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Economic Benefits of Incorporating Arable Crops in Plantation Establishment: A Concept of Agroforestry

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Food production is an issue of global concern, it was estimated that about 1.2 billion people are food secured and there is almost 900 million people who are suffering from hunger.This population of people suffering from hunger is high in the Africa region. Hence the reason for various interventions by the developed nations of the world in the Africa region. Therefore the need to research into incorporation of arable crops in plantation establishment, so as to bridge the gap between forestry and agricultural land demand. This study was carried out at settlements around Onigambari forest reserve of Oyo State Nigeria. A multi stage sampling was used in which purposive sampling was used to select four communities where taungya farming is been carried out. Simple random sampling was used to select 25 farmers from each of the participated communities to make up of one hundred selected farmers. Result shown that 82% of the farmers

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were married having a moderately large household size of between 6 and 8 persons, their household size also helped in their ability to cultivate large land as the result shows that these farmers on the average cultivated between 5-6 acres (49%) and 3-4 acres (30%) which is a large portion of land. Maize and cassava are the majority planted crops by the farmers (maize 91%), (Cassava 87%) cocoyam and melon were also planted. The neighboring market of Ogunmakin in Ogun state boundaring the forest reserve to the south, also enjoy the influx of the arable crops as they were sold in this market at a low cost because of it's production from nearby forest reserve.

Keywords: Plantation establishment; arable crops; food production.

1. INTRODUCTION

The population in Africa is still largely rural and depends mostly on agriculture for its income.Increase in population leads to a considerably increase in the demand for food in the tropical regions, which makes the use of forestland for agricultural purposes become a necessity [1-3].

The forests are important sources of fuel wood, poles, timber, hunting grounds, and numerous non-timber forest products [4]. Meanwhile the removal of trees and vegetative cover is a significant cause of land degradation; this made attention to be paid recently on the role of trees in African agriculture and the projectionsin restoring the fertility of the soil and improving land productivity through integrating trees and tree products with crops and/or livestock in integrated farming systems [5,6].

Agroforestry cannot provide the only resolution to environmental degradation issues in Africa but it could potentially make a substantial contribution to a sustainable agricultural development strategy for the continent which cannot be over emphasized. Sinclair, [7] defines agroforestry as a class of practices where trees (referring to all woody perennials, thus including shrubs) interact with agriculture at field, farm or landscape scale. A recent definition by Leakey (2017), defines "agroforestry as a natural resource management system which is dynamic, ecologically based, that includes the incorporation of trees in farm- and rangeland, diversifies and sustains smallholder production for increased social, economic and environmental benefits".

"In Nigeria, degradation of the environmental which results from increased soil erosion, deforestation or vegetation loss and hydrological changes leading to loss of productivity of land has also being tackled through agroforestry projects (integration of the forestry programme into rural farm activities of the farmers)" [8].

Given the crucial need to develop a sustainable agricultural system that alleviate and adapt to climate change, and the well-known role that the incorporation of trees with crops can contribute to such results, agroforestry in Africa taking a great attention is key. Hence this study seeks to describe the socio – economic characteristics of the farmers, level of farmer's participation in agroforestry practice, identify common arable crops grown on the farm, identify the benefits of agroforestry practices in Oluyole local government area of Oyo state, Nigeria.

2. METHODOLOGY

2.1 Study Area

This research took place at Onigambari forest Reserve which took its name from a community called Onigambari situated in Oyo state. It covers about nine thousand hectare of land. The forest reserve is location between latitude $7^0$25N and $7^0$55N, and longitude $3^0$53E and $3^0$90E on the idiaunre- Ijebu ode road, Oyo State. The communities around Onigambari Forest Reserve are; Aba Ibadan, Adebayo, Busogboro, Darley and olubi, Longe, Onipe amongst others.

2.1.1 Population of the study/ sampling technique

The study Population consists of 300 farmers that incorporate arable crops into theplantation establishment. The sampling method employed is two stages sampling method with first stage being Purposive sampling and the second stage random sampling. Four communities were selected purposively because of their proximity to the forest reserve. These communities are Aba Ibadan, Oja Ibadan, Seriki and Aba nla. The second stage was the random selection of 25 farmers from each of the selected (4) four communities. One hundred question was retrieved out of the 100 question administered.

3. RESULTS AND DISCUSSION

3.1 Socio Economic Characteristics

Data were collected on the socio economic characteristics of the respondent in the study area which includes gender, age , marital status , farming experience, educational status, farm size etc.The secondary data was collected from a wide range of documents, archival records, available literature (articles, books, policy briefs), and internet sources.

