

ISSN 1996-3351

Asian Journal of  
**Biological**  
Sciences



## Research Article

# Checklist and Abundance of Open Grown Medico-Ethnoforest Tree Species in Nnamdi Azikiwe University, Awka, Nigeria

O. Chukwu, J.U. Ezenwenyi and T.V. Kenechukwu

Department of Forestry and Wildlife, Nnamdi Azikiwe University, Awka, Nigeria

### Abstract

**Background and Objectives:** The global interest on the use of medicinal tree species for combating diseases is on the increase as against the synthetic drugs. There dearth of information on the open grown medico-ethnoforest tree species in Nnamdi Azikiwe University, Awka. Hence, the study aimed at developing checklist and assessing abundance of open grown medicinal tree species in the university premises for sustainable management. **Materials and Methods:** Total enumeration and identification of open grown tree species with their medicinal properties were made. Checklist of species was developed using table and species abundance was computed using frequencies and relative density. **Results:** A total of 25 medicinal tree species with the frequency of 479, distributed within 23 genera and 15 families were encountered in the study area. *Azadirachta indica* had the highest occurrence with Meliaceae family having the highest frequency. Out of the 25 species identified as open grown medicinal tree species, 10 species are threatened/ endangered. Furthermore, the study discovered open grown tree species within the study area are natural cure for about 40 diseases. **Conclusion:** The University premises support trees with medical remedies for various diseases. The University management should embark on enrichment planting of the threatened/ endangered tree species.

**Key words:** Ethnoforestry, medicinal trees, open grown trees, relative density, UNIZIK

**Citation:** O. Chukwu, J.U. Ezenwenyi and T.V. Kenechukwu, 2020. Checklist and abundance of open grown medico-ethnoforest tree species in Nnamdi Azikiwe University, Awka, Nigeria. Asian J. Biol. Sci., 13: 105-112.

**Corresponding Author:** O. Chukwu, Department of Forestry and Wildlife, Nnamdi Azikiwe University, Awka, Nigeria

**Copyright:** © 2020 O. Chukwu *et al.* This is an open access article distributed under the terms of the creative commons attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original author and source are credited.

**Competing Interest:** The authors have declared that no competing interest exists.

**Data Availability:** All relevant data are within the paper and its supporting information files.

## INTRODUCTION

Ethno forestry can be defined as the creation, conservation, management and use of forest resources, through continued practices of customary ways by local communities<sup>1</sup>. Thus, it is specific and appropriate to each community and environment. Traditional medicinal plants are a therapeutic resource used by the population of the African continent specifically for health care, which may also serve as starting materials for drugs<sup>2</sup>. Iwu *et al.*<sup>3</sup> reported that infectious diseases account for one-half of all deaths in the tropical countries. As a result, people of all continents have long applied poultice and imbibed infusions of indigenous plants dating back to prehistory for health purposes<sup>4</sup>. Many infectious diseases have been known to be treated with herbal remedies gotten from medico-ethno forest trees species since man's existence. The maximum therapeutic benefits and minimum side effects of herbal remedies have been verified in numerous scientific findings<sup>2-4</sup>.

Medicinal and aromatic plants have demonstrated its contribution to the treatment of diseases such as Human Immune Virus (HIV), Acquired Immune Deficiency Syndrome (AIDS), malaria, diabetes, sickle-cell anemia, mental disorders<sup>5,6</sup> and microbial infections<sup>3</sup>. According to the World Health Organization (WHO)<sup>7</sup>, 80% of the world population use medicinal plants in the treatment of diseases and in African countries, this rate is much higher. Iwu *et al.*<sup>3</sup> reported that the primary benefits of using plant derived medicines are that they are relatively safer than synthetic alternatives, offering profound therapeutic benefits and more affordable treatment. The use of medicinal plants in developing countries as a normative basis for the maintenance of good health has been widely observed by the United Nations Educational Scientific and Cultural Organization (UNESCO)<sup>8</sup>.

Furthermore, the increasing reliance on the use of medicinal plants in the industrialized societies have been traced to the extraction and development of several drugs and chemotherapeutics from these plants as well as from traditionally used rural remedies<sup>9</sup>. Moreover, in these societies, herbal remedies have become more popular in the treatment of minor ailments and on account of the increasing costs of personal health maintenance. Survey conducted by the WHO "Roll back malaria" program in 1998 showed that in Ghana, Mali, Nigeria and Zambia, more than 60% of the children with high fever were treated at home with herbal medicines<sup>10</sup>.

