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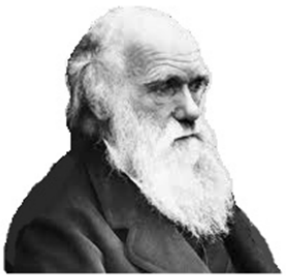

World News of Natural Sciences

An International Scientific Journal

WNOFNS 24 (2019) 36-53 EISSN 2543-5426

Preliminary inventory of the vegetation at the proposed site of Ekiti State University Botanical Garden

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ABSTRACT

A preliminary inventory of the vegetation at the proposed site of the botanical garden of Ekiti State University was carried out with a view to providing baseline information about the richness, distribution, economic and medicinal importance of the available plant species. This is to serve as fundamental knowledge for a periodical assessment of impact as the garden is fully established. The proposed site measures 1,944 m^2 in size. With the aid of a geographical compass, the entire land area was divided into four axes (i.e. north-, south-, east- and west-wards) to serve as a guide for enumerating the plant species and assessing their pattern of distribution. Plant collections were made from the four axes by means of secateurs and vasculum and thereafter prepared as herbarium specimens which were stored in the University Herbarium. Forty plant families, comprising eighty-four species were noted for the inventory. The economic and medicinal importance of the plant species was recorded. As at the period of the exercise, five plant species were abundant, twenty-three were occasional, while fifty-six were rare. It was deduced that the site is a secondary forest, rich in plant species and would be less costly to be prepared for the establishment of a botanical garden. Goals of sustainable development and species conservation were set for the management of the said garden.

***Keywords*:** inventory, proposed site, plant species, botanical garden, goal

(Received 02 March 2019; Accepted 20 March 2019; Date of Publication 21 March 2019)

1. INTRODUCTION

According to Wyse and Peter (1999) [38], a botanical garden is an institution holding documented collections of living plants for the purposes of scientific research, conservation, display, and education. It is a garden dedicated to the collection, cultivation, and display of a wide range of plants labelled with their botanical names. It may contain specialist plant collections, such as cacti and other succulent plants, herb gardens, plants from particular parts of the world, and so on; there may be greenhouses, shadehouses, again with special collections, such as tropical plants, alpine plants, or other exotic plants. Visitor services at a botanical garden might include tours, educational displays, art exhibitions, book rooms, open-air theatrical and musical performances, and other entertainments.

Botanical gardens are often run by universities or other scientific research organizations, and often have associated herbaria and research programmes in plant taxonomy or some other aspect of botanical science. In principle, their role is to maintain documented collections of living plants for the purposes of scientific research, conservation, display, and education, although this will depend on the resources available and the special interests pursued at each particular garden.

The origin of modern botanical gardens is generally traced to the appointment of professors of botany to the medical faculties of universities in 16th century Renaissance Italy, which also entailed the curation of a medicinal garden. However, the objectives, content, and audience of today's botanic gardens more closely resembles that of the grandiose gardens of antiquity and the educational garden of Theophrastus in the Lyceum of ancient Athens.

The early concern with medicinal plants changed in the 17th century to an interest in the new plant imports from explorations outside Europe as botany gradually established its independence from medicine. In the 18th century, systems of nomenclature and classification were devised by botanists working in the herbaria and universities associated with the gardens, these systems often being displayed in the gardens as educational "order beds". With the rapid rise of European imperialism in the late 18th century, botanic gardens were established in the tropics, and economic botany became a focus with the hub at the Royal Botanic Gardens, Kew, near London.

Core to any botanic garden is its living plant collections. An important characteristic that differentiates botanic gardens from ornamental gardens or parks is the scientific under-pinning of its living plant collections (Borsch and Lohne, 2014). Plant collections need to meet defined quality control standards, which are usually governed by a comprehensive Collections Policy (Rae, 2011). Hohn (2008) identified three documents that guide well- managed collections insuring adherence to the institution's mission – a collections management policy, a collections management manual and a collections plan. As institutions grow, it becomes necessary for each garden to rethink their collections management and expansion policies, prioritizing whether they are for research, conservation, and/or educational purposes based on space availability, staff resources and fiscal sustainability (Delmas *et al*., 2011). This will encourage better management and utility of unfocused collections that may represent inefficient resource use. In particular, the pool of both internal and external researchers utilizing collections should be expanded so as to reverse trends in the dwindling support and use of living collections (Dosmann, 2006). Effective collections management is key for the accessibility and utility of living collections for research, conservation, horticulture and education (Cibrian-Jaramillo *et al*., 2013). Plant records in a botanic garden will help ensure that the plant collections are named

and labelled accurately and documented and tracked in a plant records database. Periodic plant name verification is conducted in order to confirm an existing name, change an existing name to another name or to determine the identity of an unknown plant. This involves checking validity of names according to the code of botanical and horticultural nomenclature representing accepted taxa. Though slow and time consuming, verification is a fundamental task of curating and maintaining the integrity of a botanic garden collection (Rae, 2011), especially since the explosion of molecular genetic research has elucidated phylogenetic relationships between species and driven taxonomic corrections. Living collections serve a complementary role for field-work and herbarium studies. For plants not easily pre-served as herbarium specimens, the study of living collections is valuable for the development of monographs and floras. They are also valuable for systematic, molecular and phylogenetic studies and enable the study of plants whose original locality has been destroyed or is inaccessible (Delmas *et al*., 2011). In addition, they also serve as an excellent source for research in biogeography, plant physiology, pharmaceutical biology, conservation and restoration research (Borsch and Lohne, 2014) and can be executed by gardens of varying size (Dosmann, 2006).

