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FARMERS' PREFERENCES FOR TREE SPECIES ON AGROFORESTRY SYSTEM IN IJEBU NORTH LOCAL GOVERNMENT AREA, OGUN STATE, NIGERIA.

BY

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ABSTRACT

This study was conducted to generate information on tree species farmers are willing to retain or plant on their farms; the benefits they derive from the trees and the traditional management practices used for such trees in Ijebu North Local Government Area of Ogun State, in southwestern Nigeria. Multistage sampling technique was used to collect data on the tree species preferred by farmers, the benefits derived from the trees and the management practices used for such trees. A structured questionnaire was administered and data were analyzed using simple descriptive statistics. Farmers retain 72 tree species on their farms based on their knowledge and socio economic needs. They retain and plant fruit trees (17%), timber trees (18%), fuelwood (1%), and medicinal trees (1%). Sixty three percent (63%) of the farmers retain all the types of tree species on their farms as scattered on-farm trees due to the benefits they derive from them. The benefits include: food (88.8%), firewood (78.8%), fruits (95.6%), shades (91.9%), traditional medicine (94.4%), income generation (98.8%) and other environmental services (31.4%). On-farm trees are regenerated or sown directly on the field. Pruning and coppicing are the management practices applied.

Key words: multipurpose trees, agroforestry, benefits, management, conservation

INTRODUCTION

Loss of forest cover often results in environmental degradation and a decline in land productivity. This is true in many parts of the world, but particularly in the tropics where most essential nutrients are contained in the above-ground vegetation (Sabhasri, 2002). The accelerated decline in area covered by tropical forest could probably be ascribed to increased demand for arable land and tree products with increasing demographic pressure, drought and shortened fallows, leading to decreased tree regeneration (Boffa, 2000). In Nigeria, the competition for land is increasing, due to the upsurge in population, industrialization, urbanization and farming. Most of this land has been impoverished by shifting cultivation and has low productivity. Scientists have recommended a management system that would accommodate the production of different natural commodities on the same piece of land (Adesiyun *et al.*, 2007).

In the last three decades, agroforestry has been widely promoted in the tropics as a natural resource management strategy that attempts to balance the goals of agricultural development with the conservation of soils, water, local and regional climate, and more recently, biodiversity (Schroth *et al.*, 2004). Agroforestry is defined by Akinbile *et al.* (2007) as an aspect of farm forestry that encourages a deliberate integration of woody perennials with agricultural

crops and/or animals on the same land management unit, with the aim of enhancing soil fertility and increasing farmers' income through the use of economic trees. Agroforestry has been practiced traditionally in Africa for centuries. Boffa (2000) noted that most subsistence farmers in semi-arid West Africa consider trees as an integral part of agriculture and for centuries, they have maintained a traditional land use system known as "agroforestry parkland" system in which trees occur scattered in cultivated or recently fallowed fields.

Agroforestry is increasingly promoted for restoring forest and degraded environment, reducing green house gases, and gaining other co-benefits (Ingwe *et al.*, 2009). Unfortunately, its implementation, particularly as regards farmers' choices and preferences in parts of Nigeria is defective because often times, development interventions often come with a mindset on the species they consider most beneficial to the farmers. This has in most cases led to failed projects because farmers soon discard such species at the expiration of the projects. There is need to provide information on the tree species preferences of farmers, the benefits they derive from these trees and the management practices employed for managing the trees. Such information would serve as a tool for planning, regeneration and enrichment programs for such species and designing a socially acceptable agroforestry intervention program which will allow local communities to benefit maximally from forestry programs. Therefore, this study aims to provide information on tree species preferences of farmers in Ijebu North Local Government Area of Ogun State, Nigeria with respect to tree retention and planting in agroforestry system.

METHODOLOGY

Ijebu North Local Government Area is one of the twenty local government councils in Ogun State, Nigeria. It is located between latitudes $6^{\circ} 52'$ and $7^{\circ} 10'N$ and longitudes $3^{\circ}45'$ and $4^{\circ} 12'E$ with a human population of two hundred and eighty four thousand, three hundred and eighty six (284,386) residing in five development areas including: Ijebu- Igbo, Oru, Awa, Ilaporu and Ago-Iwoye (National Population Censor, 2006). Apoje farm settlement, a government farm settlement and J-ONE Forest Reserve are located in the Local Government Area.

