International Journal of Social Forestry (IJSF), 2010, 3(1):49-65
ISSN 1979-2611, www.ijsf.org

ASSESSMENT OF SOME OTHER TRADITIONAL USES OF ACCEPTED AGROFORESTRY FUELWOOD SPECIES IN AKINYELE AND IDO LOCAL GOVERNMENT AREAS, OYO STATE, NIGERIA

A.A. Erakhrumen, O.Y. Ogunsanwo, and O.I. Ajewole

Abstract
This study was carried out in order to assess some other traditional uses that some woody species can be put to, apart from their usefulness as fuelwood, using Akinyele and Ido Local Government Areas (LGAs), Oyo State, Nigeria, as a case study. Woody species found in agroforestry plots/farms in the study area, were compiled from questionnaires retrieved from 179 respondents, then prioritised using the respondents' ranking, from which twelve species that top the ranking were selected. Friedman chi-square result revealed that there was no statistically significant difference in the ranking pattern of the respondents in the two LGAs (χ^2=2.17; p<0.05). The questionnaire survey and literature search for other traditional uses to which the various parts of the accepted fuelwood species are put revealed that culinary and medicinal uses were dominant among these other uses. It was therefore recommended, based on this study, that management strategies that aim at balancing wood use as fuel and other traditional uses should be encouraged.

Keywords: *agroforestry, fuelwood, prioritisation, traditional uses, rural communities.*

Introduction

The use of wood as a means of generating heat energy, particularly for cooking and heating, is still very much relevant in the developing countries, most especially those of sub-Saharan Africa (Erakhrumen 2008a). Reports such as Arnborg (1984) had earlier shown that as much as half of the timber harvested in the world is used as fuelwood for cooking and heating, most of which are used in the developing countries (IEA 2002), where recent estimates showed that fuelwood accounts for about 90% of the timber harvested (Brooks 1993, FAO 2007).

Similarly, Temu (2002) also estimated that over 90% of the people of Africa depend on either firewood or charcoal for cooking and heating, a trend that presently appears not to have a likelihood of reversing in many decades

to come (FAO 2001, Kituyi 2002, UNDP 2002, Erakhrumen 2007, Erakhrumen 2009c) with the quantity needed expected to increase continuously, based on informed projections (FAO 1999, ITTO 2005).

These projected future increases are perhaps because of the unpredictable changes in demographic and socio-economic characteristics including the interplay between these and other factors in these areas (Erakhrumen 2007) coupled with the unpredictable fluctuations in the prices of domestic fossil fuels such as kerosene, liquefied petroleum gas, and others (Erakhrumen 2010).

However, apart from the use of biomass, especially wood, for cooking and heating, the inhabitants of these countries have depended, for livelihood and sustenance, on their indigenous plants resources for centuries. They depend on them for food security and a host of everyday products, from medicines to fibres (Leakey & Izac 1996). The increases in the use of fuelwood have partly contributed to the depletion of forests (FAO 2002) and the implications of this on the environment, biodiversity stability and, by extension, on the wellbeing of human beings are well documented in literature.

Owing to the increasing consumption of woody biomass as fuel in the world, it is imperative to be in tune with other traditional uses to which accepted fuelwood species are put by the cross section of users; this is necessary in order to be acquainted with information that may assist in various management strategies for preventing a situation whereby these species are overexploited for energy generation to the detriment of other traditional uses central to survival and sustenance in these communities where large number of people living below poverty line are concentrated (Canagarajah 1998, Popoola & Akinwumi 2001).

In line with the foregoing, this paper therefore is focused on compiling a list of woody species found in agroforestry farms/plots in Akinyele and Ido Local Government Areas (LGAs), where the predominant system of agroforestry practiced is that of scattered trees in croplands; then these are prioritised based on users' perspectives and/or native intelligence/ indigenous knowledge while the twelve mostly used among them are selected in terms of their usefulness as fuelwood based on users' perceptions; lastly, there is a compilation of some other traditional uses, apart from their use as fuelwood, that the twelve species can be put to.

Methodology

Study Area

The field survey of agroforestry trees was done in agroforestry farms/plots in Akinyele and Ido LGAs of Oyo State, Southwest, Nigeria (Latitude 7°17′–7°26′N and Longitude 3°17′–3°30′E) where the predominant method of agroforestry system practiced is scattered trees in croplands (with

most of the trees not planted by the respondents interviewed). This study area is located in between the humid and sub-humid tropical climate.