Over exploitation driven by strong market demand and human want to erect buildings poses a significant threat to the medico-ethnoforest tree species diversity. Despite the

importance and wide application of medicinal trees in Nigeria, gap of knowledge still exist on the medicinal forest trees that exist in most communities and institutions such as Nnamdi Azikiwe University, Awka, Nigeria. Hence, this study aimed at developing a checklist of the medico-ethno forest tree species in Nnamdi Azikiwe University main campus, Awka, for sustainable management of the tree species and consolidation of indigenous knowledge.

## MATERIALS AND METHODS

**Description and location of study area:** This study was carried out from 11th of June, 2019 to 27th of November, 2019 in Nnamdi Azikiwe University, Awka Anambra State, located in the southeastern geopolitical zone of Nigeria. It was established in 1991. The area is characterized by various floras. It is located from latitude 6.245° to 6.283°N and longitude 7.115° to 7.121°E (Fig. 1). The temperature in Awka is generally 27-30°C between June and December but rises to 32-34°C between January and April with the last few months of the dry season marked by the intense heat. It has an average annual temperature of 26.3°C. It has a rainfall pattern ranging from 1828-2002 mm. The climate of Awka falls within the tropic wet and dry type based on Koppen's classification<sup>11</sup>.

**Data collection:** All open grown medicinal forest trees within the Awka main campus of Nnamdi Azikiwe University were enumerated. The trees were identified into their respective species and families. Additional information on ethnomedicinal properties and local names of the trees were obtained from literature. Some of the ethnomedicinal data collected included the ailments cured and tree parts used. The trees were listed in order of alphabets of their family names.

**Statistical analysis:** Descriptive statistics such as frequency was employed to analyze the count data of open grown tree species encountered in the study area.

Relative density (%) of each species was computed following the equation of Magurran<sup>12</sup>:

$$\text{Relative Density (\%)} = \frac{n}{N} \times 100 \quad (1)$$

where, n is number of individual tree species and N is total number of trees

Hence, the density status of each species was obtained following Edet *et al.*<sup>13</sup> classification as:

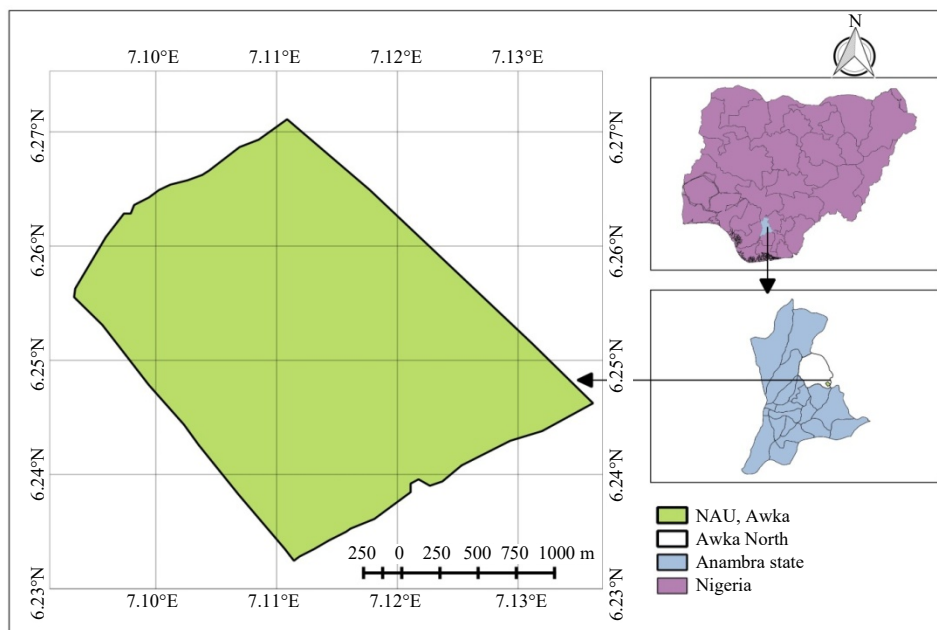


Fig. 1: Map of Nnamdi Azikiwe University, Awka, Nigeria

- Abundant ( $RD \geq 5.00$ )
- Frequent ( $4.00 \leq RD \leq 4.99$ )
- Occasional ( $3.00 \leq RD \leq 3.99$ )
- Rare ( $1.00 \leq RD \leq 2.99$ ) and
- Threatened/endangered ( $0.00 < RD \leq 1.00$ )