Higher percentage of the farmers that incorporates arable crops into the plantation at Onigambari Forest Reserve as seen in Table 1 were male with 68 percent this may be due to culture which requires males to be responsible for the procurement of the needs of the family. Also the male dominancy in agriculture is expected due to great energy required in carrying out farming activities. This is in line with Akinwalere [9] which reported male dominance among farmers in Southwest, Nigeria in their study with male been higher with over 60 percent.

The result in Table 2 shows that 29 percent of the farmers fall within the age range of 31-40 years while higher percentage falls within the age range of 41-50 years. This shows that the farmers are in their active age group which may influence their willingness to participate in agro forestry practice of incorporating arable crops in the plantation.

Table 1. Gender of respondents

Gender	Frequency	Percentage
Male	68	68
Female	32	32
Total	100	100

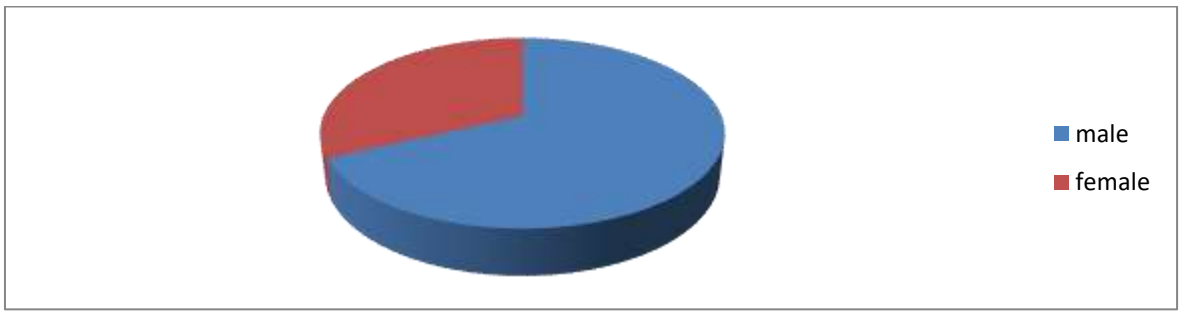

Fig. 1. Gender wise distribution

Table 2. Age of respondents

Age (years)	Frequency	Percentage
20-30	8	8
31-40	29	29
41-50	44	44
51-60	13	14
Above 60 years	6	6
Total	100	100

Table 3. Marital status of respondents

Marital status	Frequency	Percentage
Single	7	7
Married	82	82
Divorced	3	3
Widow	8	8
Total	100	100

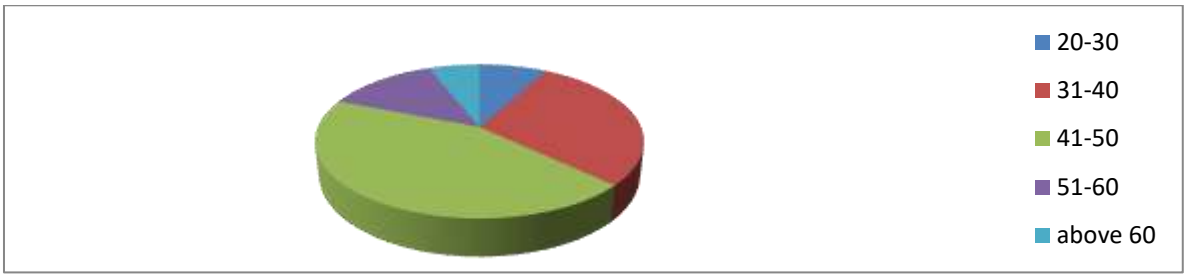

Fig. 2. Age wise distribution

Table 3 shows that 82 percent of the respondents in the study area are married, with 7 percent single, 8 percent widowed and 3 percent divorced.

The result in Table 4 shows that higher percentages of the respondents have secondary education with 37 percent followed closely by those with primary education 31 percent. This implies that their level of education might affect their incorporating of arable crops into plantation.

This also suggests that majority of the farmers in thestudy area could read and write. This is in line with United States Agency for International Development, USAID (2010), report farmers chances of adopting new innovations increases with their level of education.So, dissemination of information by forest extension agents through leaflets, pamphlets and other print media on good forest practices may be suitable and appropriate for effectiveness.

