



Research Journal of **Forestry**

ISSN 1819-3439



Academic
Journals Inc.

www.academicjournals.com

Perception on the Constraints to Propagation of Iroko (*Milicia excelsa*) (WELW) C.C. BERG in South West Nigeria

¹J.A. Ugwu and ²A.A. Omoloye

¹Department of Agricultural Technology, Federal College of Forestry Ibadan, Forestry Research Institute of Nigeria, PMB, 5087, Jericho Ibadan, Nigeria

²Department of Crop protection and Environmental Biology, University of Ibadan, Nigeria

Corresponding Author: J.A. Ugwu, Department of Agricultural Technology, Federal College of Forestry Ibadan, Forestry, Research Institute of Nigeria, PMB, 5087, Jericho Ibadan, Nigeria

ABSTRACT

The problem of population growth, development and economic pressure has resulted in a high rate of deforestation of the country's natural resource. The rate of disappearance of *Milicia excelsa* in the forests is alarming with West Africa being the hardest hit by the trend. *Milicia* suffers heavy exploitation due to its wood quality but they are not replaced for sustainability. A survey was conducted in five states of South West Nigeria (Oyo, Ogun, Ondo, Osun and Ekiti) to assess the perceptions of some communities on the problems associated with propagation of *Milicia excelsa*. A structured questionnaire was administered to the 125 respondents randomly selected from the five states of the study area. Eighty percent (80%) of respondents do not plant *Milicia* species because of slow growth (35.2%), bush burning (10.4%), religious beliefs (8.8%) and lack of seeds (45.6%). Awareness of Iroko gall bug (*Phytolyma lata*) as major constraints to propagation of *Milicia excelsa* was low (49.6%). There was a significant positive correlation ($p < 0.01$) between the states and people's belief about *Milicia excelsa*. However, negative correlation was found between the states and awareness of *P. lata* as major constraints. Therefore, there is need to encourage the communities to propagate *M. excelsa* through agro forestry by providing them with planting materials (seed) and training on the available control measures for *P. lata* infestation on *Milicia*.

Key words: *Milicia excelsa*, constraints, propagation, sustainability, community

INTRODUCTION

Rural populace in the tropical countries have a long tradition of planting trees on their land for producing a wide range of timber and non-timber forest products for meeting their livelihood needs and the needs of the wood-based industry and also for providing environmental benefits (Evans, 1992; FAO., 1997). Currently, such small-scale farming of tree planting still considerably exceeds the rate of industrial or large-scale forest plantation establishment which is of moderately recent origin in the tropics (Otsamo, 2000). There is a significant shift in timber production from natural forests to plantations with subsequent large-scale development of industrial fast-growing plantation forestry especially on degraded lands, has been predicted in tropical forestry (Sayer *et al.*, 1997).

FAO (2001) also acknowledges this trend towards greater reliance on plantations as a source of industrial wood. This trend is accelerated because of problems experienced with present forest management systems but most of all because of the need to keep up with the demands for forest

products (FAO., 2001). Brown (2000) estimated that the area of effective tropical and subtropical plantations covered a total of 55 million hectares which is 45% of global plantation forest resource. Generally, forest plantations in the tropics are dominated by *Eucalyptus* and *Pinus* spp. even though other species such as *Gmelina* spp., *Swietenia* spp., *Tectona grandis* and *acacia* are also attractive plantation species (Brown, 2000).

Milicia excelsa (Welw) C.C. Berg. *Moraceae* is an important economic tree species in West Africa. It is a highly valued commercial timber in African timber market known as iroko. The timber is strong, moderately hard and very durable with interlocked and sometimes irregular grains. It seasons well in air or kiln and does not warp or shrink afterwards (Irvine, 1961; Farmer, 1975). It is highly resistant to termite and fungi attacks (Irvine, 1961; Farmer, 1975).

The wood is extensively used due to its high durability and good working properties. There is considerable demand of *M. excelsa* timber, sliced veneer rotary veneer and profile boards for decorative and structural uses. The wood is also used for fences, furniture and other constructional purposes and represents a substantial portion of the timber and furniture export income, especially of Ghana and Côte d'Ivoire (Nichols, 1997). Despite the potential of *M. excelsa*, there is little of no propagation of this plant and the regeneration from the wild cannot commensurate the demand for *Milicia* timber in Africa. International Union for Conservation of Nature (IUCN) has placed *Milicia* in their red list as endangered species. Efforts at propagating it have been severely constrained by *Phytolyma lata* attack. Currently, there is dearth information on the community perception on the constraints to propagation of *Milicia excelsa* in Nigeria. Therefore, this study reports the perception of some communities on the constraints to *Milicia excelsa* propagation in South West Nigeria.

