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COMPARATIVE ANALYSIS OF AGROFORESTRY AND MONOCROPPING FARMING PRACTICES IN AFIJIO LOCAL GOVERNMENT AREA, OYO STATE

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ABSTRACT

Agroforestry has been recognized for its positive environmental impact including soil health improvement, water conservation and carbon sequestration whereas, Monocropping, the practice of cultivating a single crop species in the same area repeatedly, can offer short-term gains but poses long-term risks to soil fertility, biodiversity, and environmental health due to its reliance on synthetic inputs and increased vulnerability to pests and diseases. Therefore, this study aimed at comparing agroforestry with Mono-cropping system.

Structured questionnaire were used to obtain primary data from the respondents which were sampled based on multistage sampling procedures. Both descriptive and inferential analytical tools such as frequency, percentages, mean and regression were used to analyze data collected from 60 farmers (30 farmers each of monocropping and agroforestry) in Afijio Local Government Area, Oyo State, Nigeria.

Results from the study revealed that both monocropping and agroforestry are male dominated ventures with a modal age of 21–40 years and household size of 4–6members. Cashew and maize was the dominated crop used for both monocropping and agroforestry. Monocropping farmers earn a revenue of N348640.00 and make N131,008.35 as net profit annually while agroforestry farmers earn a revenue of N398,206.66 and make N200,415.14 as net profit annually. Source of finance and labour type had statistically significant effect on profitability in monocropping system. Likewise, age has a significant effect on the profitability of agroforestry.

Limited supply of inputs, inadequate capital, limited use of machineries, unavailability of labour, land tenure problem, poor access to extension services were the major constraints faced by the respondents in the study area.

In conclusion, the study revealed that agroforestry is highly profitable than monocropping in the study area. It is therefore recommended that solutions should be proffered to the constraints to agroforestry by concerned authorities to make the venture sustainable in meeting food demands all year round.

Keywords: Agroforestry, Efficiency, Marginalized farmers, Collateral, Silvopasture, Carbon sequestration.

INTRODUCTION

Agriculture is a critical sector in the economy of Nigeria, with various farming systems practiced across the country. Two prevalent farming systems in Afijio local government area are agroforestry and monocropping. Agroforestry is an approach that integrates the cultivation of trees with agricultural crops or livestock, providing a more diverse and sustainable farming system. In contrast, monocropping involves the cultivation of a single crop on a large scale, without the inclusion of trees or other vegetation. Agroforestry refers to a sustainable land use system that combines agricultural and forestry practices, where trees are intentionally grown along with crops or livestock to enhance overall production, conserve natural resources, and improve ecosystem services. Agroforestry systems can take various forms, such as alley cropping, silvopasture, and forest farming, depending on specific objectives and site conditions (Montagnini & Nair, 2004). Potential advantages of agroforestry include reducing financial and biophysical risks, improving crop yields or quality, reducing fertilizer or other chemical inputs, improving livestock health, adapting to climate change through more resilient production systems, retaining more land at least partially forested, reducing soil erosion and increasing biodiversity.

Agroforestry offers several advantages over monocropping. Firstly, the inclusion of trees in agroforestry systems provides various environmental benefits such as soil conservation, biodiversity enhancement, and carbon sequestration (Nyanga *et al.*, 2018). This contributes to climate change mitigation and resilience. Secondly, the intercropping of trees and crops in agroforestry systems diversifies farmers' income sources by expanding their product range (Nair, 2018). Moreover, the presence of trees creates microclimates that offer shade and shelter for crops and livestock, reducing the risk of crop failure due to extreme weather conditions (Kandji *et al.*, 2006).

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On the other hand, monocropping has its own advantages, particularly in terms of economies of scale and standardized production (Lal, 2004). Monocropping allows farmers to specialize in a single crop, optimizing production techniques and mechanization. Furthermore, monocropping simplifies harvesting, processing, and marketing processes, which can lead to more efficient and cost-effective operations (Byerlee *et al.*, 2017).

