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Survey of trees of ethno-botanical importance in the University of Ibadan Campus, Nigeria

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ABSTRACT

A study was conducted to survey trees of ethnobotanical importance in the University of Ibadan Campus, Nigeria. Total enumeration of trees with diameter ≥10cm at breast height (DBH) was done. DBH and total height of the trees were measured while GPS was used to record the location of the trees to map their distribution. Nearest neighbour analysis was used to determine the spatial distribution pattern of the trees. Tree identification was done by a taxonomist while the medicinal values of the plants were acquired through oral interview of indigenous respondents and herbal practitioners within and outside the University community and ethno-botanists. Results showed that there was a total of 54 species belonging to 25 families. *Mangifera indica* was the most (21.60%) recorded while *Terminalia superba* had the highest mean tree height of 29.8 m. The largest mean DBH (133.3 cm) was observed in *Adansonia digitata*. The spatial distribution pattern of trees of ethnobotanical importance was clustered (Z=-26.25; p<0.05). The study reveals that leaves and barks were the parts of the plants that are mostly used to cure ailments. The study recommended that the trees should be domesticated.

Keywords: Medicinal use, spatial distribution, DBH, ethnobotanical importance, trees

INTRODUCTION

Life on earth is fundamentally dependent on green vegetation and all aspects of life are touched by plants. The natural forests and some of today's plantations are parts of bedrock of rural economy (Kelatwang and Kaoneka 1999). Hence, pressure on plants is increasing daily because of benefits derived from plants diversity. Man will continue to need plants for food, fodder, medicine and many other resources from the fragile natural ecosystem resources. The use of plants for medicinal purposes, grazing and fodder now imposes a high pressure on the plant biodiversity with implications for longer-term sustainability. Some species under such continuous pressure are likely to become extinct in the near future (Khan *et al.* 2013). Many useful plant species today exist only in protected areas and also in limited accessed areas such as sacred grooves, shrines, game reserves, national parks and tertiary institution campuses which include University of Ibadan Campus. Therefore, there is need to conserve as much genetic diversity as possible within such environments in order to guard against future environmental degradation and to allow other continued uses which include protection of resources, education and research value, teaching and documentation of indigenous knowledge and maintenance of environmental services of forests.

The majority of rural dwellers depend on non-timber forest products for survival both in terms of economy and health care delivery. Even today, there is mass shift from conventional (orthodox) health care to traditional phytotherapy health care system or ethnobotanical therapy to cure many diseases (Falodun 2010). In 1993, a study showed that 34 percent of all Americans had used an alternative therapy in the preceding year (remedies like vitamins, herbs, healing foods, massage, homeopathy, relaxation techniques, and other natural treatments) (Bill 2000). In the same year, Americans visited primary care physicians a grand total of 388 million times while making 425 million visits to alternative practitioners. Ethnobotanical trees in the urban areas contribute immensely to the livelihood and wellbeing of people in the areas. Studies (Nwauzoma and Dappa 2013) have shown that people with low and medium income usually depend on herbal medicine for its availability and affordability. Daniel *et al*. (2012) noted that ecosystems undergo natural processes to provide goods and services that satisfy human needs directly or indirectly. Medicinal plants have been used for millennia in virtually all cultures and serve both as a source of income and affordable healthcare (Lambert and Jitendra 1997).

It was estimated that 70-95% of people in developing countries rely mainly on medicinal plants for their primary healthcare needs (World Health Organization 2011). Globally, about 53,000 plant species are used for medicinal purposes and that medicinal plants form a high percentage of non-timber forest products (Adnan 2011). Africa is a continent endowed with an enormous wealth of plant resources. Over 5,000 distinct species are known to occur in the forest regions alone, and most of them have been used for several centuries in traditional medicine for the prevention and treatment of diseases (Richmond 2010).