Botanic gardens are well positioned to provide a leadership role in climate change research and education because of their diverse plant collections from wide geographic areas and their knowledge and data on plant systematics, distribution and physiology (Primack and Miller-Rushing, 2009; Ali and Trivedi, 2011). Primack and Miller-Rushing (2009) identified five unique characteristics of botanic gardens that provide important contributions to climate change research: 1) by growing a wide variety of plant species together in one place, botanic gardens represent valuable common garden experiments; 2) by growing diverse species together from different geographic regions of the world that would not be found growing together under natural conditions representing diversity and broad taxonomic representation, these collections facilitate comparative ecological, evolutionary and phylogenetic studies; 3) the meticulous record keeping of phenology and horticultural attributes combined with systematics research help track spring flowering and leafing out times and their links to temperature and climate change; 4) plant trading among the global network of botanic gardens has resulted in the growing of genetically similar or identical specimens at various locations throughout the world helping track growth characteristics under a wide range of conditions; and 5) knowledgeable staff at botanic gardens make valuable members of interdisciplinary research teams and are in a special position to convey the impacts of climate change to the public. In addition to living collections, herbarium collections and photographs are also valuable tools for studying climate change and plants' responses. Responses of plants to changing climate can be documented by examining past flowering information from herbarium specimens and comparing them with present flowering information (Primack and Miller-Rushing, 2009). Dated photographs when compared with current observations can also be informative in examining impacts of temperature on flowering times to see if plants are now flowering earlier than in the past. Education and Outreach Botanic gardens play an important role in raising public awareness about threats to plant diversity and the con-sequences of biodiversity loss on human well-being (Borsch and Lohne, 2014).

Botanic gardens worldwide reach over 200 million people each year and represent a huge opportunity for providing informal education to a broad spectrum of society about the crucial role of plants in supporting ecosystem and human health (Schulman and Lehvavirta, 2011; Borsch and Lohne, 2014). Programs targeting specific audiences such as children, adults and professional educators should continue to be developed and advanced. Education in botanic

gardens can come in a variety of forms: children's summer camp, family programs, school programs such as field trips, teacher training and development, adult education and certification programs as well and student internships. Programming, or mediating visitor experiences, is influenced by the quality of the program and the opportunity for the participants to make personal connections. Features influencing the success of programs include: place-based programs that relate to a particular location motivating interest; project-based programs that use hands-on, interactive approaches; developmentally appropriate pro-grams that meet the needs of the specific audience served; internal collaborations utilizing the expertise of multiple departments within the gardens; programs linked to local school curricular standards; and periodic program evaluation to ensure the programs are meeting intended goals (Benveniste and Schwarz-Ballard, 2011).

With the urbanization of our society, knowledge about agricultural systems and growing food plants is waning. Located predominantly in urban areas, botanic gardens are well placed to play a critical role in addressing the issue of food security (Miller *et al.*, 2015). Display of agricultural plants in botanic gardens is not a new concept. In fact, the role of botanic gardens as field museums of agriculture was proposed in the early twentieth century (Blakeselee, 1910). Today, many botanic gardens display individual food plants, often in the tradition of the Victorian exotic aesthetic, though few botanical institutions display food crops in the context of production agriculture. Nonetheless, botanic gardens are well positioned to educate the public by providing the full picture of the agricultural landscape through presenting crop plants and agricultural technologies common on farms such as agrochemical use, conventional and sustainable cropping systems, biotechnology and mechanization.

Over the years, botanical gardens, as cultural and scientific organizations, have responded to the interests of botany and horticulture. Nowadays, most botanical gardens display a mix of the themes mentioned and more; having a strong connection with the general public, there is the opportunity to provide visitors with information relating to the environmental issues being faced at the start of the 21st century, especially those relating to plant conservation and sustainability (Krishnan and Novy, 2016).

Botanic gardens have aspects of nature and leisure, offering unique experiences that may impact visitors' individual well-being (Kohlleppel *et al*., 2002). As aesthetically pleasing physical environments, gardens can be utilized to reduce social challenges brought about by various societal stresses, thereby increasing the well-being of people such as increased life expectancy (Schulman and Lehvavirta, 2011). Kohlleppel *et al*. (2002) cite work by Owen in 1994 who measured the blood pressure of visitors to the Wichita Gardens in Kansas and found a decrease in the systolic blood pressure significantly after their visit and by Bennett in 1995 who found a decrease in perceived stress by most visitors to the Brooklyn Botanic Garden and the New York Botanical Garden. The study by Kohlleppel *et al*. (2002) conducted at three botanic gardens in Florida found that botanic gardens could be places for coping with the effects of stress. The literature on the curative impacts of exposure to green spaces and plants continues to grow with meaningful advances in relation to cognitive health (Berman *et al.*, 2008), mental health (Shaw, 2015), depression (Rappe and Kivela, 2005) and recovery from surgery (Ulrich, 1984).

According to Durugbo *et al*. (2012), Plants are of great importance in the environment. They help in conserving soil fertility, prevention of erosion, recycling of oxygen and water. They also provide shade, seeds, fruits, timber, vegetables, and medicines for man and his livestock. Since the first earth summit in Rio de Janeiro, there has been a sustained global

awareness of the importance of the superfluity of biodiversity and natural resources from tropical forests for several purposes. This stems not only from the derivable forest products but also from the potent ethno-botanical and ethno-medicinal uses of the plants in these forests. The world's tropical rain forests are especially rich in biodiversity but there is rapid depletion of these natural resources in Nigeria and possibly worldwide (Ayodele, 2005). These pressures which arise from degradation, unsustainable arable land use, urbanization and industrialization are taking their toll as well (Obute and Osuji, 2002; Ayodele, 2005). The plant genetic resources of Nigeria, according to Gbile and Adesina (1986), are a veritable source of pharmaceuticals and therapeutics. According to WHO (2001), 80% of the world population or roughly two thirds of the world's population, rely almost exclusively on traditional medicines using natural substances mostly derived from plants in the treatment of diseases. In African countries, this rate is much higher (OMS, 1983).

All over the world, studies of the vegetation of different areas are undertaken to document the flora, especially in these days of remarkable genetic losses due to over exploitation of forests and its products (Oren *et al*., 2007; Uyar *et al*., 2007; M'endez *et al.*, 2008; Betti and Lejoly, 2009).