## RESULTS AND DISCUSSION

The result of the study showed that the 25 open grown trees found in the study area were medical remedies for ranging from malaria, snake bite to cure for asthma (Table 1). Urban vegetation, particularly trees, provides numerous benefits that can improve environmental quality and human health in and around urban areas. This study identified 25 medicinal forest tree species belonging to 23 genera and 15 families having a frequency of 479 in Nnamdi Azikiwe University, Awka, Nigeria. Fabaceae was the most dominant family with four species; Apocynaceae, Loganiaceae, Meliaceae, Moraceae, Myrtaceae and Verbenaceae were represented by two species each. Many of the plant families recorded were represented by a single species (Table 1). The result of this study revealed that the medicinal trees found in the study area are traditional remedies and/or cures for about forty diseases and sicknesses.

The plants are used generally to cure diseases such as malaria, fever, cough, dysentery, skin infections, gynecological

problems and many others. The disease, malaria is a major health problem in the Nigeria and also prime among the top three causes of death in the country<sup>14</sup>. Similar result was reported in Enugu state of Nigeria<sup>15</sup>.

The plant parts used include barks, leaves, roots, stem and fruits and are prepared for medical use in different formulations such as decoction, infusion, powder and ointment etc. The vegetative plant parts (stem bark, roots and leaves) are most commonly used compared to the reproductive plant materials. According to UNESCO<sup>9</sup>, an increasing reliance on the use of these medicinal plants even in the industrialized societies has been traced to the development of several drugs and chemotherapeutics from these plants as well as from traditionally used rural herbal remedies.

The results showed that *Azadirachta indica* has the highest number of open grown medicinal forest tree species with 125 stands in the study area with Relative Density (RD) of 26.10%, followed by *Vitex doniana* (48) with RD = 10.02%, *Daniella oliveria* (46) 9.60% and *Annona senegalensis*, *Carpolobia lutea*, *Dialium guineense*, *Ficus capensis*, *Holarrhena floribunda*, *Pentaclethra macrophylla* and *Treulia africana* having the lowest RD = 0.21% and frequencies of a count each (Table 2). This study is in disagreement with the report of Chukwu and Chenge<sup>16</sup>, that reported *Eucalyptus camaldulensis*, *Terminalia superba*, *Eucalyptus tereticornis* and

Table 1: Checklist of forest trees with their medicinal values

Family	Species	Common name	Local name	Part used	Medicinal value
Annonaceae	<i>Annona senegalensis</i> Pers.	Custard apple	Abo, Ubunu-ocha, Gwandar-daji	Leaves, Stem, Root, Bark	Treatment of Yellow fever, Venereal disease, diarrhea and gastrointestinal troubles <sup>15,18</sup>
Apocynaceae	<i>Alstonia boonei</i> De Wild	Pattern wood or Camwood	Ahun	Root, Bark and Leaves	Treatment of snake bite and arrow poison, fever tumor <sup>19</sup>
	<i>Holarrhena floribunda</i> (G. Don) Dur and Schinz	False rubber tree	Bakin mutum	Bark, Leaves, Whole Plant	Treatment of gonorrhea, dysentery, jaundice, female sterility, skin, infection, venereal disease, malaria and snake bite <sup>20</sup>
Arecaceae	<i>Borassus aethiopum</i> Mart	African fan palm	Ebi	Fruits, Root, Leaves	Root boiled with potash is used to treat swollen testis and treatment of infertility <sup>19</sup>
Bignoniaceae	<i>Newbouldia laevis</i> (P. Beauv) Seaman ex Bureau	Tree of life, Fertility tree	Atoko, Ogilisi/ogirisi, Aduruku	Leaves	Treatment of asthma <sup>15</sup>
Fabaceae	<i>Albizia lebeck</i> (L.) Benth.	Indian siris	Ayinre-weere, kurmii, Kokko	Leaves, Flower, Stem, Bark, seeds	Anti-asthmatic, anti-inflammatory, anti-fertility and anti-diarrhea, antiseptic, anti-dysenteric, anti-tubercular, leprosy, paralysis, helminthic infection, allergic rhinitis, astringent to treat the eye, psychoactive, flu, lung problems, pectoral problems, cough, gingivitis, abdominal tumors <sup>21</sup>
	<i>Daniellia oliveri</i> (Rolfe) Hutchand Daz.	Copaiba balsam	Uya/Iya	Stem, Bark, Leaves	Treatment of gonorrhea and skin diseases, dysmenorrhea <sup>19</sup>
	<i>Pentaclethra macropophylla</i> Benth.	African oil bean	Ugba	Stem, Leaves, Pods, Seeds and Bark	Treatment of infertility, lactogenity, convulsion, abortion and wounds <sup>22</sup>
	<i>Tetrapleura tetraptera</i> Schumac. and Thons	Aridan	Aridan, Okpokrikpo /ososh	Fruit	Treatment of sickle cell <sup>15</sup>
Leguminosae	<i>Dialium guineense</i> Wild	African velvet tamarind	Igbaru, lchekun, Tsamiyarkum	Stem, Root, Bark	Anti-diuretic, anti-cancer <sup>23</sup>
Loganiaceae	<i>Anthocleista Schweinfurthii</i> Gilg.			Leaves, Plant, Root, Bark	Treatment of hernia, sores, vaginal prolapse, fever. It is used as a purgative and induces also to labor <sup>24</sup>
	<i>Anthocleista vogelii</i> Planch	Cabbage tree		Bark, Sap, Leaf, Root, Seed	Eye treatment, ear treatment, laxatives, diuretics, edema and antidote for sting <sup>18</sup>