A multistage sampling procedure was used to collect data on the tree species preference of farmers; the benefits derived and the management techniques employed. In the first stage, 4 wards i.e. wards 3, 4, 10 and 11 (which are rural settlements) were purposely selected for the study. For the second stage sampling, 40% of the total number of villages in the selected wards was included in the study. Thus, a total of 17 villages were surveyed. The villages include: Dagbolu, Ganrigan- Japara, Osunbudepo, Ita- Egba, Idekan, Apoje, Asigidi, Agunboye, Eganmoro, Ako, Odeseju, Esemale, Oriwu, Ewu-Oba, Aworijeje, Lagbagidi and Erilamo. From each village, 50% of the total number of households was surveyed. A total of 160 questionnaires (representing about 12.5% of the farmers' population in the area) were administered on farmer respondents.

The research tool used for this study was a questionnaire designed to obtain information on trees preferred by farmers for agroforestry, their reasons for the preference, the benefits of these trees to the socio-economic well being of the farmers, and the traditional methods employed for the management of the trees. The literate farmers were given the questionnaires to fill while questionnaires were interpreted to illiterate farmers and their responses were entered into the questionnaire. The farmers' responses were ticked on the questionnaire as appropriate.

A list of the tree species that farmers prefer to retain or plant on their farms was generated. Descriptive statistics such as frequency distribution and simple percentages, bar charts, pie charts were used to summarize the benefits farmers derive from the preferred trees and the different traditional management practices employed for the management of on-farm trees in the study area.

RESULTS AND DISCUSSION

List of tree species preferred by farmers in the study area

As shown in Table 1, 72 tree species are preferred by farmers in the area as scattered on-farm trees. These trees range from fruit trees, to fuelwood trees, timber trees, to trees of medicinal importance. This result is in conformity with the findings of Oke (2008) who recorded fruit trees such as *Cola nitida*, *Mangifera indica*, *Anacardium occidentale*, *Psidium guajava*, *Elaeis guinensis*, *Cocos nucifera*, *Dialium guineense*, *Chrysophyllum albidum*, *Garcinia kola* on cocoa farms in Ondo State, Nigeria. In the same vein, Oyebade *et al.* (2010) observed that farmers in the south-eastern parts of Nigeria have incorporated indigenous species such as *Dactydenia barterii*, *Alchonea cordifolia*, *Anthonata macrophylla*, *Baphia nitida*, *Baphia pubescence*, *Cnetis feruginea*, *Dialium guineense*, *Harungana madagascariensis*, *Napoleona imperialis*, and *Nauclea latifolia* into their farming system. Otorokpo *et al.* (2010) also reported the following wood species found in the semi-arid parts of Nigeria: *Eucalyptus camaldulensis*, *Acacia spp.*, *Adansonia digitata*, *Gmelina arborea* and *Khaya senegalensis*.

Some of these trees are preferred for more than one purpose; a tree might be retained to produce shade and at the same time produce fruits which can be sold to generate income. For example, *Mangifera indica* is a tree that produces edible fruit that can be sold to generate income; at the same time it provides shade and its bark, leaves and roots are used locally for the treatment of some diseases and ailments. This emphasizes the multi-functional nature of trees.

Benefits derived from preferred trees

Majority of the farmers (63.1%), retain all the types of trees (fuel wood trees, fruit trees, medicinal trees and economic trees) while 18.1% retain only economic trees. 17.5% of the farmers retain only fruit trees while 0.6% retain both fuel wood and medicinal tree species (Fig. 1). This is in conformity with Adekunle (2009), who reported that farmers in Ondo State retained different species of trees on their farms for different purposes.

Majority of the farmers retain and plant different tree species for different benefits. This supports Bayala *et al.* (2011) who stated that agroforestry trees are deliberately selected because of their diverse functions. Eighty eight percent (88%) of the farmers retain trees on their farms, 95.6% of the farmers retain trees for fruits (Fig.2). According to Adegeye *et al.* (2010), various fruit and nut-producing trees and shrubs make substantial contribution to the dietary needs of large number of people particularly in the rural areas. Over 78% of the respondents obtain firewood from the on-farm trees (Fig.2). This indicates that majority of the farmers depend on the on-farm trees for their source of cooking energy. A high proportion of the farmers retain trees for medicinal purposes. This indicates the dependence of these people on the on-farm trees for cure of various ailments. Farmers in the study area depend on the scattered trees to protect their

shade-loving crops and to generate cash income. When land is cleared, indigenous fruit, medicinal and timber tree species are deliberately retained both for their economic value and to provide shade for the cocoa plants (Oke, 2008). Just a few of the farmers retain trees for environmental service functions. This may probably be due to the fact that they do not appreciate the environmental benefits of the trees or they are more interested in the productive benefits of the trees which have a more direct influence on their standard of living.