The mean annual rainfall ranges from 1,117.1 to 1,693.3mm. The rainfall pattern has a characteristic bimodal distribution with peaks usually in June or July and September and the period of low precipitation in August with four months of dry season (December–March). The annual temperature ranges from an average minimum of 24.6°C to average maximum of 31.5°C. The mean monthly relative humidity reaches a minimum of 52% in February and a maximum of 83% in August (FRIN 1999).

Questionnaire Survey

In order to prioritise the woody species found in croplands in this study area and obtain those mostly preferred to be in agroforestry farms by farmers and other fuelwood users residing in these rural communities, a questionnaire was drawn for administration on this target group, in such a way as to utilise their indigenous knowledge/native intelligence for the prioritisation of the species. The importance of indigenous/traditional knowledge in prioritising and/or selecting renewable natural resources for various uses has been established in many communities; and some studies highlighting this, such as Erakhrumen (2009a), are available in literature.

A random survey of respondents was done using questionnaires targeting 240 respondents. One hundred and twenty (120) copies of this set of questionnaires were randomly administered in each LGA. This was achieved by partitioning each LGA into 4 geographical zones, that is North, West, South, and East based on the recorded information obtained from each LGA headquarters with a village/community randomly selected to represent each zone in each LGA as stated: Akinyele LGA: North: Aba Isale Community, South: Papa Malu Community, West: Motosho Community, East: Bagadaje Community. Ido LGA: North: Odetola Community, South: Dagilogba Community, West: Tade Community, East: Patako Community.

Thirty copies of the questionnaires were randomly administered on respondents in each geographical zone in a way to ensure randomisation, equitable distribution, and even spread of the questionnaires in the two LGAs. The questionnaire was drawn up in such a way that the respondents listed all the woody species on his/her farm or those encountered on agroforestry plots, and prioritised them in terms of how preferable they were for agroforestry from his/her perspective based on experience. The respondents listed the woody species from 1 to 10 in order of preference with the species in position number 1 being the most preferred while the species in position number 10 being the least preferred out of the ten species in that order.

Numerical values of 1 to 10 were allocated to each position on the ranking in descending order, that is, numerical value 10 was allocated to position number 1 on the ranking while numerical value 1 was allocated to position number 10 on the ranking in that order. Collating the numerical values allocated to each position occupied by each species on the ranking, it was found that twelve (12) species had the highest cumulative values as against only ten (10) species that were originally planned to be selected.

These methods of questionnaires administration and allocation of values to ranking position of species had been described extensively in another study by Erakhrumen (2005) and also adopted in studies by Erakhrumen (2008b), Erakhrumen (2009a), Erakhrumen (2009b), Erakhrumen (2009c). The number of copies of questionnaires that were retrieved from Akinyele and Ido LGAs was 83 and 96 out of the 120 administered respectively totalling 179 owing to incomplete information in, and non-retrieval of some of the questionnaires totalling sixty one (61). The 179 questionnaires served as the effective sample size used in the subsequent statistical analyses for the study.

Statistical Analysis

The Friedman chi-square analysis was employed in analysing the ranking pattern of the prioritised species by the respondents to ascertain if there exists significant difference in their ranking in the two LGAs. The statistical package used for the analysis was SPSS14®. The analysis was carried out at 5% probability level.

Results

The list of woody species found in agroforestry farms/plots in the study area is tabulated in Table 1 while the twelve woody species that were at the top of the priority ranking of the respondents and their cumulative ranking values in each LGA are shown in Table 2. Table 3 has the twelve species, their full scientific names and the families they belong to while the Friedman chi-square result of the ranking pattern of the respondents in the two LGAs is tabulated in Table 4. Tabulated in Table 5 are some other traditional uses of the twelve woody species, apart from their use as fuelwood.

Discussion

The fact that wood is an important source of energy in most rural communities of the developing countries cannot be overemphasised. Various reasons have been attributed to this, among which are the unreliability in demographic parameters, socio-economic realities, and interplay between these and other factors (Erakhrumen 2007). This natural resource is so important to the inhabitants of the rural, peri-urban, and some urban communities that it is harvested and/or purchased and stored in order to

reduce its moisture content for use as firewood, both for the immediate and near future use.

