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Checklist of Tree Species and their medicinal Properties in Rivers State University Campus, Port Harcourt, Rivers State, Nigeria

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Abstract: An inventory of tree species and their medicinal properties was carried out to document tree species diversity in Rivers State University Campus, Rivers State, Nigeria. This study involved intensive survey and several visits to the sample sites for plant identification. The study presents the botanical and common names, families, plant group, seasonal type, plant part(s) used and medicinal uses of each tree species. Results indicated that there are a total number of 33 tree species with a total frequency of 1,150, distributed into 30 genera and 21 families. The most abundant family was Arecaceae (12%), followed by Combretaceae, (6%), Annonaceae (6%), Malvaceae (6%), Myrtaceae (6%). The most abundant species was *Elaeis guineensis* (17%), followed by *Roystonea regia* (13%), *Terminalia mantaly* (12.2%), and *Monoon longifolium* (12%). The highest seasonal type was evergreen (73%). The plant part mostly used for medicinal purposes was the leaves (64%), followed by roots (45.5%), fruits (33%). The ailment most treated was skin infection (20.1%), inflammation (20.1%), pain and cough (17%) each. Training on proper and effective collection techniques of tree samples, avoidance of indiscriminate falling of the various trees species, planting of more trees should be carried out for proper conservation of the trees.

Keywords: Arecaceae, *Elaeis guineensis*, Evergreen plants, Medicinal plants, Rivers State University Campus, Tree diversity.

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INTRODUCTION

Most tree species are angiosperms with hardwood, while the rest are gymnosperms with softwood. Gymnosperms include Conifers, Cycads, Ginkgoes and Gnetales, which produce naked seeds found in structures such as pine cones, and they commonly have tough waxy leaves, such as pine needles (Biswas *et al.*, 2000) Majority of angiosperm trees are dicotyledons, some are the basal angiosperms such as Amborella, Magnolia, nutmeg and avocado, while the rest such as bamboo, palms and plantains are monocots. The structural strength to the trunk of most trees comes from the wood, which supports the plant as it increases in size and grows bigger. Trees are able to grow as large as they do because they possess vascular tissues that conducts water, nutrients and other chemicals throughout the plant body.

Medicinal plants contain essential components used in the treatment of different ailments such as ulcer, stomach ache, cancer etc. in humans and animals (Okigbo & Mmekka, 2006). According to Gureeb-Fakim (2006), they are usually made up of different chemical compounds that can act separately, as supplements, or collectively with others to improve health. Over 90% of traditional medicine remedies contains medicinal plants though the difference between treatment and prevention is very minute in some cases, for example, renal disease can be prevented by treating mild elevation of blood pressure.

Medicinal plants have been a resource for healing in local communities around the world for thousands of years, and is still important as a primary healthcare mode for approximately 85% of the world's population (Abayomi *et al.*, 2013; & Ahmed, 2016), and as a resource for drug discovery, with 80% of the drugs deriving from them (Bauer & Bronstrup, 2014).

A healthy ecosystem depends on plant diversity amongst other factors. Plant diversity is the variability of plant species and the ecological processes that support them within a specified geographical region. Plants make up the vegetation which lies at the base of animal food chains and are universally recognized as a vital part of the world's biological diversity and an essential resource for the plantae, comprising about 321,212 known species of mosses, liverworts, ferns, herbaceous and woody plants, bushes, vines, trees, and various others (FAO, 2005). Plants vary in size and complexity from small, nonvascular mosses, which depend on moisture to giant *sequoia* trees. Plants are mainly autotrophs and serve economic and cultural roles for growing human population. In addition, plants are essential in ecosystem stability. They also provide habitats for insect and other life forms thus, actions to conserve plant communities contributes to the survival animal communities.

Threats to tree diversity include overpopulation, agricultural practices, over exploitation, habitat destruction, deforestation, drought and desertification,

global climate change, invasive alien species, cultural practices, etc (Borokini *et al.*, 2013; & Solaja, 2014).