Although there is a large number of research publications available on the constituents and biological activities of medicinal plants from Africa, studies of African medicinal plants have not been taken as seriously or documented as fully as in other traditional societies such as India and China. Our knowledge of African medicinal plants is rather limited. The little information is often fragmented and most African medicinal legends have become distorted by several centuries of continuous waves of invasion and conquest of various parts of Africa (Iwu 1993). Thus, there is need for urgent documentation of ethnobotanical uses of African plant species because of rapid loss of the natural habitat of some of these species due to anthropological activities which the present study provides. The study provided an inventory of plants in the University of Ibadan Campus with a view to determining tree composition, measuring their growth characteristics (Girth, DBH and Total Height), documenting their current ethnobotanical status and uses and mapping their locations.

MATERIALS AND METHODS

Study Area

The study area is the main campus of the University of Ibadan which is located 8 km from the centre of the city of Ibadan in South Western Nigeria. It is lies between latitudes 7º 25’ and 7º 27’N and longitudes 3º 52’ and 3º 54’E. The study area is underlain by metamorphic rocks of the Basement Complex, most of which are very ancient, being of Pre-Cambrian age

(Smyth and Montgomery 1962). The study area is located in the tropical region and thus enjoys tropical climate with distinct wet/rain season from March to October and dry season from November to February (Egbinola and Amobichukwu 2013). The mean minimum temperature is about 21^{o}C while the mean maximum is 26.46^{o}C (Areola 1994; Egbinola and Amobichukwu 2013; Osowole *et al.* 2013; Audu *et al.* 2015). The relative humidity is more than 70% (Audu *et al.* 2015). The prevalent wind in the study area between March and October is the moist maritime South-west monsoon which blows inland from the Atlantic Ocean while dry dust laden winds blow from the Sahara Desert between November and February (Osowole *et al.* 2013). The study area enjoys two rainfall maxima regimes in June and September and The mean annual rainfall is about 1205mm (Audu *et al.* 2015). The vegetation is generally made up of mixed moist evergreen semi-deciduous rainforest.

DATA COLLECTION

Geographic Information Systems (GIS) and remote sensing were employed in this study. The imagery of the University of Ibadan was acquired from the Google Earth 2013 version and used to acquire the road networks within the University. The imagery was geo-referenced to world coordinates using some known control points from the imagery. Global Positioning Systems (GPS) was used to determine the location in terms of the latitude and longitude of trees of ethnobotanical importance within the study area for inventory purpose. The point data of trees were imported from Microsoft Excel into ArcGIS 10.0 whereby the spatial distribution pattern of the trees was mapped.

Then, the trees were identified to species level. Next, enumeration of trees of ethnobotanical importance with DBH of greater > 10cm was done in the University of Ibadan Campus excluding the Botanical Garden. On each tree, growth variables such as girth, DBH and total height were measured and recorded. This would assist the growth tendencies of individual tree species in the study area to be understood. Nearest neighbour analysis in ArcGIS 10.0 was used to determine the spatial distribution pattern (cluster or disperse) of the trees. The species diversity of the trees was determined using Simpson's diversity index (Simpson 1949). Oral interview was carried out with 30 purposively sampled indigenous respondents and herbal practitioners within and outside the University community. They were considered for the interview to provide the medicinal values of the trees (Khan *et al.* 2013). This enables to tally and analyse ethnobotanical data sets based on indigenous traditional knowledge together with data from vegetation surveys to provide a better understanding and management of ecosystems (Negi 2010).

RESULTS

Tree composition

A total of 54 plant species belonging to 25 families was found in the study area. Table 1 shows that *Mangifera indica* had the highest abundance of 21.60% (138) followed by *Terminalia catappa* (16.74%) (107), *Azadirachta indica* (10.64%) (68) and *Milicia excelsa* (6.26%) (40). *Lannea welweitschii*, *Dalium guinensis*, *Afzelia africana*, *Afzelia bella*, *Tamarindus indica*, *Anthocleista dialonensis*, *Sterculia tragacantha*, *Celtis zenkeri* and *Gmelina arborea* were the least in terms of the total population (Table 1). It was also observed that species composition of trees in the entire study area belonged to the Anacardiaceae, Meliaceae, Moraceae and Sterculiaceae families (Table 1).

