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FARMER'S WILLINGNESS TO ADOPT BAMBOO (*Bambusa vulgaris*) IN AGROFORESTRY ALONG SELECTED AREAS IN IDO LOCAL GOVERNMENT AREA, OYO STATE, NIGERIA

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ABSTRACT

This study was carried out to investigate the adoption of Bambusa vulgaris in agro-forestry practices along some selected farms in Ido Local Government Area of Ibadan, Oyo State, Nigeria. A simple random sampling method was used, while 50 pieces of semi-structured interview schedule were randomly administered among agro-forestry farmers in the local government area. The data collected was analysed using SPSS version 20 and was presented using Tables, Pie charts, and Bar charts. The results indicate that farming practices in the study area are predominantly male-dominated (90.0%) and at their prime and active age (86.0%) with little or no formal education (54.0%) coupled with marital responsibility (100.0%). The majority (86.0%) of the access to land ownership for the agro-forestry farmers was mostly communal and owned showing family attributes still exist. The regular farming method adopted there is basically to feed their family (60.0%) and to generate income from sale of products (40.0%) and this has been on for between 0-21 years but their willingness to adopt agro-forestry was observed (100.0%), while citing access to fertilizer was seen as a major problem. But adoption of agro-forestry farming was made to be seen as a means in this study as indicative of soil fertility. There is an indication that most of the farmers (83.0%) have either planted Bamboo before or seen people use it for several other purposes apart from agroforestry hence the adoption of Bamboo for agro-forestry farming must be given an urgent attention so as to provide income and ecological stability.

Key words: adoption, agro-forestry, bamboo, farm practice

INTRODUCTION

Agro-forestry is a collective name for land use system and technology where woody perennials (trees, shrubs, palms, bamboos, etc.) are deliberately used on the same piece of land with other agricultural enterprises such as crop or livestock production to derive both economic and ecological benefits (Nair *et al*., 2021). Agro-forestry is a very profitable and lucrative system for the value chain (Batumanyeho *et al*., 2023). It also has the potential of being effective in carbon sequestration, thereby helping in countering the emission of greenhouse gases, global warming and climate change especially when bamboo is used (Kaam *et al.*, 2023). Trees are conventionally used in agro-forestry and are gradually going to extinction due to its vast use, however, bamboo a lesser used forest product found to grow in the tropical, sub-tropical and temperate regions can be substituted for them due to its fast growth rate (Long *et al*., 2023), versatility of use, erosion control, watershed protection, stitching the soil together along fragile riverbanks, deforested areas, and in places prone to earthquakes and mudslides and its ability to restore nutrient back to soil though overlooked (Perumal *et al*., 2023). A number of reports have identified bamboo as a universally useful plant to man for furniture and tools due to its attributes of durability, strength and light weight (Tripathi *et al*., 2021).

Bamboos of different heights and growth characters may also be used as windbreaks and thereby protecting gardens and other agricultural systems from the damaging effects of either winds or the frosts that roll off the hillside (Adedeji and Nusirat, 2023). It can also recover much of the nutrients leached deeper into the soil profile due to the presence of its network of roots (Long *et al*., 2023). However, in Nigeria, the full potential of bamboo has not yet been harnessed unlike in the other parts of the world where it is considered a viable land use option to reduce the dependence on natural forest, mainly due to lack of awareness and

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knowledge of these potentials especially by policy makers and the populace (Okokpujie *et al.*, 2020). To align the design and introduction of bamboo agro-forestry to the needs of farmers, necessary information on its acceptability and adoption is necessary. Therefore, the aim of this study was to investigate the willingness to adopt Bamboo in agro-forestry by farmers along the selected areas in Ido Local Government Area of Oyo State, Nigeria through inquiries on the level and type of farm practices of the people and also their local knowledge of bamboo either for agro-forestry or other uses.

METHODOLOGY

Study Area

This study was carried out in Ido Local Government Area (Figure 1) of Oyo State, Nigeria of Latitude 7.5068 N and Longitude 3.7119 E. It has an estimated population of 123,549 and a land mass of 1,016.95 km^2 (National Population Commission, NPC, 2012). The study cut across six farm settlements namely Omi-Adio, Emi-Oga, Bakatari-Eleso, Ita-Faji, Ido, and Elenu-Sonso.