MATERIALS AND METHODS

Study area: The study area is South Western Nigeria which consists of Lagos, Ogun, Oyo, Osun, Ondo and Ekiti states. It is also known as the South West geographical zone of Nigeria. The area lies between longitude 2°31' and 6° 00' East and latitude 6°21' and 8°37' N (Agboola, 1979) with a total land area of 77, 818 km² and a projected population of 28, 767, 752 in 2002 (NPC., 2002). The study was conducted in five states of South West Nigeria (Fig. 1).

Sampling procedure: A multistage sampling technique was used to achieve the respondents for the purpose this study. The first stage was the selection of five states in South West Nigeria namely; Oyo, Osun, Ogun, Ekiti and Ondo. The second stage was selection of five locations in each state using the stratified random sampling technique. The local governments of the selected locations in each state were identified. Twenty five Local Government Areas were surveyed (Egbeda, Saki West, Ido, Akinyele and Kajolola) in Oyo states, (Iwo, Ayedade, Ola-oluwa, Osun East and Irewole) in Osun state, (Ijebu-East, Odeda, Imeko, Ita oba and Yewa) in Ogun state, (Odigbo, Okitipupa, Ondo West, Owo and Ose) and (Ire, Oye, Ifelodu, Ilejemeji and Gbogo) in Ondo and Ekiti states respectively. The third stage was selection of five respondents from each location of the selected Local Government Areas.

Source of data and analytical techniques: Primary data was used for this study. This was obtained by using a well-structured questionnaire. The respondents were forestry stake holders (farmers, saw millers, civil servants and traders). Twenty five structured questionnaires were administered in each state. A total of 125 questionnaires were administered. The method of