However, monocropping also poses several risks. The lack of diversity in monocropping can make the farming system more vulnerable to pests, diseases, and climate variability (Gliessman, 2014). Additionally, monocropping depletes soil nutrients and can contribute to soil erosion and degradation, reducing long-term agricultural productivity (Montagnini *et al.*, 2016). Meanwhile, agroforestry systems, with their diverse plantings, have the potential to enhance soil fertility and productivity (Schroth *et al.*, 2016). In terms of labour requirement, several studies have examined the labor requirements in agroforestry and monocropping systems. For example, Acheampong (2018) conducted a study in Ghana and found that agroforestry systems require more labor inputs compared to monocropping systems. This is due to the additional tasks such as tree planting, pruning, and maintenance involved in agroforestry. In contrast, monocropping systems often have higher mechanization and therefore lower labor requirements.

Numerous studies have examined the profitability of agroforestry systems compared to monocropping. For instance, Knoke (2005) conducted a comprehensive economic analysis in Germany and showed that agroforestry systems, such as alley cropping and silvopastoral systems can be more profitable than monocropping due to the additional income streams from timber, non-timber forest products, and livestock. Similarly, studies conducted in tropical regions have suggested that agroforestry systems can generate higher profits compared to monocropping due to the diversification of income sources (Garrity *et al;*, 2010; Thomas and Nair, 2004).

A review of the literature indicates that the profitability of agroforestry and monocropping systems can vary depending on factors such as crop species, market conditions, and the inclusion of ecosystem services. For instance, Roshetko and Materne (2019) compared the profitability of agroforestry and monocropping systems in Vietnam and found that while agroforestry systems had the potential for higher profits in the long term; monocropping systems often generated higher short-term returns due to factors such as quicker turnover of crops. Furthermore, agroforestry systems have been shown to have the potential for increased resilience and risk mitigation compared to monocropping. This can result in higher long-term profitability. For example, a study by Luedeling (2014) in Kenya demonstrated that agroforestry systems with diversified income sources were better able to withstand economic shocks, such as fluctuating commodity prices or extreme weather events, compared to monocropping systems.

In contrast, monocropping systems often rely on economies of scale and specialization to maximize profits. Although they may achieve higher yields and lower production costs due to mechanization and simplified management, this narrow focus can lead to increased vulnerability to market fluctuations and environmental risks such as pest outbreaks or crop failures (Pagiola, 2008; Pretty *et al;*, 2001).

Several studies have also examined the costs and benefits associated with agroforestry and monocropping. For example, Sileshi *et al;* (2008) conducted a comparative economic analysis in Ethiopia and found that agroforestry systems provided higher net economic benefits compared to monocropping due to the additional income generated from trees and diversified crops. Similarly, other studies have shown that agroforestry systems can reduce input costs and increase overall farm productivity, leading to higher economic returns compared to monocropping systems (Lamprecht *et al.*, 2012; Akinnifesi *et al.*, 2013).

A review of existing literature suggests that the costs and benefits of agroforestry and monocropping can vary depending on factors such as the crop species, management practices, and market conditions. For instance, Garrity *et al.* (2010) compared the economic viability of agroforestry and monocropping systems in different regions of Africa and found that the profitability of agroforestry systems varied depending on the specific agroecological conditions and demand for tree products.

The ecological functions provided by agroforestry systems, such as soil conservation, water regulation, and enhanced biodiversity, can also have economic benefits. For instance, a study by Perfecto *et al.*, (2009) in coffee agroforestry systems in Costa Rica demonstrated that the presence of shade trees increased coffee yield and quality, leading to higher profits for farmers compared to monocropping. Similarly, other studies have shown that agroforestry systems can enhance ecosystem services and reduce external input costs, further contributing to their economic viability (Akinnifesi *et al.*, 2008; Jose, 2009).