Sampling technique

A purposive sampling method based on the practise of agro-forestry was imbibed in sampling 12 farmers from Omi-Adio, 6 each from Emi Oga, Bakatari-Eleso, Ita-Faji and Elenu-Sonso farms while 14 farmers were sampled from Ido all in the study area based on the size of the farms.

Data collection

For this study, 50 copies of an interview schedule sectioned into five parts with questions revolving round the objectives were used as an instrument for data collection, and the study site was surveyed with the guidance of a knowledgeable experienced individual well-versed in the details of the terrain.

Data Analysis

The data collected were subjected to descriptive statistical analysis, with measures of central tendency (mean) and variability (standard deviation) calculated for each variable. The results are presented in a clear and concise manner using charts and tables to facilitate ease of interpretation and understanding.

RESULTS AND DISCUSSION

The demographic data presented in Table 1 shows a predominant male presence (90.0%) among agro-forestry farmers. This trend may be attributed to the technical and power demands that often position males at the forefront, aligning with the reports of Ibrahim *et al*. (2019). Their research also highlighted male dominance in home garden agro-forestry, particularly in activities such as land preparation, planting, and the sale of cash crops within the agro-forestry system. Also, Perez *et al*. (2015) noted that the energy requirements associated with agro-forestry farming align more closely with the day-to-day activities of males, contributing to the increasing adoption of male farmers in Southwest Nigeria.

Figure 1: Map of the study area
Source: Ministry of Land Housing and Physical Planning, Ibadan, Oyo State

Table 1: Demographic characteristics of the respondents

Demographic Characteristics	
Gender	Percentage (%)
Male	90.0
Female	10.0
Marital Status	
Single	0
Married	100.0
Divorced	0
Widow	0
Age (Years)	
30-50	86.0
Over 50	14.0
Educational Level	
No formal education	54.0
Primary education	46.0

Moreover, the findings further indicate that all (agro-forestry farmers) were married (100.0%). The high proportion of married respondents suggests an increasing endorsement and adoption of agro-forestry as an alternative income source to support their families. Involving multiple family members in agro-forestry endeavours enhances the potential to achieve objectives such as food security, employment, and soil improvement. This aligns with the report of Kamugisha *et al*. (2023) who highlighted the positive impact of agro-forestry systems beyond food security in tribal farmers in South Western Uganda.

Regarding the respondents' age distribution, the results reveal that the majority (86.0%) fell within the 30-50 years age bracket. This distribution may be attributed to the physical agility and power required for various agro-forestry management practices, supporting the findings of Ibrahim *et al*. (2019) regarding the need for agility in agro-forestry activities, particularly during the adoption stage.

Examining the educational levels of the respondents, Table 1 indicates that slightly over half (54.0%) had no formal education. This trend may stem from a lack of awareness regarding the importance of education in rural areas which supports the findings of Kolade *et al*. (2020), who noted that the majority of farmers with a better educational background are aware and can accept agro-forestry easily than those will lower education.

When evaluating the farming experience and land ownership of farmers who adopted Bamboo in agro-forestry farming, the data in Table 2 highlight the farming experience among the respondents, as well as the nature of land ownership. The results show that the highest proportion of farmers (45.0%) have been farming for 0-5 years, followed by those with 6-10 years of experience (30.0%), 11-15 years (15.0%), and 16-20 years (10.0%) indicating a recent rise in agro-forestry farming with the adoption of bamboo to replace previously used tree species in the study area.

Regarding land ownership, the data show that the largest proportion of farmers (38.0%) own the land they cultivate, while a significant portion (48.0%) farm on communal land. A smaller percentage (14.0%) are engaged in farming through hired or rented land. This distribution suggests that family ownership remains predominant, with customs and traditions still influencing land use. These results align with the findings of Mugure *et al.* (2013) who reported that the majority of land ownership related to the adoption of bamboo as an agro-forestry tree in Kenya is communal and personally owned.

