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ADOPTION OF ORGANIC AGRICULTURAL PRACTICES AMONG SMALLHOLDER CROP FARMERS IN IBARAPA AGRICULTURAL DEVELOPMENT ZONE OF OYO STATE NIGERIA

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Abstract

Organic farming remains a major way to enhance sustainable agricultural production however the adoption of the different organic agricultural practices varies due to various constraints. In this study, adoption of organic agricultural practices among smallholder farmers was assessed using primary data collected with the aid of well-structured questionnaire. Data were analyzed using descriptive statistics such as mean, frequency and percentages; composite score analysis and chi-square analysis. The results revealed that majority of farmers were male (76.00%), married (72.00%) with no formal education (78.87%) and an average age of 41.67±8.27years. Higher percentage of the farmers had an average of 2±1 production cycle per year with an average income of ₦173,820±64,956.40 per production cycle. The most adopted organic agricultural practice among farmers was tillage (78.00%) while the least adopted practice was planting of cover crops (43.33%). More than 75% of the farmers fell into the moderate adoption category while about 11% and 12% of the farmers fell in the low and high adoption categories respectively. Age, education and income of farmers significantly influenced the level of adoption of organic agricultural practices. The three major constraints associated with adoption of organic agriculture practices identified in the study were lack of credit facilities/intervention funds; inadequate markets for organic products and inadequate supporting infrastructure. The study thus recommended that there should be more enlightenments in terms of training, knowledge sharing and extension education on the benefits of adoption of these practices especially among older and low-income farmers.

Keywords: Adoption, organic agriculture, organic practices, smallholder farmers, tillage

INTRODUCTION

Agriculture in Nigeria is characterized with heavy reliance on chemicals and synthetic inputs that poses numerous challenges such as water pollution, land degradation, climate impact, negative health outcomes and many other menaces (Sanchi et al., 2022). Policy makers and relevant stakeholders have been raising concerns on the depletion of finite resources and related consequences that has persisted due to continued use of unsustainable farm systems by smallholder farmers that play a crucial role in food security in developing countries. (Azadi et al., 2015; Tscharntke et al., 2012). Organic farming has been identified as one of the several approaches to meet the objectives of sustainable development of agriculture.

The International Federation of Organic Agricultural Movement (IFOAM) defines organic farming as "a production system that sustains the health of soils, ecosystems and people. The practice relies on ecological processes, biodiversity, and cycles adapted to local conditions rather than using inputs with adverse effects. It combines tradition, innovation, and science to benefit the shared environment and promote fair relationships and good quality of life for all involved (IFOAM, 2021). There has been a tremendous awakening to the negative impact of conventional farming system and it has become crucial to mitigate these effects as the continued use of unsustainable farming system would no longer be an option if the issues of climate change, land degradation, biodiversity loss, human health issues, and more need to be addressed (FAO, 2018).

Organic farming plays a key role in realizing the different sustainable agricultural goals. This is because the practices do not only provide sufficient food but also ensures environmental and natural resource benefits by limiting the use of non-renewable resources and external inputs, thereby ensuring the sustainability of the livelihoods of farmers and their communities over time (Schreer and Padmanabhan, 2020). Conventional agriculture which is mostly practice by farmers have been associated with problems such as biodiversity loss,

nitrate pollution, animal welfare concerns, food safety among others. Lapple and Van Rensburg (2011) opined that organic farming offers solutions to some of the problems associated with convectional agriculture.

According to the Food and Agriculture Organization of the United Nations (FAO, 2023), Organic farming offers several benefits over conventional farming practices such as biodiversity, environmental sustainability, health and safety, economic benefits, and climate change mitigation. Singh (2021) asserted that organic farming has been proven to be environmentally friendly because it enhances the reuse of farm and household products as organic fertilizer. This fertilizer type does not only improve the physical and chemical characteristics of the soil but also reduces the risk of global warming and chemical residues in food, enhances plant growth and physiological activities, allows for healthier farmworkers, protects biodiversity, reduces groundwater pollution, produces optimal conditions for high yields and good quality crops and helps combat erosion (Meemken and Qaim, 2018).

Several studies have affirmed that organic farming can also be a viable alternative to conventional arable farming in terms of yields and profitability (Langemeier et al., 2020; Suwanmaneepong et al., 2020). Different scientific disciplines have increasingly strived to configure ways through which the adoption of organic practices will not only help in reducing the impact of climate change but also help to reverse the negative climate change effects that we have experienced over the past decades (Swenson and Conbere, 2021; Zanoli et al., 2019; Alexander-Bloch et al., 2016).

The adoption of organic agricultural practices is crucial for ensuring food security, environmental sustainability, and human health as conventional agricultural practices have been linked to soil degradation, water pollution, and loss of biodiversity (Sanchi et al. 2022). In addition, organic agriculture promotes soil health, conserves water and preserves ecosystem services. Moreover, organic produce has been shown to have higher nutritional value and lower pesticide residues than conventionally grown produce (Meemken and Qaim, 2018). Therefore, organic farming has been recognized as an essential means of mitigating the effects of conventional farming, achieving sustainable agriculture and food security through the Sustainable Development Goals (SDGs).