Table 1: Continue

Family	Species	Common name	Local name	Part used	Medicinal value
Malvaceae	<i>Ceiba pentandra</i> (L.) Gaertn	Silk Cotton	Araba, Akpuowu	Leaves, Bark, Silk	Stimulant/laxative, fresh leaves used as vegetable. Bark boiled in water and used for diabetes and erectile dysfunction treatments. The silk used in some medicinal preparations <sup>15</sup>
Meliaceae	<i>Azadirachta indica</i> (L.) Adelb	Neem	Dongoyaro, Atuyabasi/ ogwuakom Maina, Eke-oyibo, Dongo-yaro	Fruit juice, Stem, Leaves and Tree bark	Treatment of boils, anti-malaria and skin rashes <sup>15,19</sup>
Moraceae	<i>Melicia excelsa</i> (Welw.) C.C. Berg <i>Ficus capensis</i> Thunb.	Mulberry, Iroko Bush fig, fig of heaven, African mustard tree,	Iroko, Loko, Oji Opoto, Farin, bauree, Anwerenwa	Root Leaves, Bark	Treatment of rheumatism <sup>15</sup> It serves as a blood tonic and immune booster. It is used in the treatment of chest problem, toothache, tonsillitis, peptic ulcer, epilepsy <sup>25</sup>
Myrtaceae	<i>Treculia africana</i> Decne <i>Eucalyptus camaldulensis</i> Dehnh.	Africa Breadfruit River red gum tree	Afon, Ukwa Ugbaikolo	Leaves Leaves, Gums	Treatment of heart problem <sup>15</sup> Treatment of cough, rheumatism, dysentery, astringent and antiseptic <sup>26,27</sup>
Pinaceae	<i>Eucalyptus globulus</i> Labill <i>Pinus caribaea</i> Morelet	Blue gum tree Caribbean pine		Leaves, Gums Leaves, Bark	It is taken against asthma, against cold, to treat malaria, abscesses, chicken pox and rheumatism <sup>28</sup>
Polygalaceae	<i>Carpobrotia lutea</i> G. Don	Cattle stick	Ikpafulum, Agba, Angalagala	Leaves, Bark	Anti-septic, diuretic, antifungal, rheumatism, inhalers and skin issues <sup>29</sup>
Rubiaceae	<i>Morinda lucida</i> Benth	Brimstone Tree	Oruwo, Ezeogwu,	Leaves	Treatment of gonorrhoea, gingivitis, infertility, antiulcer and malaria <sup>30</sup>
Verbenaceae	<i>Gmelina arborea</i> Roxb. <i>Tectona grandis</i> Linn. f.	Gmelina Teak	Melina	Leaves, Stem, Bark Leaves, Seed, Bark, Root	Treatment of fever <sup>15,19</sup> Anti-diuretic, anti-cancer, anti-diabetic, treatment of bone fracture <sup>31</sup> Bronchitis, biliousness, hyperacidity, diabetes, leprosy, astringent and helminthiasis. It is used in the treatment of pile. <sup>2</sup>
	<i>Vitex doniana</i> Sweet	Black plum	Ejiji	Leaves, Root, Fruit, Bark	Treatment of malaria, diarrhoea, sterility, Painful menstruation, cough, burns, fatigue <sup>33</sup>

