandrophagma utile*, *Allamblakia floribunda*, *Trichoscypha* sp., *Diospyros* sp., *Gnetum africanum*, *Dialium guineense*, *Gongronema latifolium* and a host of others.

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