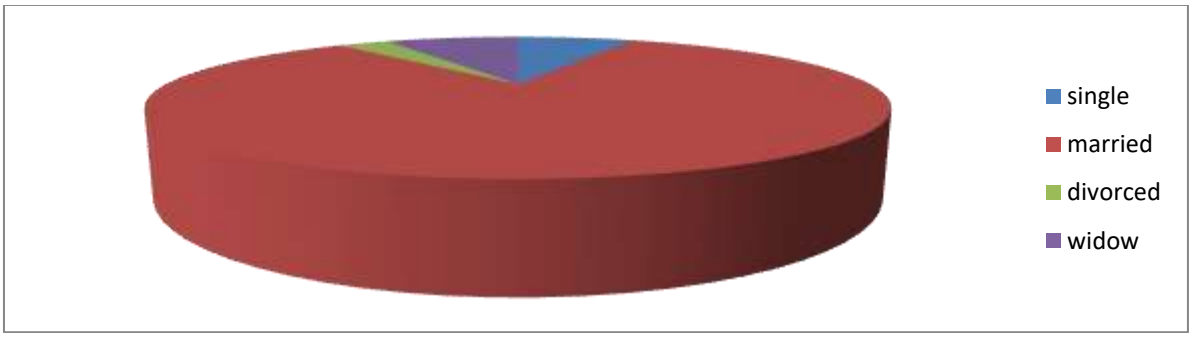

Fig. 3. Diagram shows the marital status of respondents

Table 4. Education status of respondents

Education status	Frequency	Percentage
No formal education	20	20
Adult education	8	8
Primary education	31	31
Secondary education	37	37
Tertiary education	4	4
Total	100	100

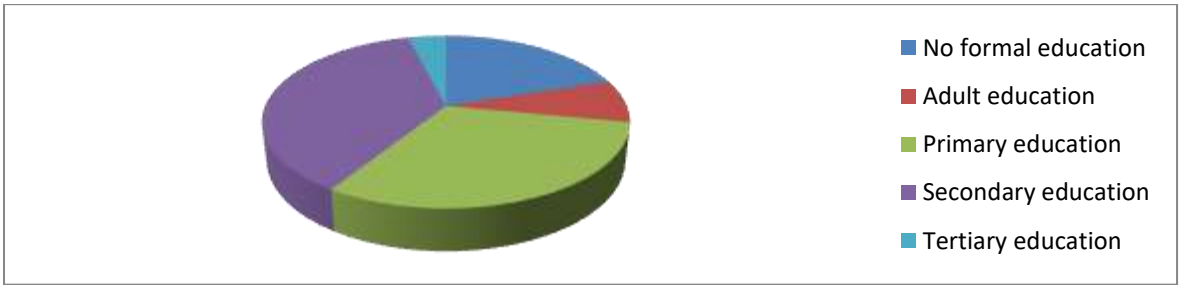

Fig. 4. Diagram shows Education status of respondents

Table 5. Farming experience of respondents

Farming experience		
1-5 years	12	12
6-10 years	41	41
11-15 years	36	36
16 years above	11	11
Total	100	100

The result in Table 5 shows that farming experience of the farmers between 6-10 years is the highest followed by those with 11-15 years with 36 percent. In study area, 77 percent of the farmers have farming experience of between 6-15 years. It is expected that good / longer year of farming experience should influence the level of farmers participation in agroforestry practices in the study area.

With the majority of the farmers married,those with family size of 5 are more with 51 percent followed by those with over 10 family size with 39 percent in Table 6, Given that most of the farmers operated at both subsistence and commercial levels, this trend encourages the use of hired labour with an appreciable percentage still making use of family labour especially during pre-planting operations.

Table 7 shows that higher percent of the farmers have 5-6 acres of land cultivated with 49 percent followed by those with 1-5 hectares of land with 19 percent. This result shows that the farmers in the area are medium scale farmers.