For instance, in the two LGAs that fall within the study area of this work, apart from their headquarters and few adjoining communities, the other villages and communities were largely without electric power supply from the national power grid, an observation which is not unexpected, as IEA (2002) had earlier observed that four out of five people without electricity live in the rural areas of the developing world, mainly in south-east Asia and sub-Saharan Africa. The dependence on biomass, especially fuelwood, as a source of energy should not be unexpected in communities with such characteristics.

The result of the survey showed that a majority of the inhabitants of the study area depends on fuelwood for generating heat energy most especially for heating and cooking. This observation was corroborated by the result of a study by Anaukwu (1992) which revealed that people with low income consume more fuelwood than those with higher income while the consumption in the rural areas was higher than that in the urban centres in Nigeria, an observation which is supported by the opinion of Popoola and Akinwumi (2001) who stated that a large population of poor people live in the rural areas of the country.

The response of the respondents revealed that twelve among the listed woody species in Table 1 top their priority ranking based on their perceived energy value (Table 2). There was similarity in their preference in the two LGAs as revealed by the result of the Friedman chi-square analysis (Table 4) which showed that the ranking pattern in the two LGAs did not significantly differ statistically from the expected value at $p < 0.05$.

This result supports the fact that the indigenous knowledge is an important factor that governs the acceptance and use of any renewable natural resources for any purpose in any community. It also shows that the 'rural' people are aware of the fact that not all woody species, for instance, possess the ability to provide the same quantity of energy at the same rate based on their personal and inherited generational experience.

It is however important to note that the problem associated with defining 'rurality' is not new irrespective of the fact that division between 'urban' and 'rural' areas is often based on the assumption that the physical distinction between the two is self-explanatory and uncontroversial. The definition(s) of what 'urban' or 'rural' areas are is definitely beyond the scope of this discussion.

Various studies have shown the importance of trees and non-tree resources for the sustenance of livelihood in many local communities in this part of the world. Results of the questionnaire survey in this study and information from literature tabulated in Table 5, revealed that there are other traditional uses to which the twelve most preferred woody species as

fuelwood can be put, particularly in the rural areas; this makes their inclusion on the list of fuelwood species a good pointer to both the importance of wood as domestic energy source in many of the rural areas and the declining state of wood, in terms of quantity, for this purpose.

For instance, the use of plant medicines plays an important role in daily health care in many parts of Africa. It has been observed in some communities that "local" medicines are even preferred to "modern" medicines. They are of course less expensive, but they are often regarded as being more "effective" in some instances (Betti 2004). The use of herbal medicines have produced results of proven efficacies compared to conventional modern medicines (Chopra *et al*. 1956), it is therefore, not surprising that various parts of the twelve prioritised woody species have one medicinal use or another, as shown in Table 5. It is also important to note that trade in plant parts for medicinal uses also serve as a means of livelihood to some rural and urban inhabitants.

Although, some of the respondents indicated that the branches of trees and shrubs are mostly harvested and used as fuelwood, it should be noted that these same branches produce fruits and leaves of invaluable importance to the rural and urban communities as also shown in Table 5. For instance, branches of *Parkia biglobosa* serve as a source of locust beans that has been found to be of high nutritive value. In an ethno-botanical and socio-economic survey carried out for preferred economic trees by farmers and stakeholders in the savannah region of Nigeria, *P. biglobosa* topped the list of eighteen selected indigenous fruit trees providing services and income (Soladoye *et al*. 1989, Popoola & Maishanu 1995).

Apart from the consumptive use of the fruit/seeds and leaves of the species as food, juice, spices, condiments, production of oil, among others, some of them also serve as a source of chew stick for cleaning the teeth, and this has been demonstrated to have inhibitory effect on some microbial organisms that cause certain mouth diseases (Rotimi *et al*. 1988). They also serve as a habitat for some beneficial insects. For instance, *Triplochiton scleroxylon* particularly serves as a good habitat for African silkworm (*Anaphe venata*) that has been reported to be an edible caterpillar (Ashiru 1988) which also spins their cocoon for silk production.

Others, like *Daniellia oliveri*, ranked high among browse species for cattle in a study by Bayer (1988). The importance of species like *Vitellaria paradoxa* (Fajimi *et al*. 2002) and *Terminalia avicennoides* (Gefu *et al*. 2000) in ethnoveterinary medicine have been well highlighted in literature. Therefore, the continuous unsustainable removal of these woody species for the purpose of energy generation will obviously have negative effects on these other services rendered by them and by extension affect the health of human and animals, environmental, and biodiversity stability negatively.