Given the importance of sustainable agricultural practices, understanding the differences between agroforestry and monocropping systems is therefore crucial for maximizing agricultural productivity and minimizing environmental impacts in Afijio local government area. This study therefore aims to provide evidence-based insights to help farmers and policymakers make informed decisions for sustainable agricultural development.

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METHODOLOGY

Study Area

This study was carried out in Afijio Local Government Area, Oyo State, Nigeria. The indigenous people of Afijio Local Government are largely farmers who grow a wide range of agricultural goods such as maize, yam, cassava, groundnut, fruit, cocoa, and oil palm.

Population of the Study

The study population consists of all monocropping and agroforestry farmers in the study area.

Sampling Techniques

The study adopted a three – stage sampling techniques. In the first stage, Afijio Local Government Area noted for large Agroforestry and monocropping farmers in Oyo State, was purposively selected out of four local government areas in Oyo town. In the second stage, 5 communities in the LGA were selected using simple random sampling techniques. In the third stage, farmers in each community were stratified into two: those who are practicing monocropping system and those who are practicing agroforestry system. 8 respondents practicing monocropping and 4 respondents practicing agroforestry system were randomly selected in each of the community. A total sample size of 60 respondents was therefore used for the study.

Data Collection

Primary data collection technique was used for this study. Structured questionnaire and interview was used to obtain data from the respondents. The interview method was adopted to assist farmers who may find it difficult to understand or interpret any of the questionnaire items. Their responses were then recorded in the spaces provided in the questionnaire.

Data Analysis

The researcher analyzed the data using both descriptive and inferential statistics. Descriptive Statistics was employed to describe and present the distribution of variables in the study using percentages, mean and frequency counts. The partial budget approach was also used to compare the costs and returns to mono-cropping and agroforestry system through the computation of gross margin. Gross Margin (GM) is defined as the difference between total revenue and total variable cost. *Mathematically, it is usually expressed as;*

$$\mathbf{GM = TR - TVC}$$

Profitability ratio = GM /TC

Efficiency ratio = TR/TC

Where

GM = *Gross Margin*

TR = Total Revenue

TVC =Total Variable Cost

TC = Total cost

REGRESSION ANALYSIS

Multiple linear regression models were used to assess the main determinants of profitability of monocropping and agroforestry in the study area. Multiple linear regression was chosen for its ability to handle multiple predictors, its flexibility in including different types of variables, its capacity to adjust for confounders, and its robustness in statistical testing, making it an ideal choice for analyzing the determinants of profitability in agricultural systems like monocropping and agroforestry.

Mathematically, *it is usually expressed as;*

$Y = f(X_1, X_2, X_3, X_4, X_5, X_6 + \boldsymbol{\mu}_i)$

a = constant

Y = Gross Margin in Naira

X_1= Age (years)

X_2= Farming experience

X_3= Method of land acquisition

X_4= Source of finance

X_5= Labour type

X_6= Number of harvest

$\boldsymbol{\mu}_i$ =Stochastic error term

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PRESENTATION OF RESULTS

Socio-demographic Characteristics of the Respondents

Table 1 show that all the respondents were male. Gender has been found to have a significant impact on farming practices and outcomes. Research shows that women farmers often face gender-specific challenges, including limited access to resources such as land, credit, and inputs (FAO, 2011). This may be the reason why women are not dominant in the study area. Table 1 also shows the respondents age range. Findings indicate that 66.70% of the respondents were between 21-40, 33.30% between the 41-60, this implies that majority of the respondents were between the age of 21-40 years. Age has been recognized as a critical factor in farming, as it can influence farmers' knowledge, skills, and ability to adapt to changing circumstances. Research suggests that younger farmers may be more open to adopting new technologies and practices, while older farmers may rely on traditional methods (Liu *et al.*, 2014). Age-related issues such as retirement and succession planning can also affect farming practices (Bell *et al.*, 2015).