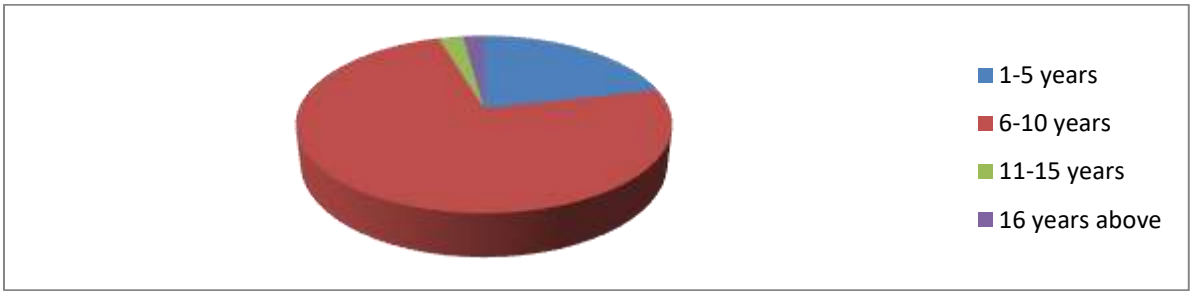

Fig. 5. Diagram shows Farming experience of respondents

Table 6. Household size of respondents

Household size	Frequency	Percentage
5	51	51
10	10	10
Above 10	39	39
Total	100	100

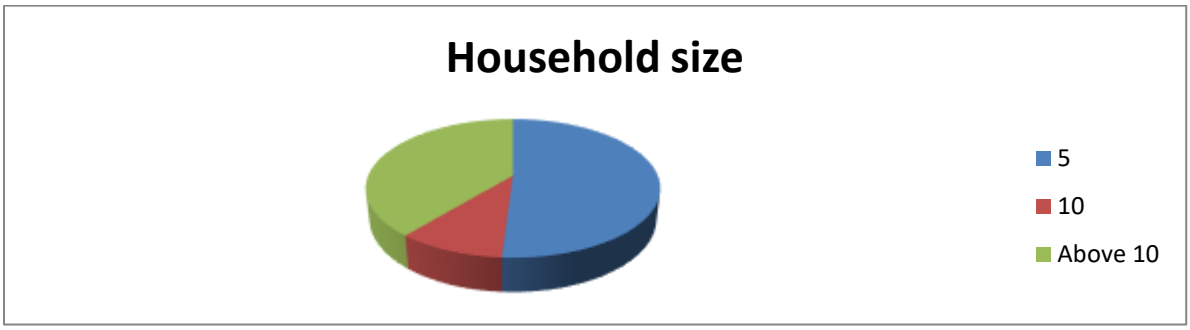

Fig. 6. Diagram shows Household size of respondents

Table 7. Land size of respondents

Land size (hectares)	Frequency	Percentage
1-2	11	11
3-4	30	30
5-6	49	49
7-8	8	8
Above 8	2	2
Total	100	100

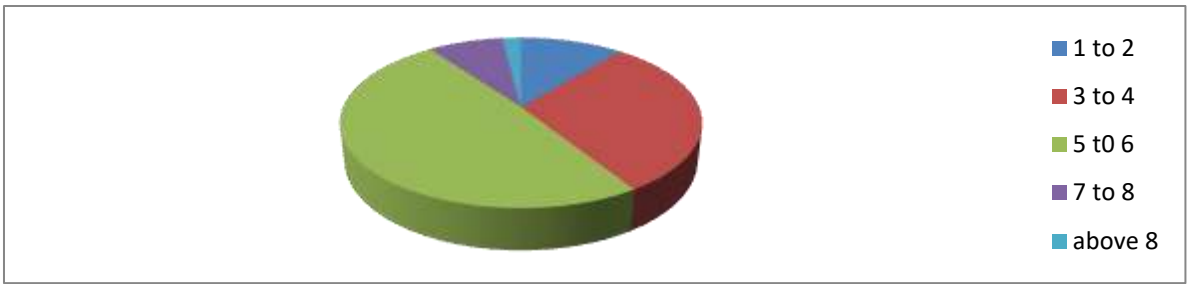

Fig. 7. Diagram shows land size (acres) of respondents

Table 8. Major crop incorporated into plantation by respondents

Major crop incorporated into plantation	Percentage
Cassava	87
Cocoyam	67
Maize	91
Melon	63

