

## Contribution of Agroforestry Practices to improvement of Crop Production among farmers in Odeda Local Government Area of Ogun State, Nigeria

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**Abstract.** The poverty status of many smallholder farmers is a serious challenge to agricultural production especially in the area of input supply which led them to traditional farming system. Therefore, the study investigated the contribution of agro-forestry practices to improvement of crop production among farmers in Odeda Local Government Area of Ogun state. Purposive sampling was used to select Odeda LGA due to high concentration of farmers whereas simple random sampling procedure was used to select 120 respondents through well-structured interview schedule for the study. The data collected were analyzed with descriptive statistics and inferential statistical tool, to test the hypothesis. The study revealed that the majority of the respondents that practiced agroforestry in the study area were males (56.7%). Majority of the respondents (62.5%) were married and also majority of the dweller (48.3%) had no formal education. The results also showed that all the respondents (100%) frequently cultivated arable crops in the study area. The findings further revealed that the majority of the respondents (83.8%) practiced shifting cultivation. Virtually all the respondents (100%) benefited from agroforestry practice with a significant improvement on their crop production which brought increase in income to the farmers. There was a significant association between the types of agroforestry practiced and improvement of arable crops in the study area ( $p < 0.01$ ). Finally, it was concluded that agro-forestry is profitable as it gives room for intercropping with other crops, which with other agro-forestry practices, aid replenishing the soil nutrient. It was recommended that the Forestry Department should organize practical demonstrations of some agroforestry practices among

the rural farmers. It also recommended that the government should empower the extension agents to enlighten the farmers on the best practices in agroforestry without destroying the ecosystem.

**Keywords:** Agroforestry Practices, Crop Production, Improvement

### 1. Introduction

Agroforestry is defined as a dynamic ecologically based natural resource management system that through the integration of trees on farms and in the agricultural landscape, diversifies and sustains production for increased social, economic and environmental benefits for land users at all levels (Alao and Shuaibu, 2013). Agroforestry practices have been successful in sub-Saharan Africa (Kuyah *et al.*, 2016) and in parts of the United States (Iqbal and Nausheen, 2018) and (Schoeneberger and Michele, 2017). The need for sustainable agroforestry practices is key to optimizing the mix of products and services from the forest. (Bargali, *et al.*, 2004), (Bargali, *et al.*, 2009) and (Parchaar *et al.*, 2015). Optimizing benefits in the long term involves making trade-offs between benefits, which can be reaped today and those which should be left for the future as argued by (Onumadu *et al.*, 2000). Nearly 500 million people around the world depend on forest for their livelihood; among them is high number of forest and wood workers (Bowling, 2000). Sustainable forest management must include safe, stable jobs, adequate wages and working conditions (Udofia, 2005). Most forest-dependent people wholly live on the forests for their sustenance, some at subsistence level, and others on commercial basis. However,

owing to the increasing pressure on the forest to meet increasing demands, for forest goods and services, there is over exploitation of the forest resources (Bargali *et al.*, 2015). Consequently, the actual value and contributions of the forest sector to the economy are not adequately appreciated by government and the general public. According to Okunade and Yekinni (2007), adoption of agroforestry practices among farmers could be a response to ensuring alternative sources of sustaining their families. The adoption of agroforestry might have been an attempt by the farmers to ensure security against crop losses and wastage, as the agroforestry products will provide alternatives to food income and other uses.

The level of poverty among smallholder farmers is a major constraint to agricultural investment in terms of inputs supply and this has led many farmers to traditional farming system (Steinfeld *et al.*, 2010). The traditional farming system of African farming (shifting cultivation and fallow) was formerly sustainable. There is more demand for food, leading to more pressure on forestlands and forest products. Moreover, recent increases in urbanization and infrastructural development have further increased pressure on forestland. As a result, fallow periods are shortened; there is reduction in productive capacity of the soil and decrease in crop yields. Therefore, the import of agroforestry that is, land use systems and practices to social and environmental sustainability cannot be downplayed especially where woody perennials are deliberately grown in combination with agricultural crops and/or animals to help find solution to problem of food insecurity and environmental challenges (Thangataa and Hilderbrand, 2012). However, apart from contribution of agroforestry to food security, timber resources and amelioration of environmental challenges, it also helps in protecting the soil from erosion and extreme temperatures (Adedire, 2004).