The results presented in Table 3 indicate that a majority (62.0%) of the respondents who have adopted bamboo in agro-forestry have been in production for the past 5 years, while the remaining (38.0%) have been in production for a period ranging from 5-10 years. This disparity could be attributed to the lack of essential materials required to enhance production effectiveness, aligning with the findings of Agbaje (2000), who suggested that the duration of production may vary based on environmental parameters, especially with the introduction of new adoptions or innovations.

Furthermore, various reasons for cultivating crops with bamboo were identified, with a significant percentage (60.0%) attributing it to feeding their families, while the remaining 40.0% were cultivating for sale. This trend may be linked to the livelihood and sustenance of the respondents, supporting the findings of Kamugisha *et al*. (2023) who emphasized that agro-forestry can enhance overall turnover, potentially serving as a lifeline for numerous households in Nigeria. Assessing crop performance after integrating tree species with arable crops serves as a means of evaluating development.

The findings presented in Table 4 highlight the perception of agroforestry farmers regarding soil fertility challenges and access to fertilizers. It was observed that all the respondents agreed that they face soil fertility challenges (100.0 %) and lack access to fertilizers (100.0%). The soil fertility challenges may be attributed to factors such as land overuse, anthropogenic activities, and varying soil requirements for the growth of both tree species and crops. These findings suggest that soil fertility remains a challenge in agro-forestry combinations, compounded by anthropogenic disturbances.

Table 1: Time of farming and nature of farm ownership in agro-forestry

Farming experience (years)	Percentage (%)	Nature of ownership	Percentage (%)
0-5	40.0	Owned	38.0
6-10	30.0	Communal	48.0
11-15	20.0	Hired/Rent	14.0
16-20	10.0		
21 and above	0.0		
Total	100.0		100.0

Table 3: Years of production and reasons for growing crops by farmers

Year of production	Percent-age (%)	Reason for growing crop	Percent-age (%)
< 5	62.0	For sale	40.0
5-10	38.0	Feeding of the family	60.0
Total	100.0	Total	100.0

Table 4: Perception of farmers on soil fertility challenges and access to fertilizer

Soil fertility challenges	Percentage (%)	Access to fertilizer	Percentage (%)
Yes	100.0	Yes	0
No	0	No	100.0
Total	100.0		100.0

The lack of affirmative response regarding the farmers' access to fertilizers can be attributed to difficulties in sourcing and the logistical challenges involved in distributing fertilizers to local farmers. Adeloja (2000) corroborated this in his findings that credit facilities and logistics were major challenges in distributing fertilizers to rural dwellers.

The data in Table 5 demonstrate that all respondents (100.0%) expressed their willingness to adopt agro-forestry utilizing bamboo as an alternative to the traditionally used tree species, especially since the majority of agro-foresters (78.0%) are involved in various regular cropping methods. Given the prevalent soil fertility challenges and limited access to fertilizers, the willingness to adopt this new combination of bamboo and other agricultural crops within the agro-forestry system indicates the potential for diversification to enhance food security and increase income for the community which is in line with the conclusions of Kamugisha *et al*. (2023), who highlighted agro-forestry diversification as the best alternative for agriculture, providing both food security and income. The willingness to adopt may also stem from a preference for agro-forestry as an alternative source of livelihood and food provision, as confirmed by the work of Fagbemi (2007), both of whom emphasized the increasing popularity of agro-forestry and the numerous ecological and environmental advantages of planting trees on farms.

Figure 2 illustrates the various reasons for planting bamboo and its uses among farmers, showing that it is primarily for fuel wood provision (35.0%), fodder (26.0%), economic gain (20.0%), and soil and water conservation with shade (19.0%). This highlights the diverse importance of bamboo, aligning with the findings of Isukuru *et al*. (2023), who emphasized its potential uses in various ways, e.g., ecological, economical and environ- mental uses. The holistic adoption of bamboo is often viewed as a potential solution for addressing household, soil, and ecological challenges.

In Figure 3, it is evident that only 5.0% of the respondents are aware of and have utilized bamboo as a source for making charcoal, while the majority (95.0%) have not used bamboo for this purpose. This low percentage of bamboo adoption for charcoal production may be attributed to the recent introduction of bamboo adoption, as supported by the findings of Ajala (2001), who noted that the initial uptake of newly adopted agroforestry tree species can be quite limited.