Some of the farmers (55%) apart from retaining trees also plant trees on their farms. High proportion of these farmers (73.9%) plant only fruit trees while 5.7% plant timber trees and 20.5% plant both fruit and timber trees (Fig.3). This may probably be due to the continuous production by fruit trees once they attain maturity. The continuous production of fruits serves as a source of food to the farmers' households and a steady supply of supplementary household income.

Majority of the farmers plant trees for food, fruit and income-generation while a few of them plant trees for firewood, shade, medicinal purposes, and environmental benefits (Fig.4). This is an indication that farmers are more interested in the production functions of the trees than the service functions. This corroborates the findings of Elnour (2003) who reported that farmers use the wood products from trees for poles, fuel, simple furniture and utensils. The fruits and leaves are used as food and fodder. On farm trees also provide raw materials such as gums, resins, tannin, and fibre, used in cottage industries.

The numerous benefits derived from these tree species make them very important for the survival of the rural dwellers. The timber and non timber products from on-farm trees serve as the foundation of the local economy in the rural areas. Non timber products such as edible fruits which can be consumed raw or processed form the main constituent of their diet in the rural areas. Various parts of the tree (Leaves, bark, root, sap, bud, flowers etc.) are used for herbal preparations for the cure of ailments and infections. Leaves of some trees are highly nutritious for both humans and animals. Twigs and branches of these trees are the main sources of energy in the farmers' households. Timber, poles and leaves from some trees are used for the construction of their huts, sacks, barns, fences, cages for their livestock, bridges, traps etc.

Some tree species are not only important because of their economic benefits but also for their significance in the culture of the farmers. Trees such as *Milicia excelsa*, *Ceiba pentandra*, *Newbouldia laevis* are considered to be important trees in the area and play a very significant role in the culture of the rural dwellers. For instance, the leaves of *Newbouldia laevis* are used in chieftaincy installation rites among the *Yorubas*. Some groups worship certain tree species such as *Milicia excelsa* (iroko), *Ceiba pentandra* (kapok tree) and *Adansonia digitata* (baobab) This was summed up by Elnour(2003) who reported that people living in and around the forest (farmers/hunters) depend in various ways on the products and services produced by the diversity of on-farm trees.

Table 1: List of species preferred by farmers in the study area

S/N	BOTANICAL NAMES	YORUBA NAMES	SOME LOCAL USES.
1.	<i>Azela africana</i>	Apa	Timber, herbal concoction
2.	<i>Albizia zygia</i>	Ayunre/Ayinre wewe	Timber, roofing, firewood
3.	<i>Alstonia boonei</i>	Awun	Leaves are used as anti malaria
4.	<i>Anacardium occidentale</i>	Kaju/ cashew	Edible fruit and medicinal uses
5.	<i>Anthocleista spp.</i>	Sapo	Timber, firewood, herbal medicine
6.	<i>Antiaris toxicaria</i>	Ooro	Timber, roofing, edible fruit, medicinal uses
7.	<i>Artocarpus attilis</i>	Berefuutu(breadfruit)	Edible fruit as staple food.
8.	<i>Azadirachta indica</i>	Dongoyaro	Leaves and bark used for the treatment of malaria
9.	<i>Ceiba petandra</i>	Araba/ Eegu	Timber, firewood, and cultural uses
10.	<i>Celtis integrifolia</i>	Itara/ Ita	Timber, firewood
11.	<i>Chrysophyllum albidum</i>	Agbalumo	Ripe fruit is eaten raw; medicinal uses
12.	<i>Citrus aurantium</i>	Grape	Ripe fruit is eaten raw; it is used as herbal concoction
13.	<i>Citrus sinensis</i>	Osan	Ripe fruit is eaten raw; herbal medicine
14.	<i>Cleistopholis patens</i>	Apako	Timber, anti malaria mixture, spice
15.	<i>Cocos nucifera</i>	Agbon (coconut)	Fruit is eaten raw; coconut oil production
16.	<i>Cola nitida</i>	Obi	Fruit is eaten raw; colouring production
17.	<i>Cordia millenii</i>	Omo	Timber, firewood
18.	<i>Cynometra manii</i>	Eku	Roofing, timber, fencing, herbal mixture
19.	<i>Detarium spp.</i>	Ogbogbo	Timber; medicinal uses
20.	<i>Dialium guineense</i>	Awin	Fruit is eaten raw
21.	<i>Diospyros monbuttensis</i>	Erikesi/ ogan	Medicinal uses, firewood