Trees represent one of the important components of each and every terrestrial ecosystem and are a part of nature's precious gifts. Some are deciduous; others are evergreen. Some have beautiful flowers; others have beautiful fruits or foliage. Some are scented; others are ugly but economically very important. The welfare of humankind is affected not only by their density and diversity but also by their direct and indirect values, which are beyond estimation. Trees are sources of timber, natural purifiers of the environment, trees act as wind barriers by decreasing the force of the wind and reducing the level of noise from highways and other sources, they help to reduce temperature by providing shade and by intercepting, absorbing and reflecting solar radiation, especially in warmer places, where there is year-round warmth and sunshine (Schubert, 1979; & Chakraverty & Jain, 1984). The presence of shrubs and trees along roadsides makes their edges and curves conspicuous, thus making a natural guide for safe driving, and for this purpose the lower portions of their stems are usually painted white (Chakraverty & Jain, 1984).

Trees are one of the major sources of sustenance: food; sugars; starches; spices and condiments; beverages; fumitories, masticatories and narcotics; medicines; essential oils; fatty oils and vegetable fats; waxes; soap substitutes; vegetable ivory; fodder; fuel, bioenergy or biofuel; fertilizers; fiber; pulp and paper; tannins; dyes; rubber and other latex products; gums; resins; and cork (Fuwape & Onekwelu, 2011).

Most threats to Tree diversity is largely related to human factors due largely to interaction with the environment for development, improved quality of life resulting from industrialization, technological advancement and rapid growth in urbanization.

The UNDESA (2012) has projected that by 2050 Nigeria's population could rise to 350 million making it one of the third largest populated countries in the world. This means that more demand would be made for food, water, educational and health facilities as well as other infrastructure in the very near future (FGN, 2012). Most of the rural poor, derives their livelihood from wild species of tree diversity. The urban population also benefit from the exploitation of the country's biological resources.

The widespread introduction of exotic species by humans especially researchers pose a serious threat to biodiversity extinction as the endemic species may not survive. The use of improved varieties of crops and complete neglect of local varieties and the land-races may lead to loss of biodiversity in Nigeria (Emma-Okafor *et al.*, (2010). These exotic organisms may be either predators, parasites or simply aggressive species

that deprive indigenous species of nutrients, water and light thereby cause loss of the indigenous species.

Tree diversity in Rivers-State University is threatened by factors such as over-collecting, unsustainable agriculture, urbanization, pollution, land use changes, the spread of invasive alien species, climate change and lack of information about the medicinal uses of these trees. Therefore, this research work is carried out to document the trees in the university campus in order to improve their management, protection and conservation within the university community because of their vast economic and ecosystem service delivery.

MATERIALS AND METHOD

Study Area

This study was carried out in Rivers-State university, located within Port-Harcourt metropolis in the Niger Delta sedimentary basin of Nigeria, with latitude 4.9026 or 4 56 9° N, longitude 6.9206° or 6 55 14 E and elevation 16 meters (52 feet). The climate is dominated with distinct dry and wet seasons with a temperature range of 24 – 36°C and annual rainfall of 1520-2020mm.

Collection and Identification of Tree Species

This study involved intensive survey and several visits to the sample sites for plant identification and enumeration exercise. Surveys and direct field observation were carried out from the month of July to November, 2022. Field collection of plant species at different sites in the University campus was documented. The species were thereafter carefully documented, along with their families, botanical and common names, plant group, seasonal type, plant part(s) used for medicinal purposes and medicinal importance. Voucher specimens were dried, pressed and deposited in the Herbarium unit, Department of Plant Science and Biotechnology, Rivers State University, Port Harcourt, Rivers State.

Data Collection and Analysis

A total of 46 local people having an age range 18-75 years were interviewed using semi-structured questionnaire. Among them 21 were female and rest 25 were male. Regular field studies were made in the study area during the period. Data presented here about the plants used for various diseases was gathered through local knowledge, oral interviews of traditional healers and reviews of literature published in scientific journals.

RESULTS

Tree Diversity in Rivers State University Campus

The results from the study of the tree diversity in Rivers State University campus is summarized in Tables 1- below.

The results showed that there are a total number of 33 tree species, distributed into 21 families and 30 genera (Table 1). The most abundant plant family was

Arecaceae (12%), followed by Combretaceae (6%), Annonaceae (6%), Malvaceae (6%), Myrtaceae (6%), Rosaceae (6%), Fabaceae (6%) and Apocynaceae (6%). Others contained one species each (3%) (Table 2).