Figure 4 shows majority (83.0%) of the respondents are aware of the utilization of Bamboo in various forms agro-forestry inclusive, while only 17.0% have not seen anyone use Bamboo before. This might due to wider awareness on the uses and benefits of Bamboo gaining ground across agro-forestry practicing landscape. Awareness is thus the key in propagating and adoption of new agro-forestry practices in Abeokuta metropolis, though this contradicts Ajayi *et al.* (2019) who reported that the respondents' awareness and adoption regarding agroforestry technologies was generally low among cocoa farmers in Ekiti State Nigeria.

Table 5: Use of regular cropping methods and willingness to adopt agro-forestry among the farmers

Use of regular cropping methods	Percentage (%)	Willingness to adopt agroforestry	Percentage (%)
Yes	78.0	Yes	100.0
No	22.0	No	0
Total	100.0		100.0

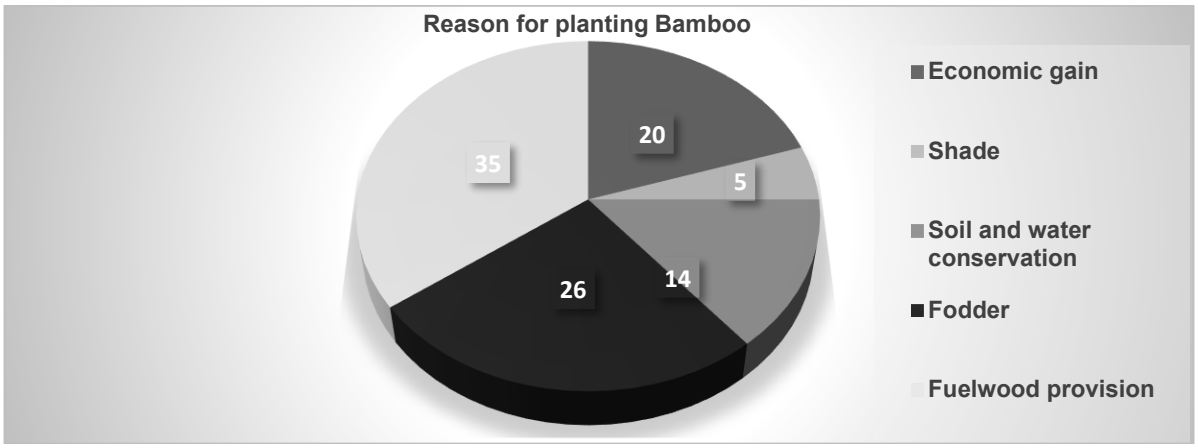

Figure 2: Reasons for planting Bamboo (*Bambusa vulgaris*) among the farmers

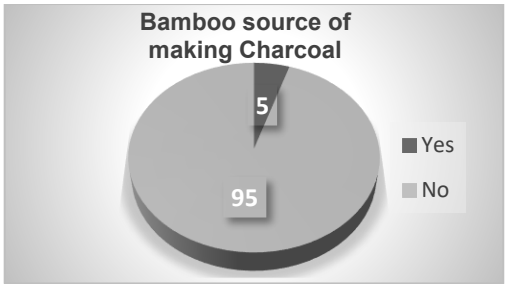

Figure 3: Bamboo as a source of making charcoal

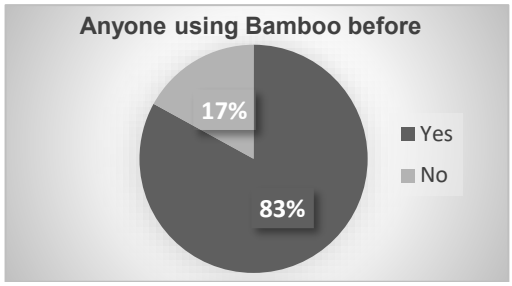

Figure 4: Response of anyone using Bamboo before

CONCLUSION

Based on the results obtained from this study, the use of regular cropping methods was prominent in the study area, the study concludes that farmers in Ido Local Government Area of Oyo State were strongly willing to adopt bamboo-based agro-forestry innovation. Therefore, adoption of Bamboo as a tree for agro-forestry farming when given an urgent attention and publication provides solution to food security, provision of income, ecological stability and soil protection.

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