22. <i>Dracaena arborea</i>	Porogun	Boundary demarcation, ear infection cure
23. <i>Elaeis guineensis</i>	Ope	Palm oil; Palm kernel oil, brooms, thatch
24. <i>Entandrophragma utile</i>	Jebo	Timber, herbal concoction
25. <i>Ficus capensis</i>	Opoto	Timber, traditional medicine
26. <i>Ficus exasperate</i>	Epin	Medicinal uses, leaves for washing household utensils.
27. <i>Ficus mucuso</i>	Obobo	Timber, herbal preparation
28. <i>Garcina kola</i>	Orogbo	Traditional rites of god of thunder, medicinal uses
29. <i>Gmelina arborea</i>	Melaina/ Melana	Timber, firewood
30. <i>Griffonia simplicifolia</i>	Tapara	Timber, medicinal uses
31. <i>Hevea brasiliensis</i>	Rubber	Latex sold for income
32. <i>Holarrhena floribunda</i>	Ire/Ako ire	Medicinal uses; firewood
33. <i>Holoptelea grandis</i>	Ayo	Timber, medicinal uses
34. <i>Irvingia gabonensis</i>	Apon/ Oro/Atupon	Fruit is processed into soup, herbal uses
35. <i>Khaya ivorensis</i>	Oganwo	Timber, firewood, medicinal uses
36. <i>Lactuca taraxacifolia</i>	Yanrin(herb)	Medicinal uses
37. <i>Lannea acida</i>	Eekan aja	Timber, herbal preparations
38. <i>Leucinia leucocephala</i>	-	Fodder for livestock, Nitrogen fixation.
39. <i>Magnifera indica</i>	Mongoro (mango)	Fruit is eaten raw, firewood, medicinal
40. <i>Mansonia altissima</i>	Mansonia	Timber, firewood
41. <i>Milicia excelsa</i>	Iroko	Cultural uses, timber, firewood
42. <i>Morinda lucida</i>	Oruwo	Traditional medicine preparation
43. <i>Musanga cecropioides</i>	Aga	Sap is highly medicinal; firewood
44. <i>Nauclea diderrichii</i>	Opepe	Timber, firewood
45. <i>Nauclea pobeguinii</i>	Opepe ira	Timber, firewood
46. <i>Nesogodonia papaverifera</i>	Oro	Timber, firewood

47. <i>Newbouldia laevis</i>	Akoko	Chieftaincy rites, medicinal uses, timber
48. <i>Parinari excels</i>	Yinrin-yinrin	Timber; medicinal uses
49. <i>Piptadeniastrum africanum</i>	Agbonyin	Timber, medicinal uses
50. <i>Psidium guajava</i>	Guava/ guafa	Fruit eaten raw, chewing stick, medicinal uses
51. <i>Pterygota macrocarpa</i>	Poroporo	Timber, firewood
52. <i>Pycnanthus angolensis</i>	Akomu	Medicinal uses
53. <i>Senna alata</i>	Asunrun	Timber, firewood, medicinal uses
54. <i>Spathodea campanulata</i>	Oruru	Timber, medicinal uses
55. <i>Spondias mombin</i>	Olosan/ Iyeye	Boundary marker, firewood, fodder, timber
56. <i>Sterculia rhinopetala</i>	Aye/Koko igbo	Timber, medicinal uses, firewood
57. <i>Strombosia pustulata</i>	Itako	Timber, firewood, medicinal uses
58. <i>Tectona grandis</i>	Tiiki/ Teak	Timber, firewood, roofing, food packaging.
59. <i>Terminalia catappa</i>	Igi furutu/ Igi fruit	Fruit, medicinal uses, shade
60. <i>Terminalia ivorensis</i>	Afara dudu/ Idigbo	Timber, firewood
61. <i>Terminalia superba</i>	Afara funfun	Timber, firewood
62. <i>Tetrapleura tetraptera</i>	Aidan	Timber, firewood, herb for convulsion
63. <i>Treculia africana</i>	Afon	Fruit processed and eaten; serves as shade
64. <i>Trichilia monadelpha</i>	Efo	Firewood, medicinal uses
65. <i>Trilepisium madagascariense</i>	Saworo	Timber, medicinal uses, firewood
66. <i>Triplochiton scleroxylon</i>	Arere/ Obeche	Timber, firewood
67. <i>Uapaca spp.</i>	Akun/ Yeye	Timber, medicinal uses
68. <i>Uvaria chamae</i>	Eruju	Timber, herbal preparation
69. <i>Vernonia amygdalina</i>	Ewuro	Herbal preparation, soup, firewood
70. <i>Vitex doniana</i>	Oori	Shea butter production
71. <i>Xylopia aethiopica</i>	Aranje	Timber, firewood, medicinal uses
72. <i>Zanthoxylum zanthoxyloides</i>	Orin ata	Chewing stick, medicinal uses