The table also shows the respondents marital status; married respondents were 76.70% while 23.30% were single. Marital status can impact farming practices through various mechanisms. For instance, studies have shown that married farmers may have access to additional labor, resources, and social networks through their spouses. Conversely, single farmers may face challenges related to labor availability and decision-making processes (Dercon and Krishnan, 2000). About 46.70% had a household size of 1-3 persons.

Findings also indicate that 16.70% of the respondents had no formal education, 23.30% have primary education, 43.30% have secondary education. Education has been widely recognized as a key determinant of farming practices and outcomes. Research indicates that higher levels of education are associated with greater adoption of sustainable agricultural practices (Mdemu *et al.*, 2020). Educated farmers may have better access to information, technology, and market opportunities, leading to increased productivity (Blackie *et al.*, 2013). In addition, 16.70% had farming experience of 1-5 yeras, 16.70% had farming experience of 6-10 yers, 20.00% had farming experience of 11-15 years, 46.70% had above 15 years of farming experience. The influence of farming experience on practices and outcomes is well-documented. Research suggests that experienced farmers tend to have higher levels of technical knowledge, better decision-making skills, and greater resilience in the face of challenges (Matin *et al.*, 2017). However, experience alone may not guarantee success, as farmers also need access to resources and support services (Larochelle *et al.*, 2018).

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Table 1: Socio-demographic Characteristics of the Respondents

Variables	Frequency	Percentage (%)
Gender		
Male	60	100.00
Total	100	100.00
Age Range		
21 – 40	40	66.70
41 – 60	20	33.30
Total	60	100.00
Marital Status		
Single	14	23.30
Married	46	76.70
Total	60	100.00
Household Size		
1 – 3	20	33.30
4 – 6	40	66.70
Total	60	100.00
Qualification		
No formal education	10	16.70
Primary education	14	23.30
Secondary education	26	43.30
Tertiary education	10	16.70
Total	60	100.00
Farming Experience		
1 – 5 years	10	16.70
6 – 10years	10	16.70
11 – 15years	12	20.00
Above 15years	28	46.70
Total	60	100.00
Farm Size (acre)		
1 – 5	40	66.70
6 – 10	18	30.00
11 – 15	02	3.30
Total	60	100.00

Source: Field Survey, 2023.

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Production Characteristics of the Respondents

Table 2 shows that 50.00% of the respondents were maize farmers; 43.30% of the respondents were cassava farmers while 6.70% of the respondents plant other crops. The choice of crop grown has a significant impact on farming outcomes. Research indicates that different crops have varying requirements in terms of soil, water, and climate, and thus the choice of crop can influence agricultural production and profitability (Ejeta *et al.*, 2016). Findings also indicate that 10.00% inherited their farmland, 6.70% purchased the land while 83.30% borrowed the land. The land tenure system also plays a crucial role in farming practices and outcomes. The ownership, rental, or lease system affects farmers' incentives to invest in land improvements, adopt sustainable practices, and take risks. Also, 73.30% were collecting credit to finance their farm while 26.70% were using their personal saving to finance their farm. The table also shows the respondent labour type, majority (80.00%) use hired labour.

Table 2: Production Characteristics of Mono-cropping Farmers

Variables	**Frequency**	**Percentage**
Crop for Monocropping		
Maize	15	50.00
Cassava	13	43.30
Others	02	6.7
Total	30	100.00
Method of Land Acquisition		
Inheritance	03	10.00
Purchase	02	6.70
Borrowed	25	83.30
Total	30	100.00
Source of Finance		
Credit	22	73.30
Personal Savings	08	26.70
Total	30	100.00
Labour Type		
Hired labour	24	80.00
Family labour	06	20.00
Total	30	100.00

Source: Field Survey, 2023.