Soladoye *et al*. (2005) had studied the angiosperm community in the permanent site of Olabisi Onabanjo University, Ago Iwoye, Ogun State, Nigeria with the aim of conserving them for posterity especially during the development of the new University campus. They listed one hundred and thirty eight species (138) belonging to fifty-five families. There were one hundred and twenty seven dicotyledonous species while monocots were eleven. Leguminosae appeared the dominant family followed successively by Rubiaceae and Euphorbiaceae. Furthermore, they encountered fifty four trees, forty three shrubs, ten climbers, twenty eight herbs, and three grasses/sedges.

Ubom (2010) documented the ethnobotanical and biodiversity conservation of plant resources in the Niger Delta Nigeria and listed about three hundred and thirty nine plant species which are used by the Niger Delta dwellers for purposes such as medicinal, food/condiments, fuel, commercial uses (fruits, beverages, timber, spices, thickeners, etc). Commonest among these were *Acanthus montanus*, *Anthocleita vogelii*, *A. djalonensis*, *Antiaris africana*, *Alstonia boonei*, *A. congoensis*, *Elaeis guinensis*, *Raphia hookeri*, *Dacryodes edulis*, *Cocos nucifera*, *Irvingia gabonensis*, *Hevea brasiliensis*, *Pterocarpus santalinoides*, *Lonchocarpus cayanescens*, *Milicia excelsa*, *Daniellia ogea*, *Newbouldia laevis*, *Napoleoona vogelii*, *Mimosa pigra*, *Nauclea diderrichii*, *Musanga cecropioides*, *Paullinia pinnata* and a host of others.

2. MATERIALS AND METHODS

Study site: The proposed site for the establishment of the Botanical Garden of Ekiti State University is on 7º42'13" North, 5º15'14" East. This falls within the moist equatorial/tropical rainforest belt of Nigeria known for its rich reserve of economic and medicinal plants. The site is 1,944 m^2 in size.

Preparation of herbarium specimens: The site was divided with the aid of geographical compass into four geographical axes, i.e. the North, East, West and South. Plant parts such as leaves, flowers and fruits were collected using a secateurs and vasculum. Parts of tall trees were got using a wooden pole. These collections were made from each of the four axes and the

samples were taken, poisoned and pressed. The papers were changed daily until well dried. The dried samples were preserved in the Herbarium of Ekiti State University.

Plant identification: Identification was done using Flora of West Tropical Africa (Hutchinson and Dalziel, 1968); Nigerian Trees (Keay *et al*., 1964); Guide to West African Weeds by Akobundu and Agyakwa (1987) and Handbook of African Medicinal Plants by Iwu (1993). The plants were identified to families, genera, and species.

Plant authentication: Authentication was done by Mr. Omotayo Felix of the Ekiti State University Herbarium Ekiti State.

Period of research: The research work was carried out during raining season of the months of April till August in the year 2018.

Plant species enumeration: Enumeration of the species was by counting on sight.

Relative abundance: The relative abundance of the species was reported as abundant, frequent, occasional, and rare. Plants less than 5 individuals were taken as Rare while 5-10 individuals were taken as Occasional, 11-30 individuals were taken as Frequent and over 30 individuals were taken as abundant.

3. RESULTS

The results of the inventory have been summarized in **Tables 1-6**. Forty (40) different plant families, comprising 101 species were identified. Their habits, relative abundance and distribution across the four (4) geographical axes were considered.

In general, the plant families identified were Acanthaceae, Amaranthaceae, Amaryllidaceae, Anacardiaceae, Apocynaceae, Aracaceae, Asteraceae, Bignonaceae, Clusiaceae, Combretaceae, Commelinaceae, Convovulaceae, Cucurbitaceae, Cyperaceae, Dioscoreaceae, Euphorbiaceae, Fabaceae, Icacinaceae, Lecythidaceae, Loganiaceae, Loranthaceae, Malvaceae, Marathaceae, Melastomataceae, Moraceae, Musaceae, Onagraceae, Passifloraceae, Poaceae, Portulacaceae, Rubiaceae, Sapindaceae, Simaroubaceae, Solanaceae, Spigeliaceae, Sterculiaceae, Thelypteridaceae, Tiliaceae, Ulmaceae and Vitaceae (**Table 1**).

Asystasia gangetica, Indigofera hirsuta, Sida garckeana, Brachiaria spp. and *Panicum maximum* were abundant in the proposed site. Contrariwise, the rare species were *Amaranthus spinosus, Anacardium occidentale, Mangifera indica, Pseudospondias microcarpa, Alstonia boonei, Rauwolfia vomitoria, Newbouldia laevis, Spathodea campanulata, Harungana madagascariensis, Combretum racemosun, Quisqualis indica, Aneleima* spp, *Commelina* spp, *Lepistemon owariensis, Mariscus alternifolius, Dioscorea cayenensis, Dioscorea esculenta, Acalypha indica, Alchornea cordifolia, Ricinodendron heudelotii, Albizia feruginea, Baphia nitida, Brachystegia eurycoma, Dalbergia saxatilis, Dialium guineense, Dioclea reflexa, Lonchocarpus cyanescens, Lonchocarpus sericeus, Piptadenastrium, africanum, Pterocarpus santalinoides, Icacina tricantha, Napoleona vogeli, Anthocleista djalonensis, Anthocleista vogeli, Tapinanthus dodoneifolius, Hibiscus* spp., *Marantochloa* spp, *Ficus exasperate, Ficus mucoso, Ficus sur, Milicia excels, Musa* spp, *Adenia cissampeloides, Bambusa vulgaris, Olyra latifolia, Oplismenus burmannii, Portulaca quadrifida, Sarcocephallus latifolius, Blighia sepida, Lecaniodiscus cupaniodes, Quassia undulate, Corchorus olitorius, Glyphaea brevis, Trema orientalis, Cissus* spp. and *Cissus quadrangularis*. Similarly, the frequent species were