Conclusion

Studies have shown that inhabitants of developing countries, especially in the rural areas, are dependent upon plant resources for livelihood and sustenance. The use of biomass, especially wood, for energy generation in this part of the world is an issue that may not be easily wished away in the nearest future, probably owing to the vagaries associated with demographic and socio-economic conditions, coupled with the level of technological advancement.

The results obtained in this study have shown that all parts of the twelve highly prioritised fuelwood species have other important traditional uses which, therefore, make their preference for fuelwood an indicator to both the importance of fuelwood and the decline of wood resource for this purpose in this particular study area and perhaps in other rural areas with similar characteristics.

Since a cheaper alternative is yet to be found for the use of wood as fuelwood, it is important that strategies which can enhance sustainable means of producing wood for energy generation and other traditional uses be developed and supported with the active participation and cooperation of all stakeholders, especially the rural dwellers, in order to prevent overexploitation of accepted selected woody species as fuelwood at the expense of other traditional uses.

Acknowledgement

It is the first author's wish to acknowledge the funding support received from African Forest Research Network (AFORNET) of the African Academy of Sciences (AAS), Nairobi, Kenya, for the project titled "*Wood Energy Value as a Factor of Species Selectivity in Agroforestry in Selected Local Government Areas of Oyo State, Nigeria*" and also for the permission to publish scientific articles from its outcome.

References

Agbidye, F.S. and Igbabo, G.O. 2003. "Plants used in Traditional Medicine in Agatu Local Government Area, Benue State, Nigeria." *Nig. J. For*. 33 (1): 1-10.

Anaukwu, A.N. 1992. "Rural Fuelwood Utilization, Consumption Rate and Species Selectivity. A Case Study of Awka North Local Government Area of Anambra State Nigeria", p. 28.

Arbonnier, M. 2002. *Trees, Shrubs and Lianas of West African Dry Zones.* The Netherlands: Cirad Margraf Publishers, pp. 189-426.

Arnborg, T. 1984. "Agroforestry." A Paper presented at the Seminar of Faculty of Agriculture, University of Sokoto, Sokoto, 14pp.

Ashiru, M.O. 1988. "The Food Value of the Larvae of *Anaphe venata* Butler" (Lepidoptera: Notodontidae). *Ecol. Food Nutr.* 22: 313-320.

Bayer, W. 1988. "Ranking of Browse Species by Cattlekeepers in Nigeria." *RRA Notes*, Issue 3, pp.4-10, IIED London.

Betti, J.L. 2004. "An Ethnobotanical Study of Medicinal Plants among the Baka Pygmies in the Dja Biosphere Reserve, Cameroon." *African Study Monographs* 25 (1): 1-27.

Brooks, D.J. 1993. *U.S. Forests in a Global Context*, U.S. Forest Service, General Technical Report No. RM-228, Washington, D.C. p. 9.

Canagarajah, S. 1998. *Poverty and Welfare in Nigeria. Survey Report. Federal Office of Statistics and the National Planning Commission of the Federal Republic of Nigeria and the World Bank.* Washington, D.C.: American Writing Corporation, 22pp.

Chopra, R.N., Naygar, S.L. and Chopra, L.C. 1956. *Glossary of Indian Medicinal Plants.* New Delhi: Council of Sci. Industrial Res., p. 160.

Erakhrumen, A.A. 2005. *Wood Energy Value as a Factor of Species Selectivity in Agroforestry in Selected Local Government Areas of Oyo State, Nigeria.* Unpublished M.Sc. Dissertation, Dept. of Forest Resources Mgt., University of Ibadan, Ibadan, Nigeria, 87pp.

Erakhrumen, A.A. 2007. "Overview of Various Biomass Energy Conversion Routes." *American-Eurasian J. Agric. & Environ. Sci.* 2 (6): 662-671.

Erakhrumen, A.A. 2008a. "Wood Biomass as a Major Source of Energy in Sub-Sahara African Region: Implications for Sustained Research and Education in Agroforestry Technologies." In: Onyekwelu, J.C., Adekunle, V.A.J. and Oke, D.O. (eds.). *Research for Development in Forestry, Forest Products and Natural Resources Management.* Proceedings of the First Biannual Conference of the Forests and Forest Products Society of Nigeria held at the Federal University of Technology, Akure, Ondo State, Nigeria, from the 16th to 18th of April, 2008, pp. 205-211.