Table 3 shows that 23.30% of the respondents practice cocoa agroforestry, 50.00% practice cashew agroforestry, 2.0% of the respondents practice oil palm agroforestry while 6.70%

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practice agroforestry with other tree crops. Findings also revealed that 43.30% of the respondents inherited their farmland, 33.30% purchased the land, 3.30% borrowed the land while 20.00% acquired their land through leasehold land tenure system. Research has shown that secure land tenure rights are associated with increased productivity, as farmers have the confidence to invest in land and make long-term plans for sustainable agriculture (Deininger *et al.*, 2011). In contrast, insecure land tenure can lead to decreased investments and limited access to credit and infrastructure (Place *et al.*, 2014). 76.70% were using credit to finance their farm, and 23.30% were using their personal saving to finance the farm (Table 3). Access to credit facilities is critical for farmers to invest in agricultural inputs, machinery, and technology. Research has consistently shown that farmers with access to credit have higher agricultural productivity, income, and investment in improved farming practices (Alemdar and Eaton, 2017). However, lack of access to credit is a challenge for many farmers, particularly small-scale and marginalized farmers, who often lack the collateral, information, and financial literacy required to secure credit (Zeller *et al.*, 2017). Improving access to credit facilities and financial inclusion is crucial to support sustainable farming practices and income generation in agricultural communities. Table 3 also shows the respondents' labour type; 86.70% hire labour for their work at farm while 13.30% uses their family for their work at farm. The type of labour utilized in farming can greatly impact productivity and efficiency. Research has shown that the use of family labour can be beneficial for small-scale farmers, as it reduces labour costs and fosters a sense of ownership and commitment to the farm (Kijima *et al.*, 2010). However, access to hired labour or mechanization can also improve productivity and efficiency, particularly for larger scale farmers who have access to capital and resources (Heering *et al.*, 2018).

Table 3: Production Characteristics of Agroforestry Farmers.

Variables	Frequency	Percentage
Crop for Agroforestry		
Cocoa	07	23.30
Cashew	15	50.00
Oil Palm	06	20.00
Others	02	6.70
Total	30	100.00
Method of Land Acquisition		
Inheritance	13	43.30
Purchase	10	33.30
Borrowed	01	3.30
Leasehold	06	20.00
Total	30	100.00

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Source of Finance		
Credit	23	76.70
Personal savings	07	23.30
Total	30	100.00
Labour Type		
Hired labour	26	86.70
Family labour	04	13.30
Total	30	100.00

Source: Field Survey, 2023.

Comparative Profitability of Monocropping and Agroforestry

Table 4 revealed that hired machineries constituted the largest part of the variable cost of monocropping system while labour cost constituted the highest variable cost of agroforestry system per annum. This implies that machineries was the important factor in production process of monocropping, and in agroforestry labour was the most important factor in production process of agroforestry system,. This may be because of the limited usage of farm machineries in agroforestry systems. The result shows that the cost of production of mono-cropping is higher (#217,631.65) compared to agroforestry production (#197,791.52). Consequently, agroforestry production system has a gross margin of #200,415.14 while monocropping has a gross margin of #131,008.35. It means that both monocropping and agroforestry production are profitable ventures in the study area. However, agroforestry farming system is more profitable (Fig. 1). However, agroforestry farming system is more profitable. This finding agrees with Lasco *et al.*, (2008) and Roshetko *et al.*, (2012) that agroforestry can improve farm productivity and generate higher incomes for farmers compared to mono-cropping systems.