Aspilia africana, Chromolaena odorata, Tithornia diversifolia, Ipomea involucrata, Scleria verrucosa, Euphorbia heterophylla, Centrosema pubescens, Gliricidia sepium, Sida rhombifolia, Urena lobata, Chloris pilosa, Paspalum notatum, Talinum fruticosum, Chassalia kolly, Spigelia anthelmia, Sterculia tragacantha and Pneumatopteris afra. Furthermore, the occasional species were *Crinum glaucum, Spondias mombin, Elaeis guineensis, Vernonia amygdalina, Momordica charantia, Dioscorea rotundata, Alchornea laxiflora, Margaritaria discoidea, Albizia zygia, Tapinanthus bangwensis, Melastomastrum capitatum, Antiaris toxicaria, Ludwigia abyssinica, Adenia lobata, Passiflora foetida, Macroshyra longistyla, Allophylus africanus, Deinbollia pinnata, Paullinia pinnata, Capsicum frutescens, Triumfetta cordifolia, Triumfetta rhomboidea* and *Cissus aralioides.*

Some of the economic and medicinal plants noted at the proposed site were *Adenia cissampeloides, Adenia lobata, Amaranthus spinosus, Aneilema* spp., *Aspilia africana, Asystasia gangetica, Brachiaria* spp., *Capsicum frutescens, Centrosema pubescens, Chloris pilosa, Chromolaena odorata, Combretum racemosun, Commelina* spp., *Corchorus olitorius, Dalbergia saxatilis, Dioscorea cayenensis, Dioscorea esculenta, Diocorea rotundata, Euphorbia heterophylla, Hibiscus* spp., *Icacina tricantha, Indigofera hirsuta, Ipomea involucrata, Lepistemon owariensis, Maranthochloa* spp., *Melastomastrum capitatum* and *Mormodica charantia* (**Table 2**).

Table 1. Plant species at the proposed site and their relative abundance

S/N	Family name	Botanical name & authority	Common name	Abodance
1	Acanthaceae	*Asystasia gangetica.* L. T. Anderson	Asystasia	Abundant
2	Amarantheceae	*Amaranthus Spinosus*. L.	Spiny Amaranth	Rare
3	Amaryllidaceae	*Crinum Glaucum* A. Chev	Bulbulias Crinum	Occasional
4	Anacardiaceae	*Anacardium occidentale.* L. *Mangifera Indica*. L. *Pseudospondias microcarpa.* (A. Rich.) Engl. *Spondias Mombin*. L.	Cashew tree Mango Tree False spondias Yellow mombin	Rare Rare Rare Occasional
5	Apocynaceae	*Alstonia Boonei* *Rauvaltia vomitoria* Afzel.	Cheese wood Poison devil's pepper	Rare Rare
6	Arecaceae	*Elaeis guineensis*. Jaca	African oil palm	Occasional
7	Asteracear	*Aspilia Africana.* Pers. C. D Adams *Chromolaena odorata*. L. R.M. King & H. Rob *Tithornia diversifolia* Hemsl. A. Gray *Vernonia emygdalina.* Del.	Wild sunflower Siam weed Mexican sunflower Bitter leaf	Frequent Frequent Frequent Occasional

8	Bignonaceae	*Neubouldia laevis.* P. Beauv *Spathodea campanulata*	Chieftaincy leaf African tulip tree	Rare Rare
9	Clusiaceee	*Harungana medagascariensis.* Lam. Ex poir.	Dragon's blood tree	Rare
10	Combretaceae	*Combretum racemosun.* P. Beauv *Quisqualis indica.* Linn.	Christmas rose Rangoon creeper	Rare Rare
11	Commelinaceae	*Aneilema ssp.* R. Br. *Commelina spp.* L.	Aneilema Day flower	Rare Rare
12	Convolvulaceae	*Ipomoea involucrate.* P. Beav. *Lepistemon owariensis.* P. Beauv. Hallier. F ex De wild	Frog's gourd lepistemon	Frequent Rare
13	Cucurbitaceae	*Momordica charantia.* L.	Bitter melon	Occasional
14	Cyperaceae	*Mariscus alternifolius.* Vahl. *Scleria verrucosa.* Wild.	Mariscus Rice weed	Rare Frequent
15	Dioscoreaceae	*Dioscorea cayenensis.* Lam. *Dioscorea esculenta.* Lour. *Dioscorea rotundata.* Poir.	Yellow yam Potato yam White yam	Rare Rare Occasional
16	Euphorbiaceae	*Acalypha indica.* L. *Alchornea cordifolia.* (Schum. & Thornn.) Mull.-Arg *Alchornea laxiflora.* Benth. Pax & K. Hoffm. *Euphorbia heterophylla.* L. *Margaritaria discoidea.* (Baill.) G.L. Webster. *Ricinodendron heudelotii.* Baill.	Indian acalypha Christmas bush Lowveld bead-string Milk weed Pheasant berry/ margaritaria African nut-tree	Rare Rare Occasional Frequent Occasional Rare
17	Fabaceae	*Albizia feruginea.* Guill. & Perr. *Albizia zygia.* DC. JF Macbride. *Baphia nitida.* Lodd. *Brachystegia eurycoma.* Harms. *Centrosema pubescens.* Benth. *Dalbergia saxatilis.* Hook. F. *Dialium guineense.*willd. F. *Dioclea reflexa.* Hook. F. *Gliricidia sepium.* (Jacq.) Walp. *Indigofera hirsuta.* Linn. *Lonchocarpus cyanescens.* (Schum. Thonn.) Benth. *Lonchocarpus sericeus.* (Poir.) HB & K *Piptadenastrum africanum.* (Hook. F.) Brenan. *Pterocarpus santalinoides.* L'Herit. Ex DC.	albizia West African walnut Camwood Naga wood Butterfly pea Dalbergia Black timber Marble plant Quick stick Hairy indigo Yoruba indigo Senegal lilac African greenheart Pterocarpus	Rare Occasional Rare Rare Frequent Rare Rare Rare Frequent Abundant Rare Rare Rare Rare
18	Icacinaceae	*Icacina tricantha.* Oliv.	Icacina	Rare