Erakhrumen, A.A. 2008b. "Influence of Specific Gravity on Wood Species Selection for Agroforestry in some Local Government Areas of Oyo State, Nigeria." *Afr. J. Agric. Res.*, 3 (2): 134-139

Erakhrumen, A.A. 2009a. "Some Other Uses of Accepted Agroforestry Fuelwood Species Based on Traditional Knowledge in Selected Rural Communities of Oyo State, Southwest, Nigeria." In: Parrotta, J.A., Oteng-Yeboah, A. and Cobbinah, J. (Eds.) Traditional Forest-Related Knowledge and Sustainable Forest Management in Africa. Proceedings of an International Conference held in Accra-Ghana, from the 15th to 17th of October, 2008. *IUFRO World Series*, 23: 85-92.

Erakhrumen, A.A. 2009b. "Energy Value as a Factor of Agroforestry Wood Species Selectivity in Akinyele and Ido Local Government Areas of Oyo State, Nigeria." *Biomass and Bioenergy*, 33 (10): 1428-1434

Erakhrumen, A.A. 2009c. "Estimating the Extent of Influence of Two Intrinsic Fuelwood Properties on Acceptance/Retention of some Woody Species in Agroforestry Practices in Southwest Nigeria." *Drvna Industrija*, 60 (4): 209-218.

Erakhrumen, A.A. 2010. "Implications of Global Economic Recession/Volatility in Petroleum Products' Price, Demand, and Supply on Fuelwood Consumption and Mangrove Forests' Survival in the Niger-Delta Region." In Popoola, L., Idumah, F.O., Adekunle, V.A.J. and Azeez, I.O. (Eds.) The Global Economic Crisis and Sustainable Renewable Natural Resources Management. Volume 2 of the Proceedings of the 33rd Annual Conference of the Forestry Association of Nigeria held in Benin City, Edo State, Nigeria, from the 25th to 29th of October, 2010, pp. 136-147.

FAN, 1989. "Uses of the Forest." In Okoro, O.O. Dada, G.O.B. and Akinsanmi, F.A. (Eds) 100 years of Forestry in Nigeria. Forestry Association of Nigeria, pp. 67-74.

Fajimi, A.K., Taiwo, A.A. Adebowale, E.A. and Ogundola, F.I. 2002. "Evaluation of Sheabutter Plus Salt against Naturally Acquired *Psoroptic mange* in Rabbits." *Tropical Vet.* 20 (1): 11-16.

FAO, 1999. "Global Outlook Study Working Paper Series: Forest Policy and Planning Division," Food and Agriculture Organization of the United Nations, Rome, 33pp.

FAO, 2001. "The Role of Woodfuel in Africa by D. Gustafon. In: N Wamukonye (Ed) Proceeding of a High Level Regional meeting on Energy and Sustainable Development." 10-13 January 2001. Nairobi, Kenya. Food and Agriculture Organization of the United Nations, Rome, pp. 99-101.

FAO, 2002. Forests and Forestry in Small Island Developing States by Wilkie, M.L., Eckelmann, C.M., Laverdiere, M. and Mathias, A. Forest Management Working Paper No. FM 22. Food and Agriculture of the United Nations, Rome, Italy. 2002.

FAO, 2007. "State of the World's Forests." Food and Agriculture Organization of the United Nations, Rome, pp. xii + 144pp.

FRIN, 1999. "Agro-Climatology Data for FRIN Ibadan Weather Station." Forestry Research Institute of Nigeria, Ibadan, Nigeria, 1999.

Gefu, J.O., Abdu, P.A. Alawa, C.B. (Eds). 2000. "Ethnovet." Practices Res. Dev. Proc. of the Workshop on Ethnovet Practices held 14-18 August, 2000, Kaduna, Nigeria. Published by the National Anim. Prod. Res. Inst, ABU, Zaria, Nigeria.

IEA, 2002. *Electricity in India.* International Energy Agency Paris: OECD.

ITTO, 2005. *Tropical Forest Update,* 15(1)2005. International Tropical Timber Organization, Yokohama, Japan, 32pp.

Kituyi, E. 2002. "Towards Sustainable Charcoal Production and Use: a Systems Approach." Proceedings of a Regional Workshop on Woodfuel Policy and Legislation in Eastern and Southern Africa. RELMA, Nairobi, Kenya.