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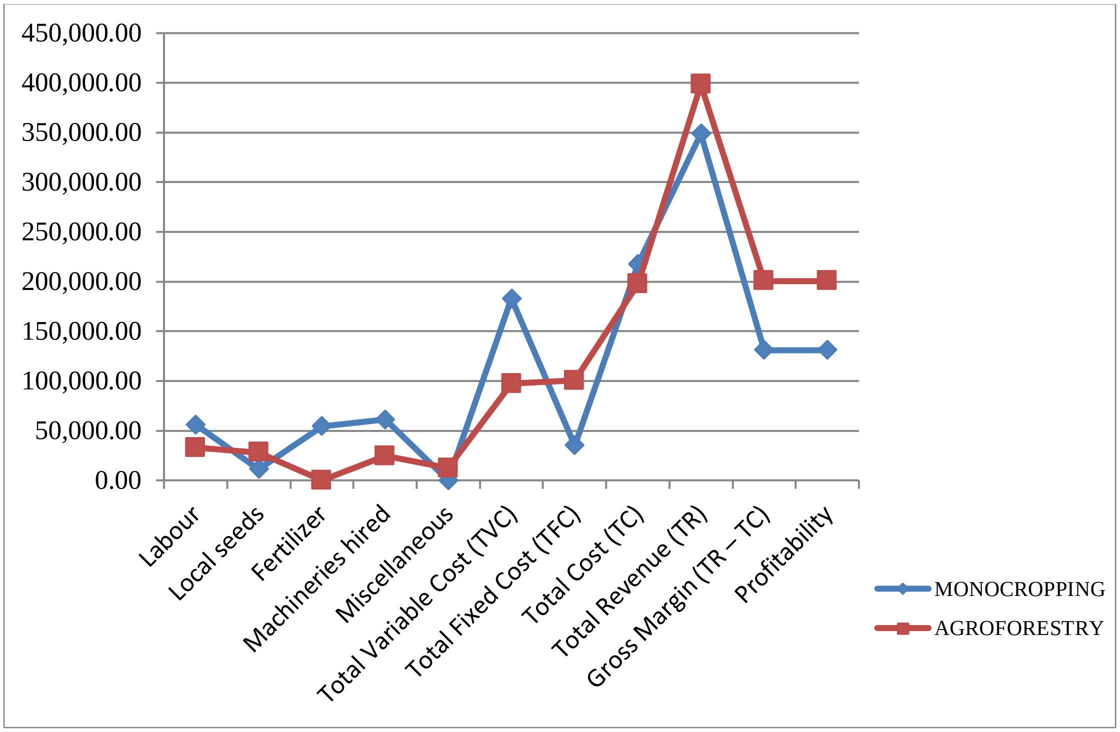

Figure 1: Comparative profitability of monocropping and agroforestry.

Table 4: Comparative Profitability of Monocropping and Agroforestry

Item Cost	Monocropping	Agroforestry
Variable Cost		
Labour	55,843.33	32,738.46
Local seeds	11,116.66	27,853.33
Fertilizer	54,464.29	0.00
Machineries hired	61,285.71	24,461.59
Miscellaneous	0.00	12,166.66
Total Variable Cost (TVC)	182,709.99	97,220.04
Total Fixed Cost (TFC)	34,921.66	100,571.48
Total Cost (TC)	217,631.65	197,791.52
Total Revenue (TR)	348,640.00	398,206.66
Gross Margin (TR – TC)	131,008.35	200,415.14
Profitability	131,008.35	200,415.14

Source: Authors' Computation, 2023.

Factors Influencing Profitability

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Table 5 shows that out of six variables modeled, variables such as age range and number of harvest have positive but not statistically significant effect on profitability of monocropping in the study area. The coefficient associated with source of finance and labour type in the linear regression function was -640464.271 and 253061.048 respectively and had statistically significant effect on profitability of mono-cropping at $P < 0.10$.

Table 5: Estimate the Factors Influencing the Profitability of Monocropping

Variables	Unstandardized Coefficients		T	Sig.
	B	Std. Error		
(Constant)	-551521.989	311716.510	-1.769	0.100
Age Range	250755.153	173830.048	1.443	0.173
Farming Experience	-47777.649	36927.689	-1.294	0.218
Method of land acquisition	70856.111	41988.973	1.687	0.115
Source of finance	-640464.271	224254.228	-2.856	0.014
Labour type	253061.048	120540.501	2.099	0.056
Number of harvest	45706.677	37256.533	1.227	0.242
R^2	0.649			
Adjusted R^2	0.380			
F	0.649			

Source: Authors' Computation, 2023.