19	Lecythidaceae	*Napoleona vogelli.* Hook. & Planch.	Napoleona	Rare
20	Loganiaceae	*Anthocleista djalonensis.* A. Chev. *Anthocleista vogelli.* Planch.	Cabbage tree Cabbage tree	Rare Rare
21	Loranthaceae	*Tapinanthus bangwensis.* Engl. & Krause. *Tapinanthus dodoneifolius.* (DC.) Danser	African mistletoe African mistletoe	Occasional Rare
22	Malvaceae	*Hibiscus sabdarifa.* L. *Sida garckeana.* Polak. *Sida rhombifolia.* L. *Urena lobata.* Linn.	Wild Hibiscus Wire weed, iron weed Broom jute Caesar weed	Rare Abundant Frequent Frequent
23	Marathaceae	*Marantochloa spp.* Brongn. ex Gris.	Maranthochloa	Rare
24	Melastomataceae	*Melastomastrum capitatum.* (Vahl.) A & R. Fernandes.	Melastomastrum	Occasional
25	Moraceae	*Antiaris toxicaria.* Lesch. *Ficus exasperata.* Vahl. *Ficus mucoso.* Welw. *Ficus sur.* Forssk. *Milicia excelsa.* (Welw.) C.C. Berg.	False iroko/upas tree Native sand paper tree The 'Oguro' tree Cape fig African teak/Iroko tree	Occasional Rare Rare Rare Rare
26	Musaceae	*Musa spp.* L.	Banana/plantain	Rare
27	Onagraceae	*Ludwigia abyssinica.* A. Rich	Ludwigia	Occasional
28	Passifloraceae	*Adenia cissampeloides.* (Planch.) Harms ex Hook *Adenia lobata.* (Jacq.) Engl. *Passiflora foetida.* L.	Wild granadilla/ monkey rope Adenia Stinking passion flower	Rare Occasional Occasional
29	Poaceae	*Bambusa vulgaris.* (Schrad.) *Brachiaria mutica.* (Irwin) Griseb. *Chloris pilosa.* Schumach. & Thonn. *Olyra latifolia.* L. *Oplismenus burmannii.* (Retz.) P. Beauv. *Panicum maximum.* Jacq. *Paspalum notatum.* Flugge.	Common bamboo Brachiaria grasses Chloris Carrycillo Burmann's basket grass Buffalo grass Bahia grass	Rare (at least 300 per stand) Abundant Frequent Rare Rare Abundant Frequent
30	Portulacaceae	*Portulaca quadrifida.* L. *Talinum fruticosum.* (L.) Juss.	Chicken weed Water leaf	Rare Frequent

31	Rubiaceae	*Chassalia kolly.* (Schumach.) Hepper. *Macroshyra longistyla.* (DC.) Hook. F. *Sarcocephallus latifolius.* (JE.SM.) EA Bruce.	Chassalia Mano, macrosphyra, Typhoid plant. African peach	Frequent Occasional Rare
32	Sapindaceae	*Allophylus africanus.* P. Beauv. *Blighia sepida.* K.D. Koenig. *Deinbollia pinnata.* Schum. & Thonn. *Lecaniodiscus cupaniodes.* Planch. *Paullinia pinnata.* Linn.	African false currant Ackee apple tree Deinbollia Lecaniodiscus paullinia	Occasional Rare Occasional Rare Occasional
33	Simaroubaceae	*Quassia undulata* (Guill. & Perr.) D. Dietr.	Quassia, the 'Afo' tree	Rare
34	Solanaceae	*Capsicum frutescens.* Linn.	Hot pepper, chilli pepper	Occasional
35	Spigeliaceae	*Spigelia anthelmia.* Linn.	Worm grass	Frequent
36	Sterculiaceae	*Sterculia tragacantha.* Lindl.	African tragacanth	Frequent
37	Thelypteridaceae	*Pneumatopteris afra.* (H. Christ) Holttum.	Waterside fern, Imu plant	Frequent
38	Tilaceae	*Corchorus olitorius.* Linn. *Glyphaea brevis.* (Spreng.) Monachino *Triumfetta cordifolia.* A. Rich.) *Triumfetta rhomboidea.* (Jacq.)	Jute mallow Glyphaea, whip shrub, Burbark / triumfetta Diamond burbark	Rare Rare Occasional Occasional
39	Ulmaceae	*Trema orientalis.*(Linn.) Blume.	Charcoal tree, the 'afefe' tree	Rare
40	Vitaceae	*Cissus aralioides.* (Welw.) Planch. *Cissus spp.* (Linn.) *Cissus quadrangularis.* L.	Cissus Woody vine Veld grape	Occasional Rare Rare

Table 2. Uses of plant species at the site and their local names

S/N	Botanical name & authority	Local name (Yoruba)	Uses (economical & medical)
1	*Albiza feruginea* (Guill. & Perr.) Benth.	Ayinre ogo	It is used in preparing arrow poison. Saponin in leaves are used as fish poison
2	*Alstonia boonei* De Wild.	Awun	