Leakey, R.R.B. and AMN Izac, A.M.N. 1996. "Linkages between Domestication and Commercialization of non-timber Forest Products: Implications for Agroforestry," Eds. Leakey R.R.B. *et al.* Domestication and Commercialization of non-timber Forest products in Agroforestry Systems. Proceedings of an International Conference held in Nairobi, Kenya 19-23 February 1996. Food and Agriculture Organization of the United Nations, Rome.

Popoola, L. and Akinwumi, J.A. 2001. "Economic Considerations for the Management and Utilization of Biodiversity in Nigeria." Paper Presented at the Symposium on Nigerian Biodiversity Update, Organised by the FEPA-UNAAB Linkage Centre for Forest Conservation and Biodiversity, University of Agriculture, Abeokuta, Nigeria, 16-17 October 2001, pp. 5-9.

Popoola, L. and Maishanu, H.H. 1995. "Socio-Economic Values of some Potential Farm Forestry Species in Sokoto State." Proceedings of the 24th Ann. Conf. of FAN, in Kaduna, Kaduna State from 30th October to 4th November, pp. 109-119.

Rotimi, V.O., Laughhon, B.E., Bartlett, J.G. and Mosadomi, H.A. 1988 "Activities of Nigerian Chewing Stick Extracts against *Bacteroides gingivalis* and *Bacteroides melaninogenicus.*" *Antimicrob. Agents Chemother.* 32 (4): 598-600.

Soladoye, M.O., Ohiere, S.S. and Ibimode B.M. 1989. "Ethno-Botanical Study of two Indigenous Multipurpose Plants in the Guinea Savanna Zone of Kwara State - *Vitellaria paradoxa* and *Parkia biglobosa.*" A Paper Presented at the Biennial Conference of the Ecology Society of Nigeria, 14th August, 1989 at Forestry Research Institute of Nigeria, Ibadan, 13pp.

Temu, A.B. 2002. "African Forestry and Challenges of Sustainable Livelihood." Proceeding of the 28th Annual Conference of the Forestry Association of Nigeria in Akure, Ondo State, Nigeria from 4th – 8th November, pp. 1-10.

UNDP, 2002. *World Energy Assessment.* United Nations Development Programme, United Nation Department of Economic and Social Affairs and World Energy Council. New York: UNDP.

Yakubu, F.B., Odeleye, F.O. and Ishola, K.A. 2001. "A Survey of Medicinal Plant in Ibadan Metropolis." In Popoola, L. Abu, J.E. Oni, P.I. (Eds) Forestry and National Development. Proceeding of the 27th Annual Conference of the Forestry Association of Nigeria held in Abuja, FCT, Nigeria, from 17th to 21st September, 2001, pp. 245-260.

Appendices

Table 1. Woody Species Listed by the Respondents as Those Found in Agroforestry Plots in the Study Area

Species	Family
Afzelia africana	Caesalpiniaceae
Afzelia bella	Caesalpiniaceae
Anacardium occidentale	Anacardiaceae
Albizia zygia	Mimosaceae
Alchornea laxiflora	Euphorbiaceae
Alstonia boonei	Apocynaceae
Alstonia congensis	Apocynaceae
Annona senegalensis	Annonaceae
Anogeissus leiocarpus	Combretaceae
Antiaris toxicaria var. *africana*	Moraceae
Blighia sapida	Sapindaceae
Bombax buonopozense	Bombacaceae
Boscia angustifolia	Capparaceae
Bosqueia angolensis (Trilepisium madagascariense)	Moraceae
Brachystegia euricoma	Caesalpiniaceae
Bridelia ferruginea	Euphorbiaceae
Bridelia micrantha	Euphorbiaceae
Cassia occidentalis (Senna siamea)	Caesalpiniaceae
Cedrela odorata	Meliaceae
Ceiba pentadra	Bombacaceae
Celtis integrifolia	Ulmaceae
Celtis wightii (Celtis philippensis)	Ulmaceae
Chrysophyllum albidum	Sapotaceae
Cola gigantea	Sterculiaceae
Cola laurifolia	Sterculiaceae
Cola millenii	Sterculiaceae
Commiphora africana	Burseraceae
Cordia millenii	Boraginaceae
Culcasia scandens	Araceae
Daniellia oliveri	Caesalpiniaceae
Detarium microcarpum	Caesalpiniaceae
Elaeis guineensis	Arecaceae
Erythrophleum ivorense	Caesapiniaceae
Erythrophleum suaveolens	Caesalpiniaceae
Ficus exasperata	Moraceae
Funtumia africana	Apocynaceae
Funtumia elastica	Apocynaceae