Table 1. Tree family and species composition

	Family	Species	Local Names (Yoruba)	Species Frequency	(%)
1	Anacardiaceae	*Anacardium occidentale* L.	Kaju	8	1.25
2		*Mangifera indica L.*	Mangoro	138	21.60
3		*Spondias mombin* L.	Iyeye	20	3.13
4		*Lannea welweitschii* (Hiern) Engl.	Oludanre	1	0.16
5	Apocynaceae	*Alstonia boonei* De Wild	Ahun	7	1.10
6		*Holarrhena floribunda* (G. Don) Dur. & Schinz	Ako-ire	8	1.25
7		*Rauvolfia vomitoria* Afzelius	Asofeyeje	2	0.31
8	Bignoniaceae	*Newbouldia laevis (*P. Beauv.) Seem	Akoko	31	4.85
9		*Spathodea campanulata* P.Beauv.	Oruru	3	0.47
10	Bombacaceae	*Adansonia digitata* L.	Ose	4	0.63
11		*Ceiba petandra* (L.) Gaertn.	Araba	4	0.63
12		*Bombax buonopozense* P.Beauv	Ponpola	2	0.31
13	Caesalpiniaceae	*Dalium guinensis* Willd.	Awin	1	0.16
14		*Senna siamea* (Lam.) Irwin & Barneby	-	6	0.94
15	Caesalpinoideae	*Afzelia africana* Sm.	Apa	1	0.16
16		*Afzelia bella* Harms	Apa	1	0.16
17		*Tamarindus indica* L.	-	2	0.31
18	Casuarinaceae	*Casuarina equisetifolia* L	-	14	2.19
19	Combretaceae	*Anogeisus leiocarpus* Gill & Peer	Ayin	10	1.56
20		*Terminalia catappa* L.	-	107	16.74
21		*Terminalia ivoriensis* A. Chev.	Afara	9	1.41
22	Euphorbiaceae	*Bridelia ferruginea* Benth.	Ira odan	2	0.31
23		*Hura crepitans L.*		1	0.16
24	Lauracea	*Persea americana* Mill.	-	13	2.03
25	Loganiaceae	*Anthocleista djalonensis* A.Chev	Sapo	1	0.16
26	Meliaceae	*Azadirachta indica* A. Juss.	Dogoyaro	68	10.64
27		*Entandrophragma angolense* (Welw.) C.DC.	Jebo	6	0.94
28		*Khaya grandifoliola* C. de Candolle	Oganwo	5	0.78
29		*Khaya ivorensis* A. Chev.	Oganwo	1	0.16
30		*Khaya sp* A. Chev.	Oganwo	1	0.16
31	Mimosaceae	*Albizia zygia* (DC.) J.F.Macbr.	Ayinre	1	0.16
32		*Albizia ferrugunea* (Guill. & Perr.) Benth.	Ayinre weere	3	0.47
33	Fabaceae	*Parkia biglobosa* (Jacq.) Benth.	Igba	1	0.16
34	Moraceae	*Antiaris toxicaria* Lesch.	Ooro	13	2.03
35		*Bosqueia angolensis* Ficalho	Saworo	4	0.63
36		*Milicia excelsa* (Welw.) C.C. Berg	Iroko	40	6.26
37		*Treculia africana* Trécul.	Afon	2	0.31
38		*Ficus mucuso* Welw.	Obobo	1	0.16
39	Myristicaceae	*Pychnanthus angolensis* (Welw.) Warb.	Akomu	4	0.63
40	Myrtaceae	*Eucalyptus camadulensis* Dehnh.	-	29	4.54
41		*Eucalyptus grandis* Hill ex Maid.	-	5	0.78
42		*Psidium guajava* L.	Guava	7	1.10
43	Palmae	*Rafia hookeri* G.Mann & H.Wendl.	Ako	1	0.16
44	Papilionaceae	*Pterocarpus erinaceous* Poir.	Aringbe	1	0.16
45	Rubiaceae	*Morinda lucida* Benth.	Oruwo	15	2.35
46	Sapindaceae	*Blighia sapida* König	Isin	12	1.88
47	Sapotaceae	*Chrysophyllum albidum* G. Don	Agbalumo	1	0.16
48		*Lecaniodiscus cupanioides* Planch.	Akika	1	0.16
49	Sterculiaceae	*Cola nitida* (Vent.) Schott & Endl.	Obi	5	0.78
50		*Sterculia setigera* Del.	Ose awere	2	0.31
51		*Sterculia tragacantha* Lindley	Alawefon	1	0.16
52		*Triplochiton scleroxylon* K. Schum.	Arere	7	1.10
53	Ulmaceae	*Celtis zenkeri* Engl.	Ita	1	0.16
54	Verbenaceae	*Gmelina arborea* Roxb.	Igi- isana	1	0.16
55		*Vitex doniana* Sweet	Oori	5	0.78
Total				639	100.0