The most abundant genera were *Terminalia* (6.7%), *Persea* (6.7%) and *Ficus* (6.7%) Table 1. The most abundant species was *Elaeis guineensis* (17%), followed by *Roystonea regia* (13%), *Terminalia mantaly* (12.2%), *Monoon longifolium* (12%), *Casuarina equisetifolia* (11%), *Gmelina arborea* (7.5%), *Dypsis lutescens* (5%), *Delonix regia* (4.1%), *Tetraclinis articulata* (3.7%), *Carica papaya* (3.7%), etc., as shown in Table 3.

Investigation of seasonal type indicated that twenty-four (73%) tree species are evergreen in nature while nine (27%) are deciduous, as shown in Table 1.

For medicinal purposes the plant part mostly used was the leaves (64%), followed by the roots (45.5%), fruit (33%), bark (24%), seed and stem (12%) each, shell (6.1%) and sap (3%), as shown in Table 4.

The ailment most treated with the tree species is skin infection (20.1%), followed by inflammations (20.1%), pains (17%), cough (17%), diabetes (13.8%), diarrhea (13.8%), dysentery (13.8%), constipation (10%), etc, as shown in Table 5.

Table 1. Check List of Tree Species Present in Rivers State University.

S/N	Botanical Name	Common Name	Family	Plant Group	Seasonal Type	Plant Part(s) Used	Medicinal Uses
1	<i>Tetraclinis articulata</i> (Vahl) Mast.	Araar tree, African juniper	Cupressaceae	Gymnosperm	Evergreen	Leaf	Expectorant, emetic and for arthritis.
2	<i>Casuarina equisetifolia</i> L.	Whistling pine	Casuarinaceae	Angiosperm	Deciduous	Bark	Used for arthritis.
3	<i>Terminalia mantaly</i> H. Perrier	Madagascar almond	Combretaceae	Angiosperm	Evergreen	Bark	Used for arthritis.
4	<i>Elaeis guineensis</i> Jacq	Oil palm	Arecaceae	Angiosperm	Evergreen	Leaf, root, fruit	Skin infection, Analgesic gonorrhea and menorrhagia. Diabetes.
5	<i>Roystonea regia</i> (Kunth) O. F. Cook	Cuban royal palm	Arecaceae	Angiosperm	Evergreen	Roots	Diabetes.
6	<i>Cocos nucifera</i> L.	Coconut	Arecaceae	Angiosperm	Evergreen	Leaf, juice, shell	Muscular pain, hydration, lowering blood sugar and teeth whitening.
7	<i>Mangifera indica</i> L.	Mango	Anacardiaceae	Angiosperm	Evergreen	Fruit peel, seed	Antioxidant. And dandruff.
8	<i>Carica papaya</i> L.	Paw-paw	Caricaceae	Angiosperm	Evergreen	Fruit (ripe and unripe), Leaf	Source of vitamin, relieves menstrual pain and improves digestion
9	<i>Monoon longifolium</i> Sonn. B. Xue & R.M.K. Saunders	Masquerade tree, False ashoka	Annonaceae	Angiosperm	Evergreen	Root, seed	Possess antioxidant and anti-microbial properties.
10	<i>Moringa oleifera</i> Lam.	Drum stick	Moringaceae	Angiosperm	Deciduous	Seed, Stem, Leaf	Protects against prostate, cancer, controls blood sugar.
11	<i>Heritiera littoralis</i> Aiton	Looking-glass mangrove	Malvaceae	Angiosperm	Evergreen	Root	Mouth infection and toothache.
12	<i>Annona reticulata</i> L.	Custard apple	Annonaceae	Angiosperm	Deciduous	Leaf	Analgesic, anti-inflammatory, antipyretic properties,