### 1.1 Purpose of the study

The purpose of this study was to examine the contributions of agroforestry practices to improvement of crop production among farmers in Odeda Local Government Area of Ogun state, Nigeria.

The specific objectives are to:

- Examine the socioeconomic characteristics of the crop farmers;
- Identify arable crops cultivated by crop farmers;
- Assess the types of agroforestry practices by crop farmers; and

- Examine the benefits of agroforestry on production improvement.

### 1.2 Hypotheses

#### Null Hypothesis (H<sub>0</sub>):

- There is no significant relationship between types of agroforestry practices and improvement of production by crop farmers.

#### Alternative Hypothesis (H<sub>1</sub>):

- There is a significant relationship between types of agroforestry practices and improvement of production by crop farmers.

## 2. Research Methodology

### 2.1 Study area

The study was carried out in Odeda Local Government, Area of Ogun State, Nigeria which is about 20 kilometers away from Abeokuta, the capital city of Ogun State. It is located between Latitude 7° 20'1N and Longitude 3° 56'1 E with an altitude of 159m above sea level. Odeda Local Government area is divided into ten wards which include; Odeda, Itesi, Osiele, Obantoko, Alabata, Obete, Opeji, Olodo, Alagbagba and Ilugun. The Local Government land mass is approximately 1, 263 square km with human population of approximately 219,000 Ogbonlowo, (2010). It has annual rainfall of about 1,232 mm, an average temperature of about 32°C and humidity as high as 95%. Its vegetations are moderate forest cover and thick grasses. Its land is suitable for forestry, agriculture and livestock farming. The type of crops grown includes maize, cassava, yam, cocoyam, tomatoes, melon, and vegetables among others.

### 2.2 Sampling technique and sample size

Purposive sampling technique was used to select Odeda Local Government Area, Ogun State as the study area. There are 10 wards in Odeda Local Government Area and Ilugun ward was purposively selected because of the high concentration of farmers who practice agroforestry. Simple random selection was used to select six (6) villages from Ilugun ward and the villages were Olokemeji, Oguntolu, Mosafejo, Temidire, Olori, and Atakon. Simple random sampling was used to select 20 respondents from each of the six villages. The reason for the equal distribution of the interview schedule was due to the high concentration of arable crop farmers in these villages who also practice agroforestry. In all 120 respondents were sampled. Data collection was carried out with a well-structured interview schedule.

Data collected were analyzed with both descriptive and inferential statistics. Stated hypotheses on the relationships among the variables of interest, were tested for either acceptance or rejection, based on the level of significance.

**3. Results and Discussion**

**3.1 Socio-economic characteristics of the respondents**

The Table 1 reveals that majority of crop farmers (56.7%) who practiced agroforestry were males. This indicated that a greater number of crop farmers that engaged in practice of agroforestry in the study area were males. This is corroborated with the submission of Kiyani *et al.*, (2017) that majority of local residents that engaged in agroforestry in Nyamagabe

district are males. Half of the respondents (50%) that practiced agroforestry were within the age range of 30 – 45 years. This indicated that half of the respondents who engaged in agroforestry practice were youthful with strength and agility. This is aligned with the work of Gebru *et al.*, (2019) that young people are the majority of the household members that engaged in agroforestry practice. The result further shows that 48.3% of the respondents did not have formal education. This indicated that 51.7% respondents who were involved in agroforestry practice in the study area were mostly literate which means formal education is important to the farmers that practice agroforestry; however, embracing practical experience overtime over time is also important. This result agrees with the submission of Gebru *et al.*, (2019) that the level of literacy has a significant effect on agroforestry practice.