Table 6 shows that out of (6) six variables modeled, variables such as farming experience, labour type and number of harvest have positive but not statistically significant effect on profitability of agroforestry in the study area. The co-efficient associated with age range in the linear regression function was 1528.483 had statistically significant effect on profitability of agroforestry at $P < 0.10$. Beside these factors, economic viability of agroforestry and monocropping systems can vary depending on factors such as scale, context, crop species and market conditions according to Rahman *et al.*, (2018) and Pagiola (2008).

Table 6: Factors Influencing the Profitability of Agroforestry Production

Variables	Unstandardized Co-efficient		T	Sig.
	B	Std. Error		
Constant	127733.240	549879.192	0.232	0.819
Age Range	1528.483	83556.394	0.018	0.098
Farming experience	60943.832	35537.601	1.715	0.105
Method of land acquisition	-7804.072	26442.500	-0.295	0.771
Source of finance	-110183.471	97815.942	-1.126	0.276
Labour type	15689.226	97772.405	0.160	0.874
Number of harvest	24433.493	80556.479	0.303	0.765
R^2	0.298			
Adjusted R^2	-0.198			
F	0.601			

Source: Authors' Computation, 2023.

Problems Militating against Agroforestry

Table 7 shows that items 1,2,3,4,5 and 6 are accepted at X ≥ 3.10 to be true by the farmers as the problem militating against agroforestry production. This indicate that limited supply of inputs, inadequate capital, limited use of machineries, unavailability of labour, land tenure problem, poor access of extension services, other constraints such as short growing nature of trees, poor soil fertility, poor access to credit, fast growing nature of trees. The limited availability of inputs, such as seeds, seedlings, fertilizers, and agrochemicals, can hinder agroforestry adoption and practices (Franzel *et al.,* 2018). Farmers may struggle to access quality inputs that are suitable for specific agroforestry systems, limiting their ability to establish and maintain trees within their farms. Insufficient capital is also a common problem faced by farmers, particularly smallholders, in adopting agroforestry practices. The establishment and management of agroforestry systems often require initial investments in inputs and labor (Mekonnen *et al.,* 2019). Limited access to credit or finance options can impede farmers' ability to invest in these practices. Also, the use of machinery can enhance efficiency and productivity in agroforestry systems. However, the limited availability and affordability of machinery in many smallholder contexts restricts their use in establishing and managing tree-based systems (Roshetko *et al.,* 2015). This reliance on manual labor can increase the time and cost involved in agroforestry practices.

The unavailability of labor is also a significant constraint in adopting and practicing agroforestry. Many rural areas experience labor migration, with young people leaving for urban areas or other sectors, such as construction or service industries. This limits the availability of labor for agricultural activities, including agroforestry practices (Njuki *et al.,* 2017). In addition, land

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tenure issues also pose significant challenges for agroforestry adoption and practices. Insecure land tenure can discourage farmers from making long-term investments in agroforestry, as they may fear losing control over their land (Franzel *et al.*, 2018). Unclear property rights and insecure tenure arrangements can limit farmers' incentives to invest in tree planting and management. Access to extension services is vital for farmers to acquire the knowledge and skills necessary for successful agroforestry practices. However, many smallholder farmers have limited access to extension services due to inadequate infrastructure, resource constraints, and limited extension staff (Mekonnen *et al.*, 2019). This lack of extension support can hinder the adoption and proper implementation of agroforestry techniques.