3	*Bambusa vulgaris* Schrad.	Oaprun	Shoot is used in treating respiratory diseases
4	*Blighia sepida* K. D. Koenig.	Ishin	
5	*Lonchocarpus cyanescens* Schum. & Thonn.	Elu	It is used in treating sores and boils
6	*Lonchocarpus sericeus* (Poir.) HB & K	Ekikan-uro	The bark is used as a laxative, The stem is used in furniture making
7	*Milicia excelsa* (Welw.) C.C. Berg.	Igi iroko	It is an economical wood tree
8	*Neubouldia laevis* P. Beauv	Iruru, Akoko	Used in treating eye infection
9	*Piptadinastrum africanum* (Hook.f) Bernan	Abonyin	Use in treating headaches and toothache. Source of valuable timber
10	*Pseudospondias microcarpa* A. Rich	Ikanyere	Used in beads making Bark is used in treating eye ailments
11	*Anthocleista djalonesis* A. Chev	Sapo, Alaara	Used in treating skin infection and general pain.
12	*Anthocleista vogelli* Planch	Apa-oro, alapara	Used in treating skin infection and general pain.
13	*Antiaris toxicaria* Lesch.	Ooro	Fruit is edible Bark is medicinal
14	*Elaeis geuineensis* Jacq.	Igi ope	Used economically in producing palm oil and soap. Used medicinally in treating malaria
15	*Mangifera indica* L.	Igi mangoro	Bark is used in treating dysentery
16	*Pterocarpus santalinoides* (L'Herit). ex DC	Gbengbe	Harvested from the wild for food and medicinal preparation
17	*Quassia undulata* (Guill. & Perr.) D. Dietr.	Igi efo	Used in treating fever
18	*Riccinodendron heudelotti* Baill.	Erinmado	Edible oil is extracted from the seed A good source of soft wood
19	*Spathodea companulata* P. Beaiv.	Akoko	Used in treating chronic ulcer and also for skin eruption.
20	*Alchornea cordifolia* (Schum & Thonn) Mull.-Arg	Ewe Ifa	Used in the production of black dye. Used in treating hypertension
21	*Alcornea laxiflora* (Benth.) Pax & K. Hoffm.	Esinyin	Used in treating infectious disease. Branch is used as chewing stick (local tooth brush)
22	*Anacardium Occidentale* L.	Kasu	Used in treating stomach ache.

23	*Baphia nitidia* Lodd.	Iyerosun	Roots are used in making red dye It is used as an ornamental shade
24	*Cissus aralioides* (Welw.) Planch.	Adapopo	Fruits is edible raw or cooked.
25	*Cissus quadrangularis* L.	Ogbakiko	Used medically for obesity, diabetes and heart diseases
26	*Cissus quadrangularis* Linn.		Use for treatment of bone diseases and joint pains
27	*Dialum guineense* Willd.	Iredi	Bark and leaves are medicinal. It is a source of useful timber.
28	*Ficus exasperata* Vahl.	Opoto nla	An economic wood tree
29	*Ficus Mucoso* Welw.	Opoto	An economic wood tree
30	*Ficus sur* Forssk.	Opoto igbo	An economic wood tree
31	*Gliricidia sepium* (Jacq) Walp.	Agunmaniye	Cures bruises and burns
32	*Glyphaea brevis* (Spreng) Monachino	Atorin	Stem bark is used in wound dressing
33	*Harungana madagascariaensis* Lam. Ex Pior	Adidun, Arunje	Leaf is used in treating dysentery. Bark used in treating leprosy.
34	*Lecaniodiscus cupanioides* Planch	Okika	Used in medically for treating fever
35	*Margaritaria discoidea* (Baill.) G.L. Webster.	Awe	Wood is used locally mainly for poles, planks and shingles
36	*Mariscus alternifolius* Vahl.	Alubosa eranko	Use as insecticides, treatment of wounds
37	*Musa spp*. L.	Ogede	Used in the treatment of epilepsy. It is a food crop.
38	Napoleona vogelli Hook & Planch	Ito or Gbogbori	Leaf, bark, and fruit rind are used in treating cough and cartarrh
39	*Rauvolfia vomitoria* Afzel.	Asofeyeje	Use for treatment of convulsions. Diabetes. Fever. Weakness. Arthritis and cancer
40	*Spondias mombin* L.	Iyeye	Used to treat infertility
41	*Adenia cissampeloides* (Planch.) Harms.ex Hook	Arokeke	Used in treating wounds.
42	*Adenia lobata* (jacq) Engl.	Ajadigi	Leaves are prepared as soup to treat fever. Other part are also used in preparing treatments for gastrointestinal problems, cough and malaria
43	*Amaranthus spinosus* L.	Tete elegun	Root is an effective diuretic.

			Decoction of roots is used to treat gonorrhea, excessive menstruation, snake bite etc.
44	*Aneilema acuminatum* R.Br.	Itopere	Used in treating skin disorders.
45	*Aspilia africana* Perss.	Yunriyun	Used in treating injuries.
46	*Asystasia gangetica* (L.)	Sekeri	Leaves are eaten as vegetables. It is used in management of asthma
47	*Brachiaria mutica* (Trin.)		It is cultivated for forage
48	*Capsicum frutescens* Linn.	Ata were	Fruit, raw or cooked is hot and used for flavoring. It is used medicinally as gastrointestinal detoxifiers
49	*Centrosema pubescens* Benth.	Ewa ahun	It is widely used as forage and a good source of protein to cattle.
50	*Chloris pilosa* schumach & Thonn.	Gbegisono	It is widely used for forage
51	*Chromolaena odorata* L.	Akintola, awolowo	Leaf is used in treating dysentery
52	*Combretum racemosun* P.Beauv.	Ogan-ibule	It is used in wound dressing
53	*Commelina* spp. L.	Ileke opolo	It is a medicinal herb. Dye obtained from petals are used in painting.
54	*Corchorus olitorius* Linn.	Ewedu	It is an edible vegetable. It is used medicinally as a blood purifier.
55	*Dalbergia saxatilis*	Elemoso	It is used in treating of cough, small pox and toothache
56	*Diosscorea cayenensis* Lam.	Isu olo	It is a food crop. It is used as an anti-diarrhea
57	*Dioscorea esculenta* Lour.	Isu ewura	Tuber is used as food
58	*Dioscorea rotundata* Poir.	Kukundu	Tuber is used as food
59	*Euphorbia heterophylla* L.	Egele	It is taking as purgative and laxative to treat stomach ache and constipation.
60	*Hibiscus sabdariffa* L.	Abiskosi igbo	Flowers and other parts of plant are used to make medicine for conditions such as high blood pressure, high cholesterol and many others.
61	*Icacina tricantha* Oliva	Oruntan	The fruit is edible. The root cooked is edible.