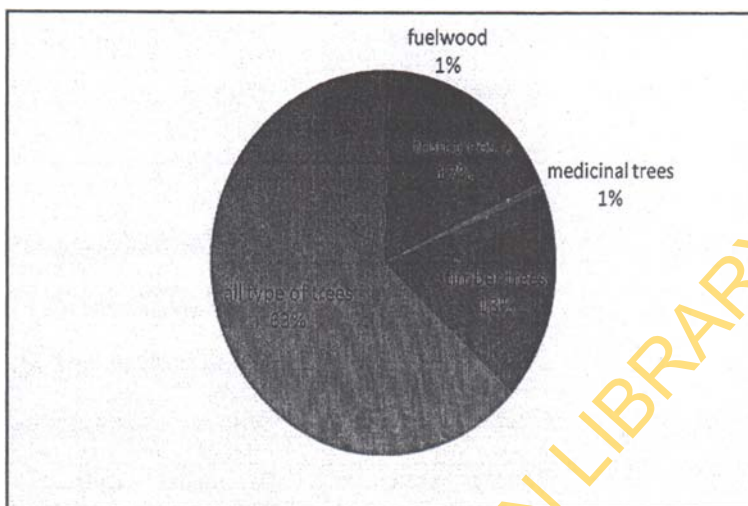


Figure 1: Type of trees retained by farmers

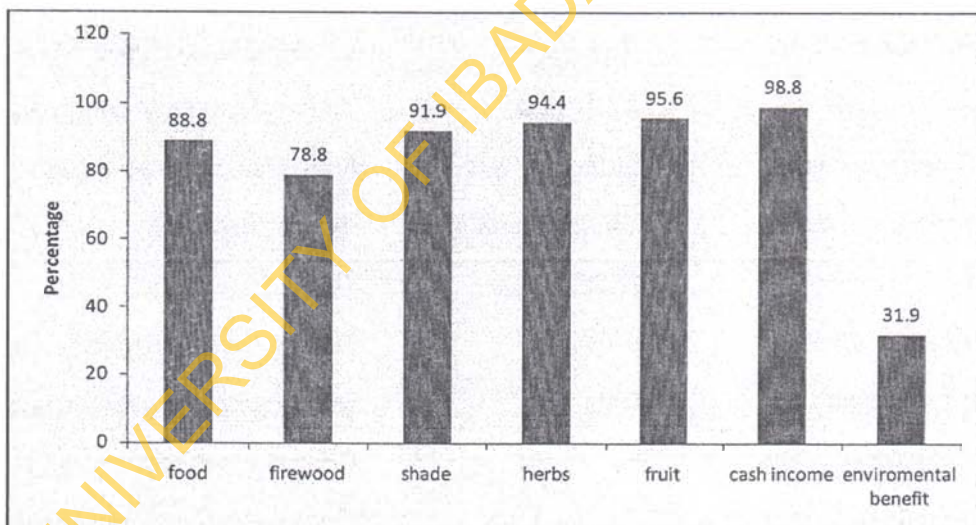


Figure 2: Benefits derived from the on-farm trees

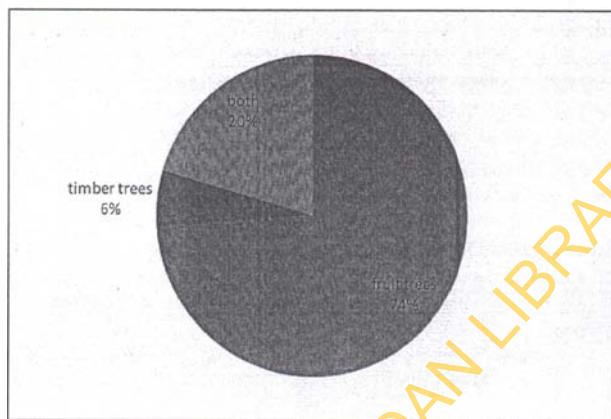


Figure 3: Type of trees planted

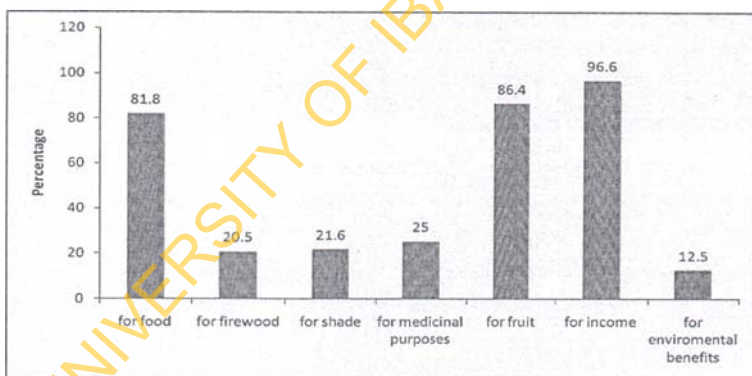


Figure 4: Farmers' reasons for planting trees

Tree management practices

Most of the tree species retained on the farm were found on the farmland during land preparation (Table 2). These trees were probably dispersed naturally, either through wind, water, wild animals, birds and other agents of dispersal. Adedire (2010) observed that some of these trees found on arable farmlands are grown naturally from seed dispersed by birds and other wildlife. Very few of the farmers have a nursery for propagating their seeds (Table 2). This indicates that majority of the farmers plant their seeds through direct sowing to the field. This has an adverse effect on regeneration of the trees through seeds. Some of the farmers get their planting stock by transplanting seedling found under the canopy of the mother tree.

Majority of the farmers prune their trees so as to prevent the shading of their crops. Adedire (2010) also observed that trees integrated into arable farmlands are pruned periodically to provide green manure and to prevent shading of the growing crops. Most of them prune their trees either when necessary or before each planting period (Table 2). This indicates that they know the effect of tree branches or canopy on their food crops. Thus they prune their trees to favour the arable crops. Some of the farmers do not allow their trees to coppice (Table 2). This is an indication that if care is not taken the biodiversity in the area will be affected.

Farmers in the area do not treat their trees when they are attacked by pests or when they are diseased, instead, the attacked or diseased tree is felled and used or sold as firewood. Just a few of the farmers (2.6%) protect their trees from animal attack, and fire (Table 2). This is probably due to their ignorance and their belief that God protects those trees. This indicates that if care is not taken most of these tree species will die-off resulting in species extinction. This invariably implies that the sustainability of these species will be in jeopardy and the biodiversity in the area will be adversely affected.