**Table 1:** Socio-economic characteristics of the respondents (n = 120)

Variables	Percentage
Sex	56.7
Male	43.3
Female	
Age	
≤ 30	-
31-45	50.0
46-60	21.7
≥ 60	28.3
Marital Status	
Single	8.3
Married	62.5
Divorced	20.0
Widowed	9.2
Education	
No Formal	48.3
Primary	29.2
Secondary	14.1
Tertiary	8.4

*Field Survey, 2021*

**3.2 Types of arable crops cultivated in the study area**

The results in Table 2 show that all the respondents (100.0%) were involved in frequent cultivation of maize, and cassava as the staple food mostly consumed by the people in the study area. This indicated that most crop farmers cultivated cassava, yam, and maize more frequently with tree plants in the practice of agroforestry. This corroborated with the submission of Ajake (2012) that cassava, yam, and maize were widely cultivated in intercropping structure arrangement with permanent tree crops.

**Table 2:** Types of arable crops cultivated (n =120)

Types of crops	Frequently(%)	Occasionally(%)	Never(%)
Maize ( <i>Zea mays</i> )	100		
Cassava ( <i>Manihot esculenta</i> )	100		
Yam ( <i>Dioscorea spp</i> )	83.3	16.7	
Potato ( <i>Solanum tuberosum</i> )	81.7	18.3	
Cowpea ( <i>Vigna unguiculata</i> )	25.0	34.2	40.8
Rice ( <i>Oryza sativa</i> )	20.8	35.0	44.2
Sugarcane ( <i>Saccharum officinarum</i> )	16.7	67.5	15.8

Percentages in parentheses

*Field Survey, 2021*

**3.3 Types of agroforestry practiced among crops farmers in the study area**

Table 3 shows that majority of respondents (83.8%) practiced shifting cultivation regularly while about 41.7% of the respondents practiced parkland or scattered trees on farmland, taungya farming, agro-pastoral system and hedgerows occasionally. This indicated that shifting cultivation is the regularly practiced agroforestry among crop farmers in the study area which is a rural area. According to Raintree and Warner (1986), shifting cultivation is an indigenous form of agroforestry which helps in sustaining intensive traditional land use. This is not line with the submission of Alao and Shuaibu (2013) that shifting cultivation is not commonly in use any longer due to rapid population growth and high demand for food.

**Table 3: Types of agroforestry practiced among crop farmers (n = 120)**

Agro forestry practices	Regularly(%)	Occasionally(%)	Never(%)
Tree on farmland	33.3	37.5	29.2
Parkland or scattered trees	33.3	41.7	25.0
Shifting cultivation	83.8	12.5	4.2
Taungya farming	37.5	41.7	20.8
Agro-pastoral system	37.5	41.7	20.8
Hedgerows	33.3	41.7	25.0
Alley farming	29.2	33.3	37.5

Percentages in parentheses  
*Field Survey, 2021*

**3.4 Benefits of agroforestry practices on production improvement in the study area**

The results in Table 4 reveal that virtually all the respondents (100%) benefited from agroforestry practices with a significant improvement on their crop production, and resultant increase in income. The results further showed that majority of respondents (83.3%) benefited from provision of forest resources for their building purposes while majority of respondents (73.3%) enjoyed provision of fuel wood for commercial and domestic purposes. This indicated that agroforestry practice among crop farmers added significant improvement to their production which brought increase in their income, created more sources of income and other economic and social benefits. This corroborated with the works of Adekunle and Bakare (2004), Kalaba *et al.*, (2013) who opined that agroforestry contribute greatly to good production and add to per capita income of the farmers.

**Table 4: Benefits of agroforestry practises on production improvement (n = 120)**

Benefit derived	S A(%)	A(%)	D(%)	SD(%)
Increase in income	100.0	0.0	0.0	0.0
Forest resources for building	83.3	16.7	0.0	0.0
Increases Fodder production	25.0	56.7	15.0	3.3
Increase in crop yield	33.3	56.7	5.8	4.2
Availability of more source of revenue	66.7	25.0	4.2	4.2
Source of medicinal plants	62.5	18.3	16.7	2.5
Source of non-timber forest products	58.3	21.7	17.5	2.5
Provision of fuel wood	73.3	18.3	55.0	3.3