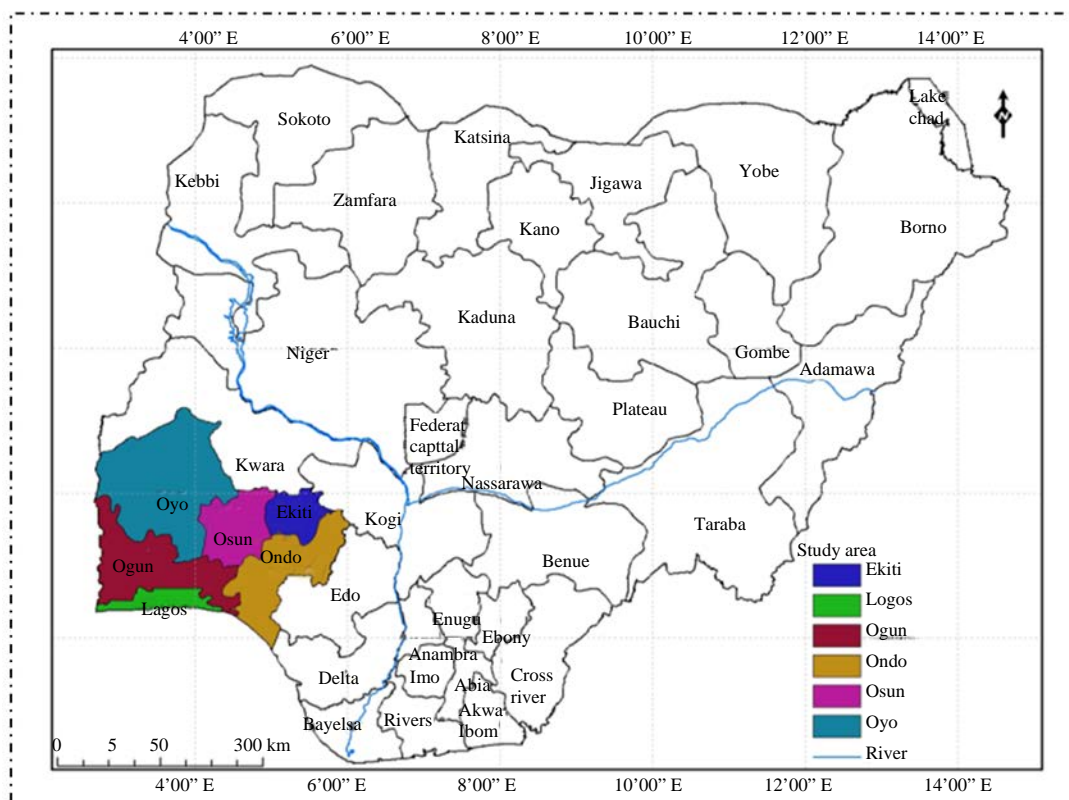


Fig. 1: Map of Nigeria indicating the study area

questionnaire administration was by direct contact with the respondents. Data on respondent's biodata, farming experience, uses of *Milicia*, population of *Milicia*, problems associated with *Milicia* and attitude towards sustaining *Milicia* production were collected. Data collected was subjected to descriptive statistics using SPSS 15.0 for Windows Evaluation version.

RESULTS

Socio-economic characteristics of the respondents: About 90.4% of the respondents were above 40 years of age. The age range of 41-60 years has the highest percentage (58.4 %) while, the age range of 81-100 years has the least percentage (1.6%). About 82.4% of the respondents were male while 17.6% were female (Table 1).

It was observed that about 97.6% of the respondents were literate and only about 2.4% had no formal education. The educational qualifications of the respondent ranged from primary education to Master's degree. Respondents with primary education had the highest frequency of 36.0% followed by those with secondary education (24.8%). The respondents with B.Sc. and Master's degree had the least percentage of occurrence 1.6% (Table 1).

The occupation of the respondents in this study include: Farming, trading saw milling, civil service and forest guards. Farmers have the highest frequency of 44.8% followed by traders 34.4%. The least group of the respondents were the forest guards (0.8%). The respondents with 20-40 years of farming experiences were highest (30.4%), followed by those with 10-20 years of farming experience 28.8% (Table 1).

Table 1: Socio-economic characteristics of the respondents

Variables	Frequency	Percentage
Age (years)		
20-40	12	9.6
41-60	73	58.4
61-80	38	30.4
81-100	2	1.6
Total	125	100.0
Gender		
Male	103	82.4
Female	22	17.6
Total	125	100.0
Education		
Non-formal education	3	2.4
Primary education	45	36.0
Secondary education	31	24.8
OND	21	16.8
NCE	7	5.6
HND	14	2.0
B.Sc.	11.2	1.6
Masters degree	2	1.6
Total	125	100.0
Occupation		
Farming	56	44.8
Trading	43	34.4
Saw milling	8	6.4
Civil service	17	13.6
Forest guards	1	0.8
Total	125	100.0
Farming experience		
5-10	22	17.6
10-20	36	28.8
20-40	38	30.4
40-60	17	16.8
60and above	8	6.4
Total	125	100.0

Source: Field survey 2011 *OND-Ordinary National Diploma, NCE: National Certificate in Education, HND: Higher National Diploma
B.Sc. Bachelor of science

Table 2: Respondents perception on the uses of *Milicia* and their belief about *Milicia* spp.

Respondents perception	States (%)				
	Oyo	Osun	Ogun	Ondo	Ekiti
Uses of <i>Milicia</i>					
Income	20	40	40	48	92
Object of worship	60	40	4	20	0
Protection	0	8	8	0	4
Shade	0	4	4	0	0
Medicinal purposes	0	0	24	4	0
Future use	0	0	12	0	0
Nothing	20	8	8	28	4
Worship of iroko tree					
Yes	44	48	56	40	0
No	56	52	44	60	100

Source: Fieldsurvey (2011)

Respondents perception on the uses of *Milicia* spp. and their belief about *Milicia*:

The response revealed that *Milicia excelsa* provides about six different benefits to the communities (Table 2) which include: income, object of worship, protection, provision of shades and medicinal uses. For income, 92% of the respondents in Ekiti state claimed that *M. excelsa* provides income to their community through the sales of timber product, 48% from Ondo state, 40% from both Ogun and Osun state while, only 20% form Oyo state said that milicia provides income to their community (Table 2).