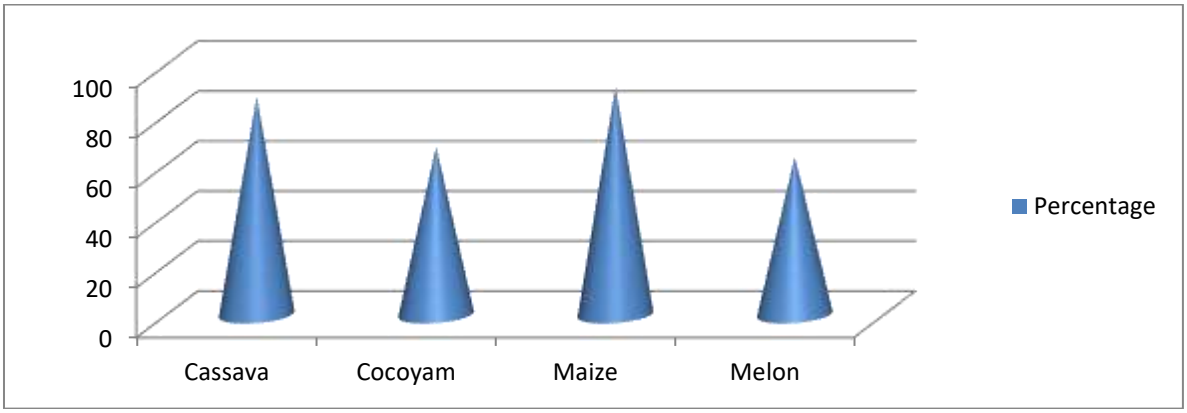

Fig. 8. Diagram shows Major crop incorporated into plantation

The result shows that maize is the most incorporated crop in the plantation with 91 percent followed by cassava with 87 percent then cocoyam with 67 percent and lastly melon with 63 percent. From the result the farmers are involved in mixed planting due to seasonality involved in some of the crops production. From this we could see that farmers incorporating this into their plantation show that it have numerous advantages, in that all year round they have a crop to plant which is a source of income to them and family which is connected to the system's provision of solution to the problem of hunger.The result also discovered that the farmers may perhaps be aware of the potentials of agro forestry practices in increasing productivity per unit area. Akinbile et al. [10], noted that "sustainable agricultural development may be achieved in the country through agro forestry practices. This is because agro forestry has the ability to combat environmental degradation as well as to mitigate deforestation".

3.2 Major Trees Planted

The Onigambari Forest Reserve was declared from Ibadan Forest Reserve by a resolution of the Ibadan city council passed in September 1899 [11]. Two sections were consolidated to form a Forest Reserve in 1953 making a total area of 125.62 km2 [11]. Hence tree like Teak (*Tectona spp*), Mahogany (Khaya ivorences), and other Agricultural crops like cocoa (*Theobroma cacao*), cassava (*Manihot spp*) with exotic trees and crops were cultivated because of their fast rate of growth. The inhabitants of the area are predominantly farmers with relatively low number of hunters [11].

This of course is followed by its numerous benefits especially in processing of timbers which brings job opportunities to rural communities and thereby expanding the national economies. According to Ibrahim et al. [12] which described "the benefits derived from agroforestry practices by farmers in New Bussa, Nigeria, it includes it being a source of income, source of food, usage as medicinal plants, source of fodder,source of employments, wind break and better use of land among others". Adedayo and Oluronke [13] also reported "most of these tree species identified in this study as the common trees planted or retained by farmers in Osun state, Nigeria".

Also, this is because profit is the major incentive in any enterprise (Popoola, 1998). Here the number of times for weeding is usually fewer than when the system is not adopted (Enabor 1975). Some economic benefits associated with incorporating arable crops in plantation consistof non-timber forest products (NTFPs), generation of extra household income, plantation establishment amongst others. Fuel wood is obtained from thinned trees and pruned branches of the woody perennials in the plantation settings. Essentially, it is used for the purpose of cooking, heating or energy generation, especially people living in rural areas [14]. Olujobi et al., (2006) explained that "sourcing fuel wood for household use by agro forestry farmers is not difficult for most of the Agro forestry farmers in Ondo State. Agro forestry practice increases farmers' income because of low cost of input due to no cost incurred in purchase of fertilizer". This attests the views expressed by Egharevba and Kalu (2004) that NTFPs contributes greatly in increasing income of rural populace.

4. CONCLUSION

This study was carried out to know the benefits of incorporating common arable crops grown in the study area. It was found that farmers in the study area incorporate arable crops like maize, cassava cocoyam ad melon into their plantation which is a source of income to them and family all year round. They are in their active age group which may influence their willingness to participate in agro forestry practice of incorporating arable crops in the plantation in the area; this is of great benefits to the sustainable agricultural development strategy. Due to increased pressure on the limited arable lands in Africa, agroforestry practice in the study area has in a way helped in mitigating deforestation and land degradation which of course alleviate poverty and provides solution to the problem of hunger .in the study area.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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