Table 2: Abundance of open grown medicinal tree species in the study area

Species	Frequency	RD (%)	Status
<i>Albizia lebbbeck</i>	4	0.84	Threatened/endangered
<i>Alstonia boonei</i>	15	3.13	Occasional
<i>Annona senegalensis</i>	1	0.21	Threatened/endangered
<i>Anthocleista schweinfurthii</i>	6	1.25	Rare
<i>Anthocleista vogelli</i>	16	3.34	Occasional
<i>Azardirachta indica</i>	125	26.10	Abundant
<i>Borrassus aethiopum</i>	37	7.72	Abundant
<i>Carpolobia lutea</i>	1	0.21	Threatened/endangered
<i>Ceiba pentandra</i>	2	0.42	Threatened/endangered
<i>Daniellia oliveri</i>	46	9.60	Abundant
<i>Dialium guineense</i>	1	0.21	Threatened/endangered
<i>Eucalyptus camaldulensis</i>	32	6.68	Abundant
<i>Eucalyptus globulus</i>	20	4.18	Frequent
<i>Ficus capensis</i>	1	0.21	Threatened/endangered
<i>Gmelina arborea</i>	25	5.22	Abundant
<i>Holarrhena floribunda</i>	1	0.21	Threatened/endangered
<i>Melicia excels</i>	11	2.30	Rare
<i>Morinda lucida</i>	4	0.84	Threatened/endangered
<i>Newbouldia laevis</i>	39	8.14	Abundant
<i>Pentaclethra macrophylla</i>	1	0.21	Threatened/endangered
<i>Pinus caribaea</i>	32	6.68	Abundant
<i>Tectona grandis</i>	5	1.04	Rare
<i>Tetrapleura tetraptera</i>	5	1.04	Rare
<i>Treulia africana</i>	1	0.21	Threatened/endangered
<i>Vitex doniana</i>	48	10.02	Abundant
Total	479	100	

*Nauclea diderichii* as the most dominant tree species in Faculty of Renewable Natural Resources, University of Ibadan, Ibadan, Nigeria. The disagreement might be due to differences in the size of the studied area.

The distribution of the relative density status revealed that 10 species were under the threatened/endangered status, 8 species were abundant, 4 species were rare, 2 species were occasional and only a single specie was in the frequent status (Table 2). The high number of threatened species might be due to indiscriminate felling of trees to make space for siting of buildings and other structures. Akindele and LeMay<sup>17</sup> pointed that indiscriminate and/or illegal logging activities and over-exploitation of trees have pose treat to tropical trees species especially in developing countries.

The University management should embark on enrichment planting of the tree species that have low frequency distribution and threatened/endangered such as *Annona senegalensis*, *Ficus capensis*, *Dalium guineensis*, *Treulia africana*, *Holarrhena floribunda*, *Carpolobia lutea*, *Albizia lebbbeck* and *Pentaclethra macrophylla*. Conservative measures should be put in place to checkmate these species as well as promote cultivation of more of these medico-ethno forest trees as cures for cancer, infections, diabetes and some other life threatening diseases discovered.

## CONCLUSION

The study documented open grown trees with medical remedies for 40 diseases in the study area. *Azardirachta indica* was recorded as the specie with the highest relative density. Out of the 25 species identified as open grown medicinal tree species, 10 species were threatened/ endangered.

## SIGNIFICANCE STATEMENT

This study discovered medicinal tree species that can be beneficial for curing of several diseases of humans. The study also revealed the abundant status of these medicinal tree species to aid their conservation. This study will help the researcher to uncover the critical areas of medicinal use of tree species in the study area that many researchers were not able to explore and document. Thus a new theory on these medicinal trees species and possibly other combinations, phytochemicals, side effects and dosage may be arrived at.

## ACKNOWLEDGMENT

The authors appreciate the Department of Forestry and Wildlife, Nnamdi Azikiwe University, Awka, Nigeria for

providing technical and material support toward the success of this research work.

Authors also thankful to the Asian Journal of Biological Sciences for publishing this article free of cost and to Karim Foundation for bearing the cost of article production, hosting as well as liaison with abstracting and indexing services and customer services.