The 60% of the respondents from Oyo state claimed that *Milicia* serves as object of worship for their community, 40% from Osun state, 20% from Ondo and 4% from Ogun state, while none of the respondents from Ekiti state admitted that *Milicia* serve as object of worship. Twenty four percent of respondents from Ogun state claimed that it is used for medicinal purposes, 4% from Ondo state while no respondent from Oyo, Osun and Ekiti indicated that *Milicia* is used for medicinal purposes (Table 2). Observation showed that 56% of the respondents from Ogun state admitted that their community worship iroko tree, 48% from Osun state, 44 % from Oyo state and 40% from Ondo, while none of the respondents from Ekiti admitted that their community worship iroko tree (Table 2).

Population distribution of *Milicia* species in the study areas: The results of this study revealed that the population of *Milicia* are very low and are sparsely distributed in the study area. Ekiti state has the highest population of *Milicia* plant, 44% of the respondents admitted that they have 25 and above number of *Milicia* trees, 52% for 10-25 trees and only 4% for 5-10 trees in their community, none of the respondents admitted that they have 1-5 trees or none in their communities.

In Osun state the distribution pattern differs, 28% said that they have 25 and above trees in their community, 12% for 10-25 trees, 16% for 5-10 trees, 44% for 1-5 trees and 0% for none, this indicates the sparse distribution of the tree in the area. In Ondo state, 12% claimed that they both have 25 and above trees and 10-25 trees in their community. In Oyo state, 48 % admitted that they have 10-25 trees in their community while, 0% said that they have 25 and above *Milicia* trees. The trend observed from Ogun state indicates that *Milicia* trees are sparsely distributed in the area than all the states surveyed. Sixty eight percent (68%) claimed that they have 1-5 trees in their community, 20% for 5-10 trees, 4% for 10-20 trees and 8% for 25 and above trees (Table 3).

For seedlings population, only 20% of the respondents from Ogun state admitted that they have 10-30 seedlings in their community. Majority of the respondents from the various states claimed that they have no *Milicia* seedlings in their area or that they have no idea about it (Table 3).

Attitude towards propagation and sustaining *Milicia* species: The result revealed that majority of the respondents (79.2%) have very poor attitude towards planting *Milicia* tree in their farm land. Most of the respondents in the five states do not plant *Milicia* in their farm land like other trees, Oyo (60%), Osun (60%), Ogun (88%), Ondo (92%) and Ekiti (95%) claimed that they do not plant *Milicia* tree in their farm. Only 20.8% of the respondents admitted that they plant *Milicia* in their farm (Table 4). The results also revealed that many people have interest in sustaining

Table 3: Population distribution of *Milicia* species in the study areas

Variables	Oyo (%)	Osun (%)	Ogun (%)	Ondo (%)	Ekiti (%)
Population of Iroko					
None	8	0	0	4	0
1-5	40	44	68	40	0
5-10	4	16	20	32	4
10-25	48	12	4	12	52
25 and above	0	28	8	12	44
Seedling population					
None	24	12	40	28	28
1-5	4	16	4	36	16
5-10	4	12	8	8	0
10-30	0	12	20	0	0
No idea	68	48	28	28	56

Source: Field survey (2011)

Table 4: Attitude towards propagation and sustaining *M. excelsa*

Variables	Oyo (%)	Osun (%)	Ogun (%)	Ondo (%)	Ekiti (%)	Average in 5 states (%)
Planting of iroko tree						
Yes	40	40	12	8	4	20.8
No	60	60	88	92	96	79.2
Sustenance of <i>Milicia</i>						
Cut the seedlings when come across it	40	40	12	8	4	20.8
Leave the seedling when come across it	60	60	88	92	96	79.2

Source: Field survey (2011)

Table 5: Perception of the respondents on the constraints to propagation of *Milicia*

Variables	Oyo (%)	Osun (%)	Ogun (%)	Ondo (%)	Ekiti (%)	Average in 5 states (%)
Problems associated with <i>Milicia</i>						
Slow growth rate	58	42	36	46	22	40.8
Insects	8	8	26	12	16	14.0
Fire	0	2	6	4	16	5.6
Lack of seed	34	26	16	8	30	22.8
Lack of interest	0	12	12	14	10	9.6
Spiritual factor	0	10	4	16	6	7.2
Awareness of <i>Phytolyma lata</i>						
Yes	44	40	36	48	80	49.6
No	56	60	64	52	20	50.4

Source: Field survey (2011)

Milicia even though they may not go into planting it on their own. From 60% and above of the respondents from the study areas admitted that they always leave *Milicia* seedlings in their farm whenever, they come across it (Oyo 60%, Osun 60%, Ogun 88%, Ondo 92% and Ekiti 96%). The percentage of respondents that have interest in sustaining the *Milicia* suggests that the population of the seedlings ought to be high in the study areas but the reverse was the case. This could be attributed to the various factors that were identified by the respondent as the problems associated with the propagation of *Milicia excelsa*.