Table 7: Problems Militating against Agroforestry Adoption and Practice

S/N	Problems	VS	S	MS	LS	NS	Total	Mean	Std. Dev.	Re-mark
1.	Limited supply of inputs	10	10	5	3	2	30	3.76	1.22	Accepted
2.	Inadequate capital	12	5	5	5	3	30	3.60	1.42	Accepted
3.	Limited use of machineries	6	15	1	5	3	30	3.53	1.27	Accepted
4.	Unavailability of labour	9	8	3	8	2	30	3.46	1.35	Accepted
5.	Land tenure problem	14	0	1	8	7	30	3.20	1.76	Accepted
6.	Poor access extension services	3	10	6	9	2	30	3.10	1.15	Accepted
7.	Short growing nature of trees	0	1	17	11	1	30	2.60	0.60	Rejected
8.	Poor soil fertility	7	2	0	6	15	30	2.33	1.68	Rejected
9.	Poor access to credit	0	5	2	19	4	30	2.26	0.90	Rejected
10.	Fast growing nature of trees	0	5	3	13	9	30	2.13	1.04	Rejected

Source: Field Survey, 2023.

CONCLUSION AND RECOMMENDATIONS

From the evidence gathered, monocropping and agroforestry farming systems are both profitable but agroforestry is the most profitable in the study area. This can be attributed to the economic and ecological efficiencies of agroforestry systems. These systems integrate multiple plant and sometimes animal species, reducing the need for costly inputs like fertilizers and pesticides due to natural pest control and enhanced soil fertility. Additionally, agroforestry provides multiple income streams from various crop and tree products, increasing overall profitability (Lasco *et al.*, 2008; Roshetko *et al.*, 2012). Studies from regions like Mizoram, India, and South Ethiopia have demonstrated that agroforestry not only optimizes resource use but also offers greater economic resilience against market and environmental fluctuations compared to monocropping (Lalriliana, 2017; Anshiso, Woldeamanuel and Asfaw, 2017).However, the major constraints to the adoption and practice of agroforestry in the study area are including but not limited to limited supply of inputs, inadequate capital, limited use of machineries, unavailability of labour, land tenure problem, poor access of extension services, other constraints such as short growing nature of trees, poor soil fertility, poor access to credit and fast growing nature of trees.

Therefore, based on the findings of the study the following recommendations are made:

i. Future researchers should evaluate the risk profiles and resilience of both systems. Such researches should answer questions like how do monocropping and agroforestry systems differ in their vulnerability to climate variability and extreme weather events?, what are the economic risks associated with monocropping and agroforestry systems under fluctuating market conditions and climate change scenarios?, how does biodiversity within monocropping and agroforestry systems impact their resilience to pest outbreaks and disease spread?, what are the social and cultural factors influencing the adoption and sustainability of monocropping versus agroforestry systems?, and how do water management practices differ between monocropping and agroforestry systems, and what are their implications for system resilience during water scarcity?. Assessing the risk and resilience factors will provide a holistic understanding of the economic sustainability of agroforestry compared to monocropping.

ii. Interdisciplinary research approaches and methodologies that integrate economic, ecological, and social analyses essential for a holistic comprehension of agroforestry systems should be considered in future researches.

iii. Involve farmers, extension agents, and relevant stakeholders in the analysis to gain practical insights on the economic aspects of agroforestry and monocropping. This can be achieved creating tailored engagement strategies that consider the unique perspectives and needs of each stakeholder, establishing platforms or forums where stakeholders can share their knowledge and experiences, engaging stakeholders directly in the research process to ensure that the findings are relevant and beneficial to all parties involved, establishing mechanisms for ongoing feedback from stakeholders to continuously improve the engagement process and the agricultural practices being analyzed and using the insights gained from stakeholder engagement to inform policy development and advocacy efforts.

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iv. Agricultural policies should be designed to lower the barriers to agroforestry adoption by addressing transaction costs and profitability concerns. This could involve providing incentives for agroforestry practices, such as subsidies or technical assistance, to offset the initial costs and management complexities associated with these systems.

v. Additionally, policies should consider the role of agroforestry in climate change adaptation and mitigation, as it can contribute to carbon sequestration and provide a buffer against climate variability.

vi. In practice, farmers should be encouraged to adopt agroforestry systems that are tailored to their specific environmental and socio-economic contexts. This includes integrating suitable tree species that do not excessively compete with crops for light.

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