13	<i>Corymbia torrelliana</i> (F. Muell.) K.D. Hill & L.A.S. Johnson	Cadaghi or Cadaga	Myrtaceae	Angiosperm	Evergreen	Bark	For gastro-intestinal disorders, wound and cough.
14	<i>Ficus hispida</i> L.f.	Opposite leaf Fig	Moraceae	Angiosperm	Evergreen	Bark, Leaf	Anti-inflammatory, ulcer and as an Emetic
15	<i>Eriobotrya japonica</i> (Thunb.) Lindl.	Loquat	Rosaceae	Angiosperm	Evergreen	Leaf	Reduce cholesterol level.
16	<i>Coffea arabica</i> L.	Arabic coffee	Rubiaceae	Angiosperm	Evergreen	Leaf	Balances the body's production of nitric oxide
17	<i>Gmelina arborea</i> Roxb.	Beechwood, Gmelina	Lamiaceae	Angiosperm	Deciduous	Root, Fruit, Leaf	An anthelmintic and for fungal infection.
18	<i>Delonix regia</i> (Boj. ex Hook) Raf.	Royal Poinciana, Flame of the forest	Fabaceae	Angiosperm	Deciduous	Leaf	For constipation, inflammation, rheumatoid.
19	<i>Dyopsis lutescens</i> (H.Wendl.) Beentje & J. Dransf.	Areca palm, Butterfly palm	Arecaceae	Angiosperm	Evergreen	Leaf, Stem	Possess antioxidant and anticancer properties.
20	<i>Ficus benjamina</i> L.	Weeping fig	Moraceae	Angiosperm	Evergreen	Fruit, Leaf	For skin disorder and liver disease.
21	<i>Hura crepitans</i> L.	Sandbox tree	Euphorbiaceae	Angiosperm	Evergreen	Stem, Bark extract.	For liver disease.
22	<i>Citrus sinensis</i> (L.) Osbeck	Sweet orange	Rutaceae	Angiosperm	Evergreen	Juice, Leaf	For constipation, cramps, cough and diarrhea.
23	<i>Persea americana</i> Mill.	Avocado	Lauraceae	Angiosperm	Evergreen	Leaf, Fruit	For dysentery, cough, high blood pressure, liver problem, gout, increase sexual desire, improves fertility and stimulates mensural flow.
24	<i>Alstonia boonei</i> De Wild.	French timber	Apocynaceae	Angiosperm	Deciduous	Bark	For fractures and dislocation.
25	<i>Theobroma cacao</i> L.	Cocoa	Malvaceae	Angiosperm	Evergreen	Leaf, Fruit	Lower blood pressure, improves blood flow to the brain and heart; fruits prevents aging.
26	<i>Jacaranda mimosifolia</i> Don	Jacaranda, Fern tree	Bignoniaceae	Angiosperm	Deciduous	Flowers, Bark,	For neuralgia, bacterial infections, gonorrhea.
27	<i>Senna siamea</i> (Lam.) Irwin et Barneby	Siamese cassia, Cassod tree	Fabaceae	Angiosperm	Evergreen	Leaf	For constipation.
28	<i>Cydonia oblonga</i> Mill.	Quince tree	Rosaceae	Angiosperm	Deciduous	Leaf, Fruit	As astringent, antiseptic, for inflammations, dysentery and diarrhea.
29	<i>Terminalia catappa</i> L.	Almond tree	Combretaceae	Angiosperm	Deciduous	Leaf	For skin diseases, diarrhea and fever.
30	<i>Pinus sylvestris</i> L.	Scots pine	Pinaceae	Gymnosperm	Evergreen	Leaf,	As an antiseptic, diuretics and cough.

31	<i>Psidium guajava</i> L.	Guava	Myrtaceae	Angiosperm	Evergreen	young root Leaf, Stem	For diarrhea and dysentery.
32	<i>Prestonia portobellensis</i> (Beurl.) R.E. Woodson	Golden trumpet	Apocynaceae	Angiosperm	Evergreen	Leaf	Treats snake bite.
33	<i>Persea americana</i> 'hass' Mill.	Alligator pear	Lauraceae	Angiosperm	Evergreen	Seed	Improves hypercholesterolemia, for hypertension, inflammation and diabetes.

Table 2. Number of Families, Genera, and Species of Tress Present in Rivers State University.