			Other Part of the plant is used externally to heal soft tumors.
62	*Indigofera hirsuta* Linn.		It is a source of dye for tie and dye.
63	*Ipomoea involucrata* P. Beauv.	Alukorese	Leaves are used for treating pulmonary troubles
64	*Lepistemon owariensis* P. Beauv.	Ewe-jenjoko	It is a vegetable of local use
65	*Marantochloa cuspidata* (Roscoe) Milne-Redh	Okigbo	Stems are widely used in construction. Leaves are used in thatching and wrapping. Plant is also used for making traditional medicine.
66	*Melastomastrum capitatum* (vahl.) A & R.Fernades.	Jagunmorasin	Leaves is used in treating dysentery
67	*Mormodica charantia* L.	Ejinrin	It is used in treating pile, diabetes, convulsion, night blindness etc

4. DISCUSSIONS

Ekiti State University is the only State-owned University in the State and has not got a Botanical Garden since inception. Recently, it got a proposed site.

Before it commences operation, the present researcher taught it wise to carry out a preliminary inventory of the vegetation at the site proposed for the establishment of the garden. This is with a view to providing baseline information about the site that would be useful for the day-to-day research and impact assessment activities in the garden.

Given the results of the present inventory, it suffices to infer, that the proposed site is a secondary forest that has suffered less from anthropogenic and agronomic impacts. The number of families, genera and species of plants captured in the present inventory makes the site recommendable for the establishment of a Botanical garden. This is because the plant resources/diversity characteristic of the site are assets for academic activities such as teaching and research in the fields of plant taxonomy, plant morphology, plant conservation, plant ecology, ethno-botany and horticulture. It will also be a useful source of raw materials for the management of the university herbarium. These assertions are in line with those of Wyse and Peter (1999), Hardwick *et al*. (2011), Williams (2011) and Spencer and Cross (2017).

When fully established, it is expected that education programs that could create awareness of the threat to earth's ecosystems from human overpopulation and its consequent need for biological and physical resources would be floated among others. This opinion supports the ones made by Heywood (1987) that Botanical gardens provide an excellent medium for communication between the world of botanical science and the general public. Thus, education programs can help the public develop greater environmental awareness by understanding the meaning and importance of ideas like conservation and sustainability.

The presence of a gentle flowing stream at the proposed site would assist, to a large extent, the horticultural activities that will likely be taking place at the garden, such like the raising of

ornamental plants, tendering of medicinal plants and vegetable seedlings, establishment of screen house, etc. These proposed tasks laid ahead of the operations of the garden are worthwhile as these are part of the activities in well managed botanical gardens, such as the Royal Botanical Gardens, Kew, England; Jardim Botanico, Rio de Janeiro, Brazil; Brooklyn Botanic Garden, New York, United States; Singapore Botanic Garden, Singapore; Berlin-Dahlem Botanical Garden and Botanical Museum, Berlin, Germany; Kirstenbosch National Botanical Garden, Cape Town, South Africa; Montreal Botanical Garden, Montreal, Canada; Nong Nooch Tropical Botanical Garden, Chonburi Province, Thailand; Denver Botanic Gardens, Denver, United States and Acharya Jagadish Chandra Bose India Botanic Garden, Kolkata, Indian.

Based on the results of the present inventory, it suffices to point out that the proposed site for the Botanical Garden is rich in species notable for medicinal values. Examples of some of the medicinal plants are *Vernonia amygdalina, Melastomastrum capitatum, Mormodica charantia, Chromolaena odorata, Combretum racemosum, Dalbergia saxatilis, Corchorus olitorius, Adenia lobata, Alstonia boonei, Piptadinastrum africanum, Pseudospondias microcarpa, Lonchocarpus cyanescens, Antiaris toxicaria*, etc. The task of conserving these medicinal plants also lies ahead of the operation of the proposed garden.

Also worthy of report is the occurrence of economic trees in the proposed site. Examples are *Elaeis guineensis, Mangifera indica, Riccinodendron heudelotti, Ficus exasperata, Dialum guineense, Ficus mucoso, Ficus sur, Margaritaria discoidea, Alcornea laxiflora*, etc. These could be conserved for useful purposes.

5. CONCLUSION

The preliminary inventory of the vegetation of the site of the proposed botanical garden has been produced. Hence, the need for sustainable development of the site and conservation of the species in order to meet the standard of top best ten botanical gardens of the world should be the goal of the management of the garden. It will be commendable if more species of plants are tendered and added to the existing ones and the size of the garden enlarged in the nearest future.

References

[1] Akobundu I.O. and Agyakwa, C.W. (1987). Guide to West African Weeds. IITA, Ibadan, Pages: 522.

[2] Ali N.S. and Trivedi C. (2011). Botanic gardens and climate change: a review of scientific activities at the Royal Botanic Gardens, Kew. *Biodiversity and Conservation.* 20: 295-307

[3] Ayodele A.E. (2005). The medicinally important leafy vegetables of South West Nigeria. *Ethnobotanical Leaflets* 1 (16): 1-6

[4] Benveniste P. and Schwarz-Ballard J. (2011). Formal education for students, teachers, and youth at public gardens. In: *Rakow DA, Lee SA, editors. Public Garden*

Management: a Complete Guide to the Planning and Administration of Botanical Gardens and Arboreta. John Wiley & Sons, Inc., Hoboken, New Jersey, USA.190–204.