Gardenia ternifolia	Rubiaceae
Gliricidia sepium	Papilionaceae
Gmelina arborea	Verbenaceae
Holoptelea grandis	Ulraceae
Hymenocardia acida	Hymenocardiaceae
Irvingia gabonensis	Irvingiaceae
Irvingia grandifolia	Irvingiaceae
Jatropha curcas	Euphorbiaceae
Jathropha gossypiifolia	Euphorbiaceae
Khaya ivorensis	Meliaceae
Lannea egregia	Anacardiaceae
Lecaniodescus cupanioides	Sapindaceae
Lophira alata	Ochnaceae
Lophira lanceolata	Ochnaceae
Mangifera indica	Anacardiaceae
Mansonia altissima	Sterculiaceae
Markhamia tomentosa	Bignoniaceae
Millettia thonningii	Papilionaceae
Milicia excelsa	Moraceae
Morinda lucida	Rubiaceae
Newbouldia laevis	Bignoniaceae
Parkia biglobosa	Mimosaceae
Pilostigma thonningii	Caesalpinoideae
Prosopis africana	Mimosoideae
Rauvolfia vomitoria	Apocynaceae
Spathodea campanulata	Bignoniaceae
Spondias mombin	Anacardiaceae
Staudtia stipitata	Myristicaceae
Terminalia avicennioides	Combretaceae
Terminalia glaucescens (Terminalia schimperiana)	Combretaceae
Terminalia macroptera	Combretaceae
Terminalia superba	Combretaceae
Tetrapleura tetraptera	Mimosoideae
Triplochiton scleroxylon	Sterculiaceae
Vitellaria paradoxa	Sapotaceae
Vitex doniana	Verbenaceae

Table 2. The Twelve Woody Species that had the Highest Cumulative Values in the Ranking Order Done by the Respondents in the Two Local Government Areas

Akinyele Local Government Area		Ido Local Government Area	
Woody species	*CRV	Woody species	*CRV
Lophira lanceolata	479	*Lophira lanceolata*	576
Daniellia oliveri	470	*Gardenia ternifolia*	513
Hymenocardia acida	420	*Daniellia oliveri*	482
Gardenia ternifolia	404	*Bridelia ferruginea*	441
Bridelia ferruginea	385	*Triplochiton scleroxylon*	413
Anogeissus leiocarpus	369	*Hymenocardia acida*	396
Triplochiton scleroxylon	352	*Parkia biglobosa*	372
Detarium microcarpum	344	*Anogeissus leiocarpus*	361
Parkia biglobosa	323	*Terminalia avicennioides*	340
Terminalia avicennioides	307	*Annona senegalensis*	326
Vitellaria paradoxa	294	*Detarium microcarpum*	309
Annona senegalensis	282	*Vitellaria paradoxa*	296

*CRV= Cumulative Ranking Value for each woody species in each Local Government Area

Table 3. The Twelve Woody Species Highly Prioritised for Fuelwood by the Respondents in the Two Local Government Areas (in alphabetical order)

Species Scientific Names	Family
Annona senegalensis Pers.	Annonaceae
Anogeissus leiocarpus (DC.) Guill. & Perr.	Combretaceae
Bridelia ferruginea Benth.	Euphorbiaceae
Daniellia oliveri (Rolfe) Hutch. & Dalziel.	Caesalpiniaceae
Detarium microcarpum Guill. & Perr.	Caesalpiniaceae
Gardenia ternifolia Schumach. & Thonn.	Rubiaceae
Hymenocardia acida Tul.	Phyllanthaceae
Lophira lanceolata Tiegh. ex Keay.	Ochnaceae
Parkia biglobosa (Jacq.) R. Br. ex G. Don.	Mimosaceae
Terminalia avicennioides Guill. & Perr.	Combretaceae
Triplochiton scleroxylon K. Schum.	Sterculiaceae
Vitellaria paradoxa C.F. Gaertn.	Sapotaceae

Table 4. Friedman Chi-Square Result for the Ranking Pattern of the Respondents in the Two Local Government Areas (LGAs)

Local Government Areas	Friedman chi-square value	Critical value	Decision
Akinyele LGA Ido LGA	2.17	3.84	No significant difference