Table 2: Tree management practices

S/N	Tree mgt practice	Categories	Frequency	Percentage
i.	Mode of planting	Regeneration	22	29.7
		Seeds	34	45.9
		Seedlings	18	24.3
		Total	74	100.0
ii.	Possession of nursery	No	53	96.4
		Yes	2	3.6
		Total	55	100.0
iii.	Pruning	No	13	8.2
		Yes	145	91.8
		Total	158	100.0
iv.	Frequency of pruning	Once a year	1	0.7
		Before each planting season	44	30.1
		Monthly	1	0.7
		When necessary	100	68.5
		Total	146	100.0
v.	Coppicing	No	108	68.4
		Yes	50	31.6
		Total	158	100.0
vi.	Tree treatment (disease)	No	156	100
		Yes	0	
		Total	160	100
vii.	Tree protection (pest attack, fire)	No	152	97.4
		Yes	4	2.6
		Total	156	100.0

CONCLUSION AND RECOMMENDATIONS

Farmers prefer 72 tree species of diverse functions on their farms and their preference is based on their knowledge and socio economic needs. Farmers in Ijebu North local government Area both retain and plant fruit trees, timber trees, fuel wood species and medicinal trees on their farms.. The benefits derived from these on-farm trees range from food, fruit, shades, herbs to income generation, while a few of them that are knowledgeable and are aware of environmental issues retain trees for environmental services. The trees are mainly regenerated from seeds which are sown directly on the field. Pruning and coppicing are the management practices employed for the conservation of these trees. On-farm trees in the local government are not treated when attacked by pests or diseases and they are not given any form of protection against animal attack and fire. This will have an adverse effect on the sustainability of these tree species and invariably the biodiversity in the area.

Therefore, there is need for the establishment of nurseries of strategic importance to farmers in different locations in the local government to provide planting stock of the tree species for the farmers. Farmers are advised to protect the trees from fire, pest and diseases and other environmental and anthropogenic hazards in order to ensure continued provision of the benefits supplied by the trees.

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