S/N	Family	Number of Genera	Number of Species
1	Arecaceae	4	4
2	Combretaceae	1	2
3	Annonaceae	2	2
4	Malvaceae	2	2
5	Myrtaceae	2	2
6	Rosaceae	2	2
7	Fabaceae	2	2
8	Apocynaceae	2	2
9	Moringaceae	1	1
10	Cupressaceae	1	1
11	Casuarinaceae	1	1
12	Anacardiaceae	1	1
13	Caricaceae	1	1
14	Rubiaceae	1	1
15	Lamiaceae	1	1
16	Moraceae	1	2
17	Euphorbiaceae	1	1
18	Rutaceae	1	1
19	Lauraceae	1	2
20	Bignoniaceae	1	1
21	Pinaceae	1	1
	TOTAL	30	33

Table 3. Tree Species Abundance in Rivers State University.

S/N	Tree Species	Number of Stand
1	<i>Elaeis guineensis</i>	196
2	<i>Roystonea regia</i>	150
3	<i>Terminalia mantaly</i>	140
4	<i>Monoon longifolium</i>	138
5	<i>Casuarina equisetifolia</i>	127
6	<i>Gmelina arborea</i>	86
7	<i>Dypsis lutescens</i>	60
8	<i>Delonix regia</i>	47
9	<i>Tectraclinis articulate</i>	42
10	<i>Carica papaya</i>	42
11	<i>Jacaranda mimosifolia</i>	29
12	<i>Mangifera indica</i>	15
13	<i>Terminalia catappa</i>	10
14	<i>Senna siamea</i>	9
15	<i>Hura crepitans</i>	8
16	<i>Persea Americana</i>	8
17	<i>Heritiera littoralis</i>	7
18	<i>Corymbia torrelliana</i>	6
19	<i>Cocos nucifera</i>	6

20	<i>Annona reticulata</i>	5
21	<i>Citrus sinensis</i>	3
22	<i>Prestonia portobellensis</i>	3
23	<i>Alstonia boonei</i>	2
24	<i>Moringa oleifera</i>	2
25	<i>Ficus benjamina</i>	1
26	<i>Persea americana 'hass'</i>	1
27	<i>Cydonia oblonga</i>	1
28	<i>Theobroma cacao</i>	1
29	<i>Ficus hispida</i>	1
30	<i>Eriobotrya japonica</i>	1
31	<i>Coffea Arabica</i>	1
32	<i>Pinus sylvestris</i>	1
33	<i>Psidium guajava</i>	1
TOTAL		1,150

Table 4. Tree Species and Plant Parts Used for Medicinal Purposes

S/N	Species	Leaf	Bark	Root	Sap	Fruit	Seed	Shell	Stem
1.	<i>Tetraclinis articulata</i>	√							
2.	<i>Casuarina equisetifolia</i>		√						
3.	<i>Terminalia mantaly</i>		√						
4.	<i>Elaeis guineensis</i>	√		√		√			
5.	<i>Roystonea regia</i>			√					
6.	<i>Cocos nucifera</i>	√			√			√	
7.	<i>Mangifera indica</i>					√	√		
8.	<i>Carica papaya</i>	√				√			
9.	<i>Monoon longifolium</i>			√			√		
10.	<i>Moringa oleifera</i>	√					√		√
11.	<i>Heritiera littoratis</i>		√						
12.	<i>Annona reticulata</i>	√							
13.	<i>Corymbia torrelliana</i>		√						
14.	<i>Ficus hispida</i>	√	√						
15.	<i>Eriobotrya japonica</i>	√							
16.	<i>Coffea arabica</i>	√							
17.	<i>Delonix regia</i>	√				√			
18.	<i>Ficus benjamina</i>					√			
19.	<i>Hura crepitans</i>		√						√
20.	<i>Citrus sinensis</i>	√				√			
21.	<i>Persea Americana</i>	√				√			
22.	<i>Alstonia boonei</i>		√						

23.	<i>Theobroma cacao</i>	√			√				
24.	<i>Jacaranda mimosifolia</i>		√		√				
25.	<i>Senna siamea</i>	√							
26.	<i>Cydonia oblonga</i>	√			√				
27.	<i>Terminalia mantaly</i>	√							
28.	<i>Pinus sylvestris</i>	√		√					
29.	<i>Psidium guajava</i>	√						√	
30.	<i>Prestonia portobellensis</i>	√				√			
31.	<i>Persia americana 'hass'</i>						√		
32.	<i>Dyopsis lutescens</i>	√						√	
33.	<i>Gmelima arborea</i>	√		√	√				
	TOTAL	21	8	15	1	11	4	2	4

Table 5. Ailments Treated with the Tree Species in Rivers State University.