Tree growth characteristics and species diversity

Table 2 shows that *Adansonia digitata* had the largest mean girth of 418.8cm while Lecaniodiscus cupanioides had the smallest mean girth of 37 cm.

In terms of the DBH, results show that DBH in *Adansonia digitata* ranged between 92.6cm and 153.1cm with mean of 133.3cm, *Anogeissus leiocarpus* ranged between 31.5cm and 119.4cm with mean DBH of 65.7cm, *Milicia excelsa* ranged between 18.8cm and 222.8cm with mean DBH of 131.6cm, *Khaya grandifoliola* ranged between 62.7cm and 201.5cm with mean DBH of 130.5cm while *Terminalia superba* had mean DBH of 96.9cm ranging between 31.8cm and 197.3cm (Table 2). Results showed that *Milicia excelsa* trees had heights of between 8m and 42m with a mean of 26.5m. The height of *Khaya grandifoliola* ranged between 18m and 29m with mean of 21.9m; *Newbouldia leavis* ranged between 9.5m and 25.0m with mean of 16.5m. Furthermore, the height of *Terminalia catappa* ranged between 7.5m and 26m with mean height of 16.8m. The analysis further showed that the mean height of *Triplochiton scleroxylon* was 28.0m while that of *Terminalia superba* was 29.8m. The height of *Mangifera indica* ranged between 5.0m and 24.5m with mean tree height of 14.1m (Table 2). Species diversity of trees with ethnobotanical importance in the University of Ibadan was 0.902. This signified high species diversity.

Table 2: Tree Girth, DBH and Height

Name	Tree height (m)			Girth (cm)			DBH (cm)		
	Min	**Max**	**Mean**	**Min**	**Max**	**Mean**	**Min**	**Max**	**Mean**
Adansonia digitata	8.0	15.5	12.3	291	481	418.8	92.6	153.1	133.3
Afzelia africana	-	-	24	-	-	240	-	-	76.4
Afzelia bella	-	-	9	-	-	88	-	-	28.0
Albizia ferruginea	12	19	15.5	117	146	131.5	37.2	46.5	41.9
Albizia zygia	21	22.2	21.6	164	184	174.0	52.2	58.6	55.4
Alstonia boonei	7.5	22.3	16.4	140	311	232.5	44.6	99.0	74.0
Anacardium occidentale	5.6	25	12.5	71.2	178.0	118.7	22.7	56.7	37.8
Anogeissus leiocarpus	11	32	22.9	99	375	206.3	31.5	119.4	65.7
Anthocleista djalonensis	-	-	25.0	-	-	130.0	-	-	41.4
Antiaris toxicaria	15	24	20.4	114	178	139.6	36.3	56.7	44.4
Azadirachta indica	6	22	12.3	65	593	155.3	20.7	188.7	49.4
Blighia sapida	11.5	27.0	18.1	82	380	183.4	26.1	120.9	58.4
Bombax buonopozense	12	15	13.5	76	109	92.5	24.2	34.7	29.4
Bosqueia angolensis	14	23	18.0	158	265	190.3	50.3	84.3	60.6
Bridelia ferruginea	7.8	17	12.4	75.5	180.0	127.8	24.0	57.3	40.7
Casuarina equisetifolia	9	15	11.8	64	104	87.3	20.4	33.1	27.8
Ceiba pentandra	17	32	24	123	552	307.3	39.1	175.7	97.8
Celtis senkarai	-	-	14	-	-	192	-	-	61.1
Chrophyllum albidium	-	-	9	-	-	54	-	-	17.2
Cola nitida	8.4	18	12.2	82	205	156.0	26.1	65.2	49.6
Dialium guineense	-	-	28	-	-	360	-	-	114.6
Enthradophragma angolensis	15	27	21.0	116	262	176	36.9	83.4	56.0
Eucalyptus camadulensis	11.5	29	21.0	92.3	235.5	160.2	29.4	75.0	51.0
Eucalyptus grandis	19	29	24.6	140	188	167.8	44.6	59.8	53.4
Ficus mucuso	-	-	23	-	-	152	-	-	48.4
Gmelina arborea	-	-	18	-	-	143	-	-	45.5
Holarrhena floribunda	9	21.2	16.7	72	296	189.5	22.9	94.2	60.3
Khaya grandifoliola	18	29	21.9	197	633	410.1	62.7	201.5	130.5
Khaya ivoriensis	-	-	18	-	-	380	-	-	120.9