Respondents perception on the constraints to propagation of *Milicia excelsa*: The respondents listed other factors apart from the problem of *Phytolyma lata* that militate against successful cultivation of *Milicia* in the study area. Among them are, slow growth rate of *Milicia* seedlings, unavailability of seeds for those that have interest in planting, bush burning which usually kill the self-propagated ones in the wild annually, insects, lack of interest and religious belief (spiritual factor).

Of all the factors listed, slow growth rate is the main factor militating against propagation of *Milicia* in the study area; Oyo (58%), Osun (42%), Ogun (36%) Ondo (46%) and Ekiti (22%), followed by lack of seeds for propagation Oyo (34%), Osun (26%), Ogun (16%), Ondo (8%) and Ekiti (30%) (Table 5). From the results, the respondents did not identify insects as a major constraints to the propagation of *M. excelsa*, although in Ogun state, 26% of the respondents admitted that insects are one of the factors militating against successful propagation of *M. excelsa* (Table 5). Above 50% of the respondents from the four out of five states surveyed are not aware of *Phytolyma lata* on *Milicia* as propagation constraints, Oyo (56%), Osun (60%), Ogun (64%) and Ondo (52%). However, in Ekiti State, 84% of the respondents admitted that they know the problem of *Phytolyma* on *Milicia* (Table 5). The average percentage awareness of *P. lata* as propagation constraints in five states is 49.6%.

Relationships between different states and *Milicia* population, (Adult plant and seedling population): A significant positive correlation between the *Milicia* population (adult plant) and

Table 6: Correlation between states, population of *Milicia* (Adult plant and Seedling)

Population	States	Population of <i>Milicia</i>
Population of <i>Milicia</i>	0.341**	
Seedling population	-0.085	0.192

**Correlation is significant at the 0.01% level (2-tailed)

Table 7: Correlation between states, people's belief about *Milicia* and awareness of *Phytolyma lata*

Parameters	State	Peoples belief about <i>Milicia</i>
People belief about <i>Milicia</i>	0.312**	
Awareness of <i>Phytolyma lata</i>	-0.324**	-0.287**

**Correlation is significant at the 0.01% level (2-tailed)

states of study were identified. The seedling population negatively correlated with the different states of study (Table 6).

Relationship among the states, people's belief about *Milicia* species and awareness of *Phytolyma lata*: A significant positive correlation ($p < 0.01$) was observed between the states and people's belief about *Milicia excelsa* while, negative correlation was observed between the states and awareness of *Phytolyma lata* and between the peoples' belief and awareness of *Phytolyma lata* (Table 7).

DISCUSSION

Investigation on the importance and uses of *Milicia excelsa* revealed that *M. excelsa* is a very important economic tree in the study area. The respondents identified about five different benefits that their communities derive from *Milicia* plant and these include: Income, object of worship, protection, provision of shades and medicinal uses. According to the respondents, the income derived from *Milicia* is through the sales of the timber, when a mature tree is cut down or harvested. The wood of *Milicia* commands a very high prize in the market due to its high quality and demand. This validates the earlier report by Bolza and Keating (1972) that *Milicia* is a highly valued and commercial timber in Africa, for which the demand is large. Burkill (1997) reported that the *M. excelsa* tree is used for soil conservation, mulch production, as ornamentals and shade tree. For the medicinal uses, earlier report has shown that various part of *Milicia* are largely used in traditional medicine (FAO., 1986a, b; Neuwinger, 2000). The result of the population and distribution pattern of *Milicia* spp. in the study areas showed that the population of adult plant is very low and are sparsely distributed. This suggests that the timber is unsustainably exploited from the natural forests without replacement. This corroborates the report by Ofori and Cobbinah (2007), that the *Milicia* species timber is unsustainably exploited from the natural forest without replenishment primarily due to attack by *P. lata*.

Moreover, according to respondents, there were several problems associated with the regeneration and propagation of *M. excelsa* in the study area. These include: slow growth nature of *Milicia*, fire problem through bush burning, spiritual problem and unavailability of seeds for propagation. About 37.6% of the respondents in this study, believed that *Milicia* is a sacred tree and that their communities worship it. They are of the opinion that the tree is spiritual and under ideal condition, it should not be planted by man. The only means of propagation should be through natural selection. Those that manage to grow through natural selection in forest are heavily affected by fire through bush burning.