SA= Strongly Agree, A= Agree, D= Disagree, SD= Strongly Disagree  
 Percentages are in parentheses  
 Field Survey, 2021

**3.5 Hypothesis testing of relationship between agroforestry practices and improvement of arable crops production**

The results in Table 5 reveal that significant association existed between the types of agroforestry practiced and improvement of arable crops production such as increase in income ( $\chi^2= 112.13, p<0.01 @1\%$ ), fodder for animals ( $\chi^2= 29.85, p<0.01 @1\%$ ), increase in crop yield ( $\chi^2= 39.20, p<0.01 @1\%$ ), availability to more sources of income ( $\chi^2= 85.00, p<0.01 @1\%$ ), source of non-timber forest product ( $\chi^2= 36.65, p<0.01 @1\%$ ) of the respondents. This result indicated that the types of agroforestry practices had a great improvement on crops production in the study area.

**Table 5:** Chi-square showing relationship between agroforestry practices and its improvement on arable crop production

Variables	$\chi^2$	df	P-value	Decision
Increase in income	112.13	1	0.000	Significant
Forest resources for building	53.33	1	0.000	Significant
Fodder for animals	29.85	2	0.000	Significant
Enhancement of environment	60.00	2	0.000	Significant
Increase in crop yield	39.20	2	0.000	Significant
Availability of more sources of revenue	85.00	2	0.000	Significant
Source of medicinal plants	43.35	2	0.000	Significant
Source of non-timber forest products	36.65	2	0.000	Significant
Provision of timber for industrial use	18.05	2	0.000	Significant
Provision of fuel wood	88.20	2	0.000	Significant

Level of significance at 1%  
Field Survey, 2021

#### 4. Conclusion

In conclusion, the findings from the study revealed that half of the respondents who engaged in agroforestry were young and agile with about 52% of them having formal education. All the respondents were also involved in the cultivation of common arable crops such as maize and cassava, which serves as an added advantage. The findings further revealed that majority of the respondents engaged in different types of agroforestry practices in which shifting cultivation was the most prominent. The practice of agroforestry among the respondents brought increase in their income, economic and social benefits. Finally, the hypothesis showed a significant association between types of agroforestry and its improvement to crop production in Odeda Local Government Area of Ogun State.

#### 5. Recommendations

It was recommended that the Forestry Department should organize practical demonstrations of some agroforestry practices among the rural farmers. It also recommended that the government should empower the extension agents to enlighten the farmers on the best practices in agroforestry without destroying the ecosystem. Finally, government should also make improved seedlings of trees available to farmers for improved agroforestry practices.

#### References

Adedire, M.O. (2004). Environmental Protection: The Agroforestry Option. *Nigerian Journal of Forestry* 34 (1): 1-6

Adekunle V.A.J and Bakare Y. (2004). Rural livelihood Benefits from participation in the taungya agroforestry system in Ondo State of Nigeria. *Small-scale Forest Economics, Management and Policy*; 3(1):131-138. Short Communications.

Ajake, A.O. (2012). The roles of forest trees in indigenous farming systems as a catalyst for forest resources management in rural villages of Cross River State, Nigeria. *Global Journal of Human Social Science, Geography and Environmental Geosciences*; 12(13)

Alao, J.S. and Shuaibu, R.B. (2013). Agroforestry practices and concepts in sustainable land use systems in Nigeria. *Journal of Horticulture and Forestry*; 5 (10):156-169

Bargali S.S., Singh SP, and Pandya KS (2004). Effects of *Acacia nilotica* on grain crop in a traditional agro forestry system of Chhattisgarh plains. *International Journal of Ecology and Environmental Science*; 30 (4):363-368.

Bargali S.S, Kiran Bargali, Lalji Singh, Gosh L, and Lakhera M.L. (2009). *Acacia nilotica* based traditional agro forestry system: *Effect on paddy crop and management*. *Current Sciences*. 96 (4):581-587.

Bargali, K., Beena J., Bargali, S.S., and Singh S.P. (2015). Oaks and the biodiversity they sustain. *International Oaks*; 26:65-76.