Lannea welwitschii	-	-	18	-	-	203	-	-	64.6
Lecaniodiscus cupanioides	-	-	5.4	-	-	37	-	-	11.8
Mangifera indica	5	24.5	14.1	44	554	209.2	14.0	176.3	66.6
Milicia excelsa	8	42	26.5	59	700	415.4	18.8	222.8	131.6
Morinda lucida	6	23	12.3	40	163	107.4	12.7	51.9	34.2
Newbouldia laevis	9.5	25	16.5	54	166	98.8	17.2	52.8	31.5
Parkia biglobosa	14	21	17.8	112	391	256.8	35.6	124.4	81.7
Persea americana	7.5	19	11.9	65	170	126.0	20.7	54.1	40.1
Psidium guajava	6.5	11	8.4	44.5	95	72.0	14.2	30.2	22.9
Pterocarpus erinaceous	-	-	12	-	-	162	-	-	51.6
Pycnanthus angolensis	17	31.5	21.4	122	375	232.8	38.8	119.4	74.1
Rauvolfia vomitoria	5.5	6	5.8	49	54	51.5	15.6	17.2	16.4
Senna siamea	13	16.6	14.9	116	177	146.3	36.9	56.3	46.6
Spathodea campanulata	17	23	20.0	195	335	247.7	62.1	106.6	78.8
Spondias mombin	6	29.5	13.7	60	227	133.1	19.1	72.2	42.4
Sterculia tragacantha	7	11	8.7	78	116	91.3	24.8	36.9	29.1
Tamarindus indica	6	18.5	12.3	81.5	170	125.8	25.9	54.1	40.0
Terminalia catappa	7.5	26	16.8	73	397	172.3	23.2	126.4	54.8
Terminalia superba	21	39	29.8	100	620	304.4	31.8	197.3	96.9
Treculia africana	9	14	11.5	91	116.3	103.7	29.0	37.0	33.0
Triplochiton scleroxylon	21	35	28.0	118	359	217.1	37.6	114.3	69.1
Hura crepitans	-	-	17	-	-	185	-	-	58.6
Vitex doniana	8	22	15.7	88	291	199.2	28.0	92.6	63.4

Current status of the tree species

It was observed that the trees of ethnobotanical importance were being threatened by people as they make use of different parts of these trees especially the bark (Plates 1 and 2). The possible outcome of this action may bring reduction in the life span of the trees and eventually the composition and richness of the tree species would be reduced over time.

Plate 1: Debarked *Mangifera indica* and *Alstonia boonei* in the Department of Forest Resources Management premises

Plate 2: Debarked *Pterocarpus osun* and *Peltophorum pterocarpum* at Practical Year Training Plot, Faculty of Agric & Forestry and front of Botanical Garden, University of Ibadan respectively.

Distribution pattern of tree species

The coordinates (longitude and latitude) of each ethnobotanical tree species was used to produce the spatial distribution map of the trees (Figure 1). The spatial distribution map of reveals that *Terminalia catappa* was around Sankore Avenue, Niger Road, Mellanby Hall, Manuwa Drive and Appleton Road. *Mangifera indica* was found almost everywhere in the study area but more along Oduduwa road, Danfodio road, Amina Way, Carver road, Benue road, Sokoto road and Water Department compound. However, *Persea americana* was concentrated at Crowther Lane and Amina Way while *Casuarina equisetifolia* was concentrated around Awo Hall. Furthermore, the concentration of *Morinda lucida* was found around Oduduwa road while *Azadirachta indica* concentrated at Emotan Lane, Baptist Primary School, Amina Way, Abadina, Veterinary Medicine area and Central Mosque.