## REFERENCES

1. Pandey, D.N., 1998. Ethnobotany: Local Knowledge for Sustainable Forestry and Livelihood Security. Himanshu Publication, Udaipur, India, ISBN-13: 9788186231425, Pages: 91.
2. Sofowora, A., E. Ogunbodede and A. Onayade, 2013. The role and place of medicinal plants in the strategies for disease prevention. Afr. J. Tradit. Complement. Altern. Med., 10: 210-229.
3. Iwu, M.M., A.R. Duncan and C.O. Okunji, 1999. New Antimicrobials of Plant Origin. In: Perspectives on New Crops and New Uses, Janick, J. (Ed.). ASHS Press, Alexandria, VA, USA., ISBN-13: 9780961502706, pp: 457-462.
4. Cowan, M.M., 1999. Plant products as antimicrobial agents. Clin. Microbiol. Rev., 12: 564-582.
5. Elujoba, A.A., O.M. Odeleye and C.M. Ogunyemi, 2005. Review-Traditional medicine development for medical and dental primary health care delivery system in Africa. Afr. J. Tradit. Complement. Altern. Med., 2: 46-61.
6. Okigbo, R.N. and E.C. Mmeka, 2006. An appraisal of phytomedicine in Africa. KMITL Sci. Technol. J., 6: 83-92.
7. WHO., 2001. Legal status of traditional medicine and complementary/alternative medicine: A worldwide review. WHO/EDM/TRM/2001.2, World Health Organization, Geneva, Switzerland, pp: 1-189.
8. UNESCO., 1996. Culture and health: Orientation texts on the 1996 theme. Document No. CLT/DEC/PRO-1996, United Nations Educational, Scientific and Cultural Organization (UNESCO), Paris, France, pp: 1-129.
9. UNESCO., 1998. Promotion of ethnobotany and the sustainable use of plant resources in Africa: Regional Africa (Kenya, Malawi, Mozambique, Tanzania, Uganda). FIT/504-RAF-48 Terminal Report, United Nations Educational, Scientific and Cultural Organization (UNESCO), Paris, France, pp: 1-60.
10. WHO., 2004. WHO Guidelines on Developing Consumer Information on Proper Use of Traditional, Complementary and Alternative Medicine. World Health Organization, Geneva, Switzerland, ISBN-13: 9789241591706, Pages: 87.
11. Ezenwaji, E.E., P.O. Phil-Eze, V.I. Otti and B.M. Eduputa, 2013. Household water demand in the peri-urban communities of Awka, Capital of Anambra State, Nigeria. J. Geogr. Reg. Plann., 6: 237-243.
12. Magurran, A.E., 1988. Ecological Diversity and its Measurement. Croom Helm, London, UK., ISBN-13: 9780709935391, Pages: 179.
13. Edet, D.I., H.M. Ijeomah and A.U. Ogogo, 2012. Preliminary assessment of tree species diversity in Afi Mountain Wildlife Sanctuary, Southern Nigeria. Agric. Biol. J. North Am., 12: 486-492.
14. Dawaki, S., H.M. Al-Mekhlafi, I. Ithoi, J. Ibrahim and W.M. Atroosh *et al.*, 2016. Is Nigeria winning the battle against malaria? Prevalence, risk factors and KAP assessment among Hausa communities in Kano State. Malaria J., Vol. 15. 10.1186/s12936-016-1394-3
15. Aiyelaja, A.A. and O.A. Bello, 2006. Ethnobotanical potentials of common herbs in Nigeria: A case study of Enugu State. Educ. Res. Rev., 1: 16-22.
16. Chukwu, O. and I.B. Chenge, 2018. Stability assessment and composition of tree species in Nigerian University. World Scient. News-Int. Scient. J., 95: 235-245.
17. Akindele, S.O. and V.M. LeMay, 2006. Development of tree volume equations for common timber species in the tropical rain forest area of Nigeria. For. Ecol. Manage., 226: 41-48.
18. Burkill, H.M., 1985. The Useful Plants of West Tropical Africa. 2nd Edn., Royal Botanical Gardens, Kew, England, UK., ISBN-13: 9780947643010, Pages: 960.
19. Shosan, L.O., O.O. Fawibe, A.A. Ajiboye, T.A. Abegunrin and D.A. Agboola, 2014. Ethnobotanical survey of medicinal plants used in curing some diseases in infants in Abeokuta South local government area of Ogun state, Nigeria. Am. J. Plant Sci., 5: 3258-3268.
20. Hoekou, Y.P., T. Tchacondo, S.D. Karou, R.S. Yerbanga and E. Achoribo *et al.*, 2017. Therapeutic potentials of ethanolic extract of leaves of *Holarrhena floribunda* (G. Don) Dur. and Schinz (Apocynaceae). Afr. J. Tradit. Complement. Altern. Med., 14: 227-233.
21. Verma, S.C., E. Vashishth, R. Singh, A. Kumari and A.K. Meena *et al.*, 2013. A review on parts of *Albizia lebbek* (L.) Benth. used as ayurvedic drugs. Res. J. Pharm. Technol., 6: 1307-1313.
22. Okoye, E.I., 2016. Extraction, characterization and pharmaceutical screening of oil obtained from seeds of *Pentaclethra macrophylla* Benth (African oil bean seed). Pharmaceut. Chem. J., 3: 88-91.
23. Olajubu, F.A., I. Akpan, D.A. Ojo and S.A. Oluwalana, 2012. Antimicrobial potential of *Dialium guineense* (Wild.) stem bark on some clinical isolates in Nigeria. Int. J. Applied Basic Med. Res., 2: 58-62.
24. Anyanwu, G.O., Nisar-ur-Rehman, C.E. Onyeneke and K. Rauf, 2015. Medicinal plants of the genus *Anthocleista*-A review of their ethnobotany, phytochemistry and pharmacology. J. Ethnopharmacol., 175: 648-667.
25. Esievo, K.B., S.O. Anthony, O.T. Fatokun and O.F. Kunle, 2018. *Ficus capensis* Thumb. (Moraceae): Review of its ethnomedicinal uses, pharmacological activities and phytochemical constituents. Arch. Curr. Res. Int., 12: 1-7.