($p < 0.05$)

Table 5. Some Other Traditional Uses of the Twelve Most Preferred Fuelwood Species

Species	Parts used and for what purpose
Annona senegalensis	***Fruits/Seeds:*** Food, jam production ***Leaves:*** Treatment of dysentery, yellow fever, insecticide ***Stem bark:*** Treatment of diarrhoea, use as insecticide ***Wood:*** Treatment of diarrhoea ***Roots:*** Treatment of yellow fever and jaundice
Anogeissus leiocarpus	***Leaves:*** Fodder, dye production, treatment of skin diseases, sores, pile, malaria ***Stem bark:*** Dye production, treatment of skin diseases, sores ***Wood:*** Chewing stick, mortar & pestle production ***Roots:*** Chewing stick, treatment of toothache, tooth decay, febrile convulsion
Bridelia ferruginea	***Leaves:*** Prevention of miscarriage, intestinal & bladder trouble, treatment of skin diseases **Stem bark:** Mouth wash, treatment of cough, pile, prevention of miscarriage ***Wood:*** Tannin production, anti-poison **Roots:** Chewing stick, tooth decay treatment
Daniellia oliveri	***Leaves:*** Treatment of tooth-ache, fever, colic diseases, wound, fodder ***Stem bark:*** Treatment of toothache, colic diseases, skin diseases ***Wood:*** Chewing stick, Timber production ***Roots:*** Chewing stick, treatment of deep wounds

Detarium microcarpum	***Fruits/Seeds:*** Fodder, oil extraction, soup thickening, gum, colourant ***Leaves:*** Medical uses
Gardenia ternifolia	***Leaves:*** Treatment of Hypertension, skin diseases ***Roots:*** Treatment of Hypertension, skin diseases
Hymenocardia acida	***Fruits/Seeds*:** Eaten as food, Treatment of diabetes ***Leaves:*** Medicinal use, fodder ***Stem bark:*** Treatment of small pox, & other skin diseases, diarrhea, dysentery ***Roots:*** Treatment of nasal blockage
Lophira lanceolata	***Leaves:*** Treatment of fever, jaundice diarrhoea, vomiting, stomach ache ***Stem bark*:** Treatment of jaundice treatment, malaria ***Wood:*** Stake, minor carving, scaffolding
Parkia biglobosa	***Fruits/Seeds:*** Condiment, fruit juice, veterinary use, treatment of hypertension ***Leaves:*** Fodder, treatment of stroke, eye infections, skin lesion, leprosy ***Stem bark:*** Treatment of fever, toothache, wound, ulcer, ***Wood:*** Timber, tannin, gums ***Roots:*** Treatment of hypertension & skin diseases treatment, stomach-ache, sore eye, infertility, anti-poison
Terminalia avicennioides	***Leaves:*** Treatment of malaria, fever ***Stem bark:*** Ethno-veterinary uses ***Wood:*** Chewing stick ***Roots:*** Chewing stick, treatment of cough, toothache, dental caries, skin infection, Ethno-veterinary uses
Triplochiton scleroxylon	***Leaves:*** Vegetable, habitat for silkworms ***Stem bark:*** Treatment of malaria, roofing and partitioning of huts ***Wood:*** Timber production
Vitellaria paradoxa	***Fruits/Seeds:*** Shea butter oil production, treatment of bees & wasp sting, diarrhea, anti-venom, anti-poison, rheumatism, waist pain, yellow fever,

	rheumatic pains, wastewater from shea-butter production as insecticide, shea butter is used to treat inflammation, rashes in children, dermatitis, sunburn, chapping, irritation, ulcers and as a rub for rheumatism ***Leaves:*** Treatment of fracture, conjunctivitis, trachoma, convulsion, stomach-ache, headache, as an eye lotion ***Stem bark:*** Treatment of dysentery, hemorrhoids, schistosomiasis, coughs, jaundice, nausea, diarrhea, constipation, headaches, fever ***Wood:*** Timber, Mortar & pestle carving, gum production, hoe handles, bowls, dugout canoes, chewing stick, latex for gum production, tannins or dyestuff from ashes of burnt wood ***Roots:*** Treatment of female sterility, gastritis, liver cancer, ascites, sores, jaundice, diarrhea and stomach-ache, use as chewing stick

Source: FAN 1989, Yakubu *et al*. 2001, Arbonnier 2002, Agbidye & Igbabo 2003.