Although, *Milicia excelsa* was found in Kwara St, Saunders road, Mellanby Hall area, and Manuwa road, more were observed along Water Department road, Stadium area, Sokoto road, CBT road, Ijeoma road and Pepple road. Nevertheless, *Newbouldia leavis* concentrated at ISI and around Independence Hall while *Treculia africana* was abundant around Carver road and Abadina area. *Antiaris toxicaria* was observed more at Pepple road, Ekwuno road (close to Awba Dam) and slightly found Stadium road and Wardle Martin road. The spatial distribution pattern analysis using nearest neighbour analysis reveals that the trees of ethnobotanical importance were clustered as the nearest neigbour ratio was 0.46 and Z score was -26.25 ($p<0.05$).

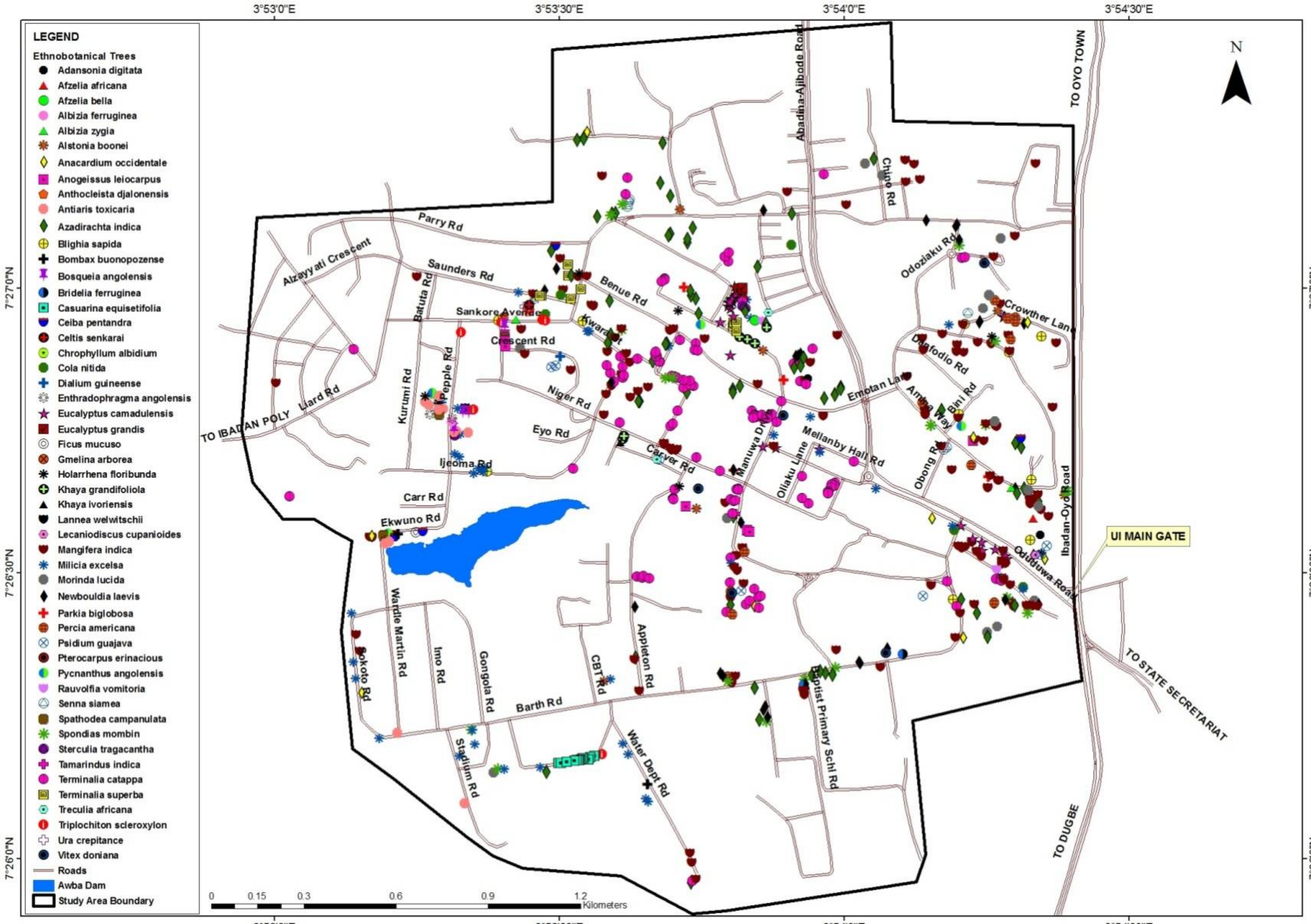

Figure1: Map of University of Ibadan showing location of trees of ethnobotanical importance

Ethnobotanical uses of the trees

There are various ailments being treated using the trees in the study area as given by indigenous respondents and herbal practitioners within and outside the University community. For instance, *Adansonia digitata*, *Holarrhena floribunda*, and *Ceiba petandra* are used to treat amenorrhea, while *Spondias mombin*, *Morinda lucida*, *Adansonia digitata*, *Holarrhena floribunda*, *Ceiba petandra* and *Spondias mombin* are used to treat dysmenorhoea (Table 4). The study also revealed that the parts of the trees with highest use were leaves and barks which accounted for 28.57% each, followed by fruits (18.37%); combination of leaves and barks (6.12%), and leaves, barks and fruits (4.09%) (Table 5). The combination of leaves and roots, seeds and latex had the least frequency of use of 2.04% (Table 5).