Due to people's belief that *Milicia* is associated with certain spirit, they do not leave it on their farm land, when they see the seedlings and they do not attempt to plant *Milicia* in their farm land. This report agrees with Neuwinger (2000), who reported that *Milicia* has a special place in the folklore and tradition of people.

The problem of slow growth of *Milicia* identified by the respondents in the study area as one of the factors militating against propagation of *Milicia* in this study, contradicted the earlier report by Birnie (1997) that *Milicia excelsa* is a fast growing species and coppices readily.

Moreover, the problem of bush burning identified in this study as a major factor militating against the propagation and regeneration of *Milicia*, requires serious consideration and action of the government, as there is no law presently in the country that control indiscriminate bush burning. Bush burning, no doubt contributed to a large extent in reducing the natural propagation of *Milicia excelsa* as, the fruits containing many seeds is being dispersed by bats and birds according to Hawthorne (1995). The percentage of the *Milicia* seedlings, that could have survived in the wild and probably escaped the attack of *P. lata* would have been high but for the fires. This assumption supports the report by White (1964) and Cobbinah and Wagner (1995) that *Milicia excelsa* was found to be attacked by *Phytolyma* in natural forest but not to the same extent as in pure plantations or in nurseries. The problem of unavailability of seeds for the interested farmer was due to the fact that the seeds loses its viability quickly. Pukkala (2000) reported that the seeds germinate best when used in the first three months after collection; however, germination was good up to nine months. Moreover, Borota (1975) reported that seeds were best used within 3 months.

This had discouraged the research institutes in the country (Forestry Research Institute) from preserving the seeds so that the farmer could have access to it whenever they need.

Similarly, the problem of poor storage facilities for seed storage in the country constituted major factor hindering the Research Institutes and interested farmers from short or long term storage of the *Milicia* seeds for future use. ICRAF (1992) reported that mature and properly dried seed can be stored in airtight container at 3°C for at least one year but this is not feasible in Nigeria due to instability in electricity power supply in the country.

Majority of the respondents admitted that they do not plant *Milicia* in their farm. This suggests that people's attitude towards propagating *Milicia* is very poor and its exploitation is not restricted as at present in this part of the country. This corroborates the report by Ofori (2007), that at the present, the exploitation of *Milicia excelsa* is not sustained in most parts of the country. If, no drastic measure is taken in solving the problem of *Phytolyma lata* in *Milicia*, which is a major constraint to the establishment of plantations of *Milicia* by the foresters, with time *Milicia* will go into extinction, when the existing ones have been harvested.

The communities' attitude towards sustaining *Milicia* was observed to be very high in this study. Despite their claim of selectively tendering volunteer seedlings, the population of *Milicia* recorded in the study areas was very low. A significant positive correlation between the *Milicia* population (adult plant) and states of study were observed. This suggests that the different states used for the study have variation in their weather condition. Ekiti state recorded the highest population of *Milicia*.

CONCLUSION

The study has confirmed that *Milicia excelsa* is a very important economic tree in South West Nigeria, the population of adult plant is very low and are sparsely distributed. The farmers' attitude towards planting *Milicia* in the study area is very poor. The study also revealed that the communities perception on the constraints to *Milicia excelsa* propagation in South West Nigeria are poor growth nature of *Milicia*, fire problem through bush burning, spiritual problem and lack of seed for propagation. Awareness of iroko gall bug (*Phytolyma lata*) as a major constraint to the establishment of *Milicia excelsa* plantation was low.

ACKNOWLEDGMENTS

This study was part of the first author's postgraduate work in the Department of Crop Protection and Environmental Biology, University of Ibadan. We are grateful to ETF for sponsoring part of this study and to the Forestry Research Institute of Nigeria for granting the enabling environment towards the success this study.