26. Doran, J.C. and W. Wongkaew, 2008. *Eucalyptus camaldulensis* Dehnh. In: Plant Resources of Tropical Africa, Volume 7, Part 1: Timbers 1, Louppe, D., A.A. Oteng-Amoako and M. Brink (Eds.). PROTA Foundation, Wageningen, The Netherlands, ISBN: 9789057822094.
27. Ghareeb, M.A., M.R. Habib, H.S. Mossalem and M.S. Abdel-Aziz, 2018. Phytochemical analysis of *Eucalyptus camaldulensis* leaves extracts and testing its antimicrobial and schistosomicidal activities. Bull. Natl. Res. Centre, Vol. 42, No. 1. 10.1186/s42269-018-0017-2
28. Vaughan, G., 2008. *Eucalyptus globulus* Labill. In: Plant Resources of Tropical Africa, Volume 7, Part 1: Timbers 1, Louppe, D., A.A. Oteng-Amoako and M. Brink (Eds.). PROTA Foundation, Wageningen, The Netherlands, ISBN: 9789057822094.
29. Oteng-Amoako, A.A. and M. Brink, 2008. *Pinus caribaea* Morelet. In: Plant Resources of Tropical Africa, Volume 7, Part 1: Timbers 1, Louppe, D., A.A. Oteng-Amoako and M. Brink (Eds.). PROTA Foundation, Wageningen, The Netherlands, ISBN: 9789057822094.
30. Oyen, L.P.A., 2012. *Carpolobia alba* G. Don. In: Plant Resources of Tropical Africa, Volume 7, Part 2: Timbers 2, Lemmens, R.H.M.J., D. Louppe and A.A. Oteng-Amoako (Eds.). PROTA Foundation, Wageningen, The Netherlands, ISBN-13: 9789290814955.
31. Arora, C. and V. Tamrakar, 2017. *Gmelina arborea*: Chemical constituents, pharmacological activities and applications. Int. J. Phytomed., 9: 528-542.
32. Nidavani, R.B. and A.M. Mahalakshmi, 2014. Pharmacology of *Tectona grandis* Linn.: Short review. Int. J. Pharmacogn. Phytochem. Res., 6: 86-90.
33. Dadjo, C., A.E. Assogbadjo, B. Fandohan, R.G. Kakai and S. Chakeredza *et al.*, 2012. Uses and management of black plum (*Vitex doniana* Sweet) in Southern Benin. Fruits, 67: 239-248.