Table 4. Ethnobotanical uses

Diseases	Trees	Parts Used
Amenorrhea	*Adansonia digitata*	Leaves
	Holarrhena floribunda	Barks
	Ceiba petandra	Leaves
Dysmenorhoea	*Spondias mombin*	Leaves, bark & fruits
	Morinda lucida	Leaves & roots
	Adansonia digitata	Leaves
	Holarrhena floribunda	Barks
	Ceiba petandra	Leaves
	Spondias mombin	Leaves, bark & fruits
Gonorrhea	*Spondias mombin*	Leaves
	Afzelia africana	Roots
Cough, TB	*Afzelia bella*	Roots
Insect sting	*Gmelina arborea*	Fruits
Malaria and Yellow fever	*Morinda lucida*	Leaves
	Alstonia boonei	Bark
	Magnifera indica	Leaves & barks
	Azadrachta indica	Leaves & barks
	Anacardium occidentale	Barks
	Alstonia boonei	Barks
Diarrhoea	*Parkia biglobosa*	Fruits
	Psidium guajava	Leaves
	Vitex doniana	Fruits
Hypertension	*Terminalia superba*	Bark
	Percia americana	Leaves
	Khaya sp	Bark
	Khaya ivorensis	Bark
	Bridelia ferruginea	Leaves
Pile	*Anogeisus leiocarpus*	Bark
	Treculia africana	Seeds
	Sterculia setigera	Bark
Weak penile erection	*Senna siamea*	Roots
Oligospermia	*Cola nitida*	Fruits
Typhoid fever	*Eucalyptus grandis*	Leaves
	Lecaniodiscus cupanioides	Leaves, barks & roots
Poor Vision	*Newbouldia laevis*	Leaves
	Parkia biglobosa	Fruits
Stomach ache	*Spondias mombin*	Leaves
	Khaya ivorensis	Barks
	Holarrhena floribunda	Bark
Cholera	*Parkia biglobosa*	Fruits
Asthma	*Khaya ivorensis*	Bark
Diabetics	*Alstonia boonei*	Bark
	Rauvolfia vomitoria	Leaves
Fibroid	*Spondias mombin*	Fruits
Kidney stone	*Terminalia catappa*	Fruits
Constipation	*Psidium*	Leaves
	Treculia africana	Fruits
Tooth ache	*Pychnanthus angolensis*	Latex