REFERENCES

- Agboola, S.A., 1979. An Agricultural Atlas of Nigeria. Oxford University Press, London, pp: 248.
- Birnie, A., 1997. What Tree is That?: A Beginners' Guide to 40 Trees in Kenya. Jacaranda Designs Ltd., USA., ISBN: 9789966884879, Pages: 80.
- Bolza, E. and W.G. Keating, 1972. African timbers: The properties, uses and characteristics of 700 species. Division of Building Research, CSIRO, Melbourne, Australia, pp: 710.
- Borota, P., 1975. Indigenous multipurpose trees of Tanzania: Uses and economic benefits for people. FAO., Ottawa, Ontario, Canada.
- Brown, C., 2000. The global outlook for future wood supply from forest plantations. Working Paper GFPOS/WP03, FAO, Forest Policy and Planning Division, Rome, pp: 145.
- Burkill, H.M., 1997. The Useful Plants of West Tropical Africa. 2nd Edn., Vol. 4, Families M.R. Royal Botanic Gardens, Kew, Richmond, UK., Pages: 969.
- Cobbinah, J.R. and M.R. Wagner, 1995. Phenotypic variation in *Milicia excelsa* to attack by *Phytolyma lata* (Psyllidae). Forest Ecol. Manage., 75: 147-153.
- Evans, J., 1992. Plantation Forestry in the Tropics: Tree Planting for Industrial, Social, Environmental and Agroforestry Purposes. 2nd Edn., Oxford University Press, Oxford, ISBN: 9780198542575, pp: 403.
- FAO., 1986a. Data book on endangered tree and shrub species and provenances. Forestry Paper 77, Rome, pp: 524.
- FAO., 1986b. Some medicinal forest plants of Africa and Latin America. FAO Paper 67, Rome, pp: 252.
- FAO., 1995. Forest resources assessment 1990: Tropical forest plantation resources. FAO Forestry Paper No. 128, Rome.
- FAO., 1997. State of the world's forests. Forestry Paper 128, Forest Department, FAO, Rome, pp: 181.
- FAO., 2001. State of the World's Forests. FAO., Rome, Pages: 200.
- Farmer, R.H., 1975. Handbook of Hard Woods./2nd Edn., HM Stationary Office, London, pp: 95, 119-124.
- Hawthorne, W.D., 1995. Ecological Profiles of Ghanaian Forest Trees. University of Oxford, Oxford, ISBN: 9780850741346, Pages: 345.
- ICRAF., 1992. A selection of useful Trees and shrubs for Kenya: Notes on their identification and management for use by farming and pastoral communities. International Center for Research on Agro Forestry (ICRAF), Nairobi.
- Irvine, F.R., 1961. Woody plants of Ghana with Special Reference to their Uses. Oxford University Press, Oxford, pp: 427-428.
- NPC., 2002. National Population Commission 2002. Abuja, Nigeria.
- Neuwinger, H.D., 2000. African Traditional Medicine: A Dictionary of Plant Use and Applications. 1st Edn. Medpharm Scientific Publishers, Stuttgart, ISBN: 978-3887630867, Pages: 589.
- Nichols, D., 1997. Factors influencing regeneration of *Milicia excelsa* in natural forests and mixed plantations in Ghana. Ph.D. Thesis, Northern Arizona University, USA.

- Ofori, D.A., 2007. *Milicia excels* (Welw). C.C. Berg. In: Protas 7(1): Timbers/Bois d'auvre 1, Louppe, D., A.A. Oteng-Amoako and M. Brink, (Eds.). PROTA, Wageningen, Netherlands.
- Ofori, D.A. and J.R. Cobbinah, 2007. Integrated approach for conservation and management of genetic resources of *Milicia* species in West Africa. *For. Ecol. Manage.*, 238: 1-6.
- Otsamo, R., 2000. Secondary forest regeneration under fast-growing forest plantations on degraded *Imperata cylindrica* grasslands. *New For.*, 19: 69-93.
- Pukkala, T., 2000. Selection of Tree Species for Plantation Forests in Eastern and Southern Africa. Joensuu Yliopisto, Metsätieteellinen Tiedekunta, USA., ISBN: 9789517089357, Pages: 80.
- Sayer, J.A., J.K. Vanclay and N. Byron, 1997. Technologies for sustainable forest management: Challenges for the 21st century. Proceedings of the Commonwealth Forestry Congress, May 1997, Victoria Falls, Zimbabwe, pp: 11.
- White, M.G., 1964. Research in Nigeria on the iroko gall bug (*Phytolyma* sp.): Being a report to the director of forest research on investigation on gall bug (*Phytolyma* sp.) injury to iroko tree (*Chlorophora* sp.). Nigerian Forestry Information Bulletin, Issue 18, pp: 1-12.