S/N	Ailments Treated	Number of Species
1	Skin infection	6
2	Inflammation	6
3	Pains	5
4	Cough	5
5	Diabetes	4
6	Diarrhea	4
7	Dysentery	4
8	Constipation	3
9	Hyper-cholesterol	3
10	Arthritis	2
11	Blood pressure	2
12	Gonorrhoea	2
13	Fever	2
14	Microbial infection	2
15	Cancer	2
16	Emetic disease	2
17	Liver disease	2
18	Menorrhagia	1
19	Mouth infection	1
20	Dandruff	1
21	Wound	1
22	Ulcer	1
23	Helminthic disease	1
24	Fungal infection	1
25	Pile	1
26	Malaria	1
27	Non-conception	1
28	Fractures and dislocation	1
29	Bacterial infection	1

DISCUSSION

A total number of one thousand, one hundred and fifty (1,150) individual trees, representing 33

species, 30 genera and 21 families were identified in Rivers State University Campus (Tables 1 & 3). *Elaeis guineensis* was the most abundant tree because palms are said to be most abundant in tropical and sub-tropical

ecosystems for millions of years (Wing *et al.*, 1993; Morley, 2000; Pitman *et al.*, 2001; & Dransfield *et al.*, 2008). Palms are significant to people because it is a major source of oil for human food uses, provide employment, used for construction materials, clothing's, fuel, food, medicine and ornamentals (Sosnowska & Balslev, 2009).

Plant groups of each species was studied; the most dominant plant group was the angiosperm (with 31 tree species) (94%) and the least, gymnosperm (with 2 tree species) (6%). Angiosperms are the most dominant and most advanced plant group all over the world and agriculture is almost entirely dependent on them. Angiosperm provides virtually all plant-based food and economic resources in the form of wood, medicine, decorative and landscaping attributes, cotton, flax etc.

The tree species identified in Rivers State University Campus undergoes two (2) seasonal types: evergreen and deciduous. Evergreen trees were twenty-four (73%) while nine (27%) tree species were deciduous (Table 1). Evergreen trees are dominant because they stick around all year long improving air quality, conserving energy and serve as shelter for birds and critters. Evergreens filter air particles and remove carbon dioxide from the air, since evergreens retain their leaves and needles all year round, they make oxygen all year.

Medicinal plants have always played a pivotal role as sources for drug lead compounds. The history of medicinal plants is as long as the history of humans. The tree species found in Rivers State University are used for the treatment of various ailments, but the most ailment treated with the tree species is Skin Infection. The plant part mainly used for these treatment is the leaf. The leaf is also called the kitchen of the plant. Practically, all tree parts were used individually or mixed with other parts for medication (Table 4). However, Table 4 showed that leaves were the most frequently used part (64%), followed by the root (45.5%), fruit (33%), bark (24%), seed and stem (12%), shell (6.1%) and sap (3%). The frequent usage of leaves could be as a result of their rapid ability to regenerate (Namukobo *et al.*, 2011) and availability. Adia *et al.* (2014) asserted that the activities of leaves during photosynthesis and biosynthesis enhance the production of maximum bioactive substances. These parts are collected at different seasons and stages of tree growth and prepared for medication in varying forms.

CONCLUSION

The diversity and abundance of tree species in Rivers State University have been documented. It has been shown that the diverse tree species are a necessary component of the institution. Anthropogenic activities are the major reasons behind the rapid decrease in the number of tree species in the institution. These diverse trees provide invaluable environmental and economic

services and thus are of great importance. Conservative measures should be put in place to checkmate their disappearance as well as promote cultivation of more trees. Awareness and orientation should be given to the inhabitants on the sustainable uses of trees as well the negative impact of falling of trees to enable them appreciate the trees in their environment. Also, a unit should be developed in the school that will be in charge of maintaining these trees.

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