Table 5. Summary of parts of the trees used for treating ailments

Part Used	Frequency	%
Leaves	14	28.57
Barks	14	28.57
Leaves, Bark and Fruits	2	4.09
Leaves and roots	1	2.04
Roots	4	8.16
Fruits	9	18.37
Leaves and barks	3	6.12
Seeds	1	2.04
Latex	1	2.04
Total	**49**	**100.0**

DISCUSSION

The species diversity of ethnobotanical plants was very high and this is similar to the studies of Pascal and Pellissier (1996). The high species diversity of trees may be due to the possibility of built up area to have high value herbal medicine potentials which is directly linked to deliberate propagation of these valuable species in the homestead for accessibility in case of emergency. The high diversity indicates that the different species present are evenly abundant (Diame 2010). In addition, the high species diversity is a reflection of many plant species in the tropical ecosystem which supports the healthy status of plants in the rainforest ecosystems. It has been observed that the health of ecosystems is closely allied to their plant biodiversity which helps in ecosystem management and conservation (Ruiz *et al*. 2008; Schafer 2011). The girth of trees was highest in *Adansonia digitata* with a mean girth of 418.8cm. This is in contrast with the study of Diame (2010) whereby *Mangifera indica* was observed to have the highest girth of 458 cm among the ethnobotanical trees that is used to cure reproductive ailments in Ghana.

Results have shown that 54 plant species belonging to 25 families were found in the study area with *Mangifera indica* having the highest abundance while Anacardiaceae, Meliaceae, Moraceae and Sterculiaceae had high dominance. The results on the number of plant species and families are in line with the work of Nodza *et al.* (2013). Also, commonly used plant species were cultivated around residential areas for easy access and utilization and these included A*zadirachta indica*, *Alstonia congensis* and *Cymbopogon citrates* and *Nauclea latifolia* that are used to cure malaria in the Southwestern Nigeria (Dike *et al.* 2012). In addition to the medicinal values attributed to the built up areas, trees are beautifying the area and providing shade during hot weather (Eludoyin and Oladele 2013).

Results showed that more than one plant species were usually used for the preparation for the treatment of ailments in the study area. The use of more than one plant species could be attributed to possible additive or synergistic effects of the plants (Bussman and Sharon 2006; Olowokudejo *et al.* 2008). This could also be likened to the diverse plant communities found in the tropical forest (Devi and Yadava 2006); which are rich in medicinal and economically important plants (Sahu *et al.* 2012).

Leaves and bark of ethnobotanical trees were mostly used for treating ailments. Previous studies (Togola *et al.* 2005; Kamatenesi-Mugisham and Oryem-Origa

2007; Sani and Aliyu 2011; Nwauzoma and Dappa 2013) reported that in Kano, Port Harcourt and Africa in general, leaves were the most frequently used plant parts to treat ailment, followed by barks, roots, and fruits. Heavy use of bark may negatively affect the plant since the bark contains phloem which transports food substances in the plant (Diame 2010). However, if the unavailability of leaves should persist, the use of stem bark will increase (Togola *et al.* 2005).

The distribution pattern of trees in the University of Ibadan is clustered in nature. This may be attributed to various internal processes of population and community dynamics in homogenous environments (Wang *et al.* 2011) which are expressed in terms of dispersal limitation (Hubbell 2001), facilitation (Kikvidze *et al.* 2005), succession (Felinks and Wiegand 2007) and gap dynamics (Nagel *et al.* 2006).

CONCLUSION AND RECOMMENDATIONS

The study revealed that *Mangifera indica* was the most abundant among the plant species of ethnobotanical importance in the study area. *Adansonia digitata* had the largest girth and DBH while the highest mean height was recorded in *Militia excelsa*. The spatial distribution of ethnobotanical trees was clustered while the species diversity of trees was very high suggesting that the study area was rich in trees that can be used by individuals to cure various ailments. The study reveals that leaves and barks were the plant parts mostly used to cure ailments. Based on results of this study, it is recommended that adequate and proper conservation and management of ethnobotanical trees should be maintained. Further, use of the plant parts of plants especially the stem bark that are very sensitive to the survival of a tree should be regulated and monitored.

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