[5] Berman M.G., Jonides J., and Kaplan S. (2008). The cognitive benefits of interacting with nature. *Psychological Science* 19(12), 1207-2012

[6] Betti J.L. and Lejoly J. (2009). Contribution to the knowledge of medicinal plants of the Dja biosphere reserve, Cameroon: Plants used for treating jaundice. *Journal of Medicinal Plants Resources* 3: 1056-1065

[7] Blakeselee A.F. (1910). The botanic garden as a field museum of agriculture. *Science.* 31: 685-88

[8] Borsch T. and Lohne C. (2014). Botanic gardens for the future: integrating research, conservation, environmental education and public recreation. *Ethiopian Journal of Biological Science.* 13, 115-133

[9] Cibrian-Jaramillo A., Hird A., Oleas N., Ma H., Meerow A.W., Francisco-Ortega J., *et al.* (2013). What is the conservation value of a plant in a botanic garden? Using indicators to improve management of ex situ collections. *Botanical Review* 79: 559 77

[10] Dosmann M.S. (2006). Research in the garden: averting the collections crisis. *Botanical Review* 72(3): 207-34

[11] Durugbo E.U., Oyetoran B.O., and Oyejide N.E. (2012). Vegetation inventory of the Redemption Camp, Ogun State, Nigeria; Evaluation of Medicinal Plant Resources and Strategies for Conservation. *Journal of Biological Sciences*, 12: 34-42

[12] Gbile Z.O. and Adesina S.K. (1987). Nigerian flora and its pharmaceutical potential. *Journal of Ethnopharmacology.* 19: 1-16

[13] Hardwick K.A., Fielder P., Lee L.C., Pavlik B., Hobbs R.J., Aronson J., *et al*. (2011). The role of botanic gardens in the science and practice of ecological restoration. *Conservation Biology* 25(2): 265-75

[14] Heywood V.H. (1987). The changing role of the botanic gardens. In Bramwell, David *et al*. Botanic Gardens and the World Conservation Strategy. London: *Academic Press*. Pp. 3-18

[15] Hohn T.C. (2008). Curatorial Practices for Botanical Gardens. AltaMira Press, Plymouth, UK.

[16] Hutchinson J. and Dalziel J.M. (1968). Flora of West Tropical Africa. In: Crown Agents for Overseas, Keay, R.W.J. and F.N. Hepper (Eds.). Government and Administrations, London, UK.

[17] Iwu M.M. (1993). Handbook of African Medicinal Plants. 2nd Edn, CRC Press, Boca Raton, FL., USA, ISBN-13: 9780849342660, Pages: 435.

[18] Keay R.W.J., Onochie C.F.A., and Stanfield D.P. (1964). Nigerian Trees. Vol. II, Department of Forest Research, Ibadan, Nigeria.

[19] Kohlleppel T., Bradley J.C., and Jacob S. (2002). A walk through the garden: can a visit to a botanic garden reduce stress? *HortTechnology* 12 (3): 489–92

[20] Krishnan S. and Novy A. (2016): The role of botanic gardens in the twenty-first century. *CAB Reviews Perspectives in Agriculture Veterinary Science Nutrition and Natural Resources* 11(023): 1-10

[21] M´endez M., Garc´ıa D., Maestre F.T., and Escudero A. (2008). More ecology is needed to restore Mediterranean ecosystems: a reply to Valladares and Gianoli. *Restoration Ecology* 16: 210-216

[22] Miller A.J., Novy A., Glover J., Kellogg E.A., Maul J.E., Raven P., *et al*. (2015). Expanding the role of botanical gardens in the future of food. *Nature Plants* 1: 15078

[23] Obute G.C. and Osuji L.C. (2002). Environmental awareness and dividends: A scientific discourse. *African Journal of Interdisciplinary Studies* 3: 90-94

[24] OMS, 1983. Medecine Traditionnelle et Couverture des Soins de Sante. OMS, Geneve, Suisse, Pages: 335.

[25] Oren M., Uyar G., and Keceli T. (2007). The bryophyte flora of erdek, bandirma, manyas districts (Balikesir, Turkey). *International Journal of Botany* 3: 1-14.

[26] Primack R.B. and Miller-Rushing A.J. (2009). The role of botanical gardens in climate change research. *New Phytologist* 182: 303-13

[27] Rae D. (2011). Fit for purpose: the importance of quality standards in the cultivation and use of live plant collections for conservation. *Biodiversity and Conservation.* 20: 241-58

[28] Rappe E. and Kivelä S. (2005). Effects of garden visits on long-term care residents as related to depression. *HortTechnology*. 15(2): 298-303

[29] Schulman L. and Lehvavirta S. (2011). Botanic gardens in the age of climate change. *Biodiversity and Conservation* 20: 217-20

[30] Shaw S. (2015). The positive effects on mental health of visiting botanic gardens. *Sibbaldia* 13: 51-59

[31] Soladoye M.O., Sonibare M.A., Nadi A.O., and Alabi D.A. (2005). Indigenous angiosperm biodiversity of Olabisi Onabanjo University permanent site. *African Journal of Biotechnology* 4: 554-562

[32] Spencer R. and Cross R. (2017). The origins of botanic gardens and their relation to plant science with special reference to horticultural botany and cultivated plant taxonomy. *Muelleria* 35: 43-93

[33] Ubom R.M. (2010). Ethnobotany and biodiversity conservation in the Niger Delta, Nigeria. *International Journal of Botany*. 6: 310-322

[34] Ulrich R. (1984). View through a window may influence recovery from surgery. *Science* 224 (4647): 420-21

[35] Uyar G., Alatas M., Oren M., and Keceli T. (2007). The bryophyte Flora of Yenice Forests (Karabuk, Turkey). *International Journal of Botany* 3: 129-146

[36] Williams R.L. (2011). On the establishment of the principal gardens of botany: A bibliographical essay by Jean-Phillipe-Francois Dleuze. *Huntia*. 14 (2): 147-176

[37] WHO. (2001). Legal Status of Traditional Medicine and Complementary/Alternative Medicine: A Worldwide Review. World Health Organization, Geneva.

[38] Wyse J. and Peter S. (1999). Experimentation on a large scale - An analysis of the Holdings and Resources of Botanic Gardens. BGC News. Richmond. UK: *Botanic Gardens Conservation International* 3 (3): 53-72