Bowling, J. (2000). A Workers' View on Sustainable Forestry. In: von Gadow, K., Pukkala, T., Tomé, M. (Eds). *Sustainable Forest Management. Management Forest Ecosystems*. Vol. 1. Springer Dordrecht.

Gebru, B.M., Wang, S.W, Kim, S.J., Lee, W.K. (2019). Socio-ecological Niche and Factors affecting Agroforestry Practice Adoption in Different Agroecologies of Southern Tigray, Ethiopia. *Sustainability* Vol.11Pp1-19

Iqbal, N. (2018). "A Food Forest Grows in Atlanta". USDA.gov blog. Retrieved 17 June, 2020.

Kalaba, K.F., Chirwa, P., Syampungani, S., and Ajayi, C.O. (2010). Contribution of agroforestry to biodiversity and livelihoods improvement in rural communities of Southern African regions, in: Tschardtke, T.,

- Leuschner, C., Veldkamp, E., Faust, H., Guhardja, E., Bidin, A. (Eds.), *Tropical Rainforest and Agroforests Under Global Change: Ecological and Socio-economic Valuations*. Springer, Berlin, pp 461-476
- Kiyani, P., Andoh, J., Lee, Y., Lee, D.K. (2017). Benefits and challenges of agroforestry adoption: A case of Musebeya sector, Nyamagabe District in Southern Province of Rwanda. *Forest Science and Technology*; 13(4):17-180
- Kuyah, Shem, Öborn, Ingrid, Jonsson, Mattias; Dahlin, A Sigrun; Barrios, Edmundo; Muthuri, Catherine; Malmer, Anders; Nyaga, John; Magaju, Christine; Namirembe, Sara; Nyberg, Ylva; Sinclair, and Fergus L. (2016). "Trees in agricultural landscapes enhance provision of ecosystem services in Sub-Saharan Africa". *International Journal of Biodiversity Science, Ecosystems Services and Management*: 1. doi:10.1080/21513732.2016.1214178.
- Ogbonlowo, O.J. (2010). Survey of Wildlife Resources and their Utilisation in Odeda Local Government Area of Ogun State, Nigeria. A Project Submitted to the Department of Forestry and Wildlife Management, University of Agriculture, Abeokuta, Nigeria. 17-18
- Okunade EO, Yekinni OT (2007). Women participation in forest management practices for sustainable livelihood in Abeokuta South Local Government Ogun State. *Journal of Applied Science*; 2 (4):377-381.
- Onumadu, F.M.; Popoola, L. and Adekunle, O.A. (2000). Agro-forestry Farming systems: Environmental and socio-Economic Benefits of its practice. *Journal of Environmental Extension*. 1(1) 36:36-43
- Parchaar R.S., Kiran B., and Bargali S.S. (2015). Status of an indigenous agro forestry system: A case study in kumaun Himalaya, India. *Indian Journal of Agricultural Sciences*; 85(3):442-447.
- Raintree, J.B. and Warner, K. (1986). Agroforestry pathways for the intensification of shifting cultivation. *Agroforestry systems*. 4:39-54. Available at <https://link.springer.com>
- Schoeneberger, H. and Michele M. (2017). "Agroforestry: Enhancing resiliency in U.S. agricultural landscapes under changing conditions". Gen. Tech. Report WO-96. Doi: 10.2737/WO-GTR-96. Retrieved 17 June 2018.
- Steinfeld, H., Mooney, H.A., Schneider, F., and Neville, L.E. (eds.) (2010). *Livestock in a Changing Landscape: Drivers, Consequences, and Responses* 1,17-18
- Thangataa, P.H. and Hilderbraand, P.E. (2012). Carbon stock and sequestration potential of agroforestry systems in smallholder agroecosystems of sub-Saharan Africa: mechanisms for reducing emissions from deforestation and forest degradation (REDD+). *Agric. Ecosystem Environ* 2012, 158:172-183
- Udofia S.I. (2005). Conservation of biodiversity through appropriate sustainable forest management strategies. *Proceedings of 30th Annual Conference of forestry Association of Nigeria held in Kaduna, 7th-11th November*; 92-104.