In spite of these obvious benefits, many arable crop farmers still rely on agrochemicals. They do not take deliberate actions regardless of the global awareness of climatic change and environmental degradation that might arise from the constant practice of inorganic farming coupled with the risk it constitutes to sustainable agriculture. In light of the foregoing, it becomes imperative to assess the adoption of organic agricultural practices among smallholder crop farmers in Ibarapa Agricultural Zone of Oyo State, Nigeria. The broad objective of the study was to assess adoption of organic agricultural practices among small holder crop farmers in Ibarapa Agricultural Zone of Oyo state Nigeria. The specific objectives were to:

i. identify the various types of organic agricultural practices adopted by the farmers;
ii. examine the level of adoption of organic agricultural practices among the farmers;
iii. analyze the difference between level of adoption of organic agricultural practices and selected socio-economic and enterprise characteristics of farmers; and
iv. describe the constraints associated with the adoption of organic agricultural practices among the farmers.

MATERIALS AND METHODS

Study area

The study was conducted in Ibarapa zone of Oyo State. Ibadan-Ibarapa is one of the four agricultural development zones in Oyo State. The state covers approximately an area of 28,454 km2 with an estimated population of 5,591,589 people (NPC, 2006). Oyo State is one of the 36 states of the Federal Republic of Nigeria. It is located in the south west geo-political zone and has an equatorial climate with dry and wet seasons and relatively high humidity. It is an inland state in South-Western Nigeria. It bounded in the north by Kwara State, in the east by Osun State and the south by Ogun State. The agricultural zones of the state were notably known for cultivation of crops such as cassava, yam, maize, vegetables, tree crops etc.

Method of data collection and sampling procedure

Data for the study were collected with the aid of a well-structured questionnaire. Information was collected on socio-economic characteristics of farmers, enterprise characteristics of farmers, types organic agricultural practices adopted, frequency of use of the practices and the constraints associated with adoption of organic agricultural practices. As regards selection of sample, multi-stage sampling technique was used to select sample for the study. In the first stage, Ibarapa Agricultural Development Programme zone was purposively selected out of the four (4) ADP zones in Oyo state due to the predominance of farming activities in the zone. In the second stage, Ibarapa has seven principal towns and out of which three towns were randomly selected, the selected towns were Lanlate, Eruwa and Igboora. In the third stage, five communities/villages were randomly selected in each town and lastly ten crop farmers were

randomly selected in each community/villages making a total of 150 crop farmers for the study.

Analytical technique

Descriptive statistics such as frequency, mean and percentage were used to describe the socio economic and enterprise characteristics of the farmers. The method was also used to identify the types of organic agricultural practices adopted by the crop farmers and identify the constraints associated with the adoption of organic agricultural practices among the crop farmers. Composite score analysis which is the use of single score derived from multi-information by adding all the ratings together, was used to assess the level of the adoption of organic agricultural practices among the crop farmers. Farmers were categorized into three levels of adoption namely: low adoption category, moderate adoption category and high adoption category. To measure the level of adoption a farmer belongs to, farmers were asked whether they adopted any of the 13 indicators of organic agricultural practices used in the study. The score was calculated by summing up the Yes/No responses of the farmers as regards the adoption of any of the 13 organic agricultural practices used in this study. A binary scale that scores 1 for farmers with "Yes" and 0 for farmers with "No" was used. With 13 indicators, the maximum obtained score was 13 and a minimum of 0 score. The mean score and standard deviation were 8 and 3 points respectively. The categorization into low, moderate and high adoption was then achieved by categorizing farmers with 0-5points as having low adoption, farmers with 6-10points as having moderate adoption while farmers with 11-13points were categorized as having high adoption. The indicators of organic agricultural practices used in the study are presented in Table 1.

Chi-square analysis was used to test for significant difference between level of adoption of organic agricultural practices and selected socio-economic and enterprise characteristics of the farmers.

Table 1: Indicators of organic agricultural practices used in the study

Indicators	Response
Tillage	Yes; No
Crop Rotation	Yes; No
Farm Sanitation	Yes; No
Intercropping System	Yes; No
Bush Fallowing System	Yes; No
Use of Organic Fertilizer	Yes; No
Mulching	Yes; No
Use of Natural Pesticide	Yes; No
Use of biocontrol system	Yes; No
Planting of Cover crops	Yes; No
Use of Green Manure	Yes; No
Use of Animal Manure	Yes; No
Use of Integrated Management System	Yes; No

RESULTS AND DISCUSSION

Socio-economic characteristics of farmers

The socio-economic characteristics of farmers are presented in Table 2. Over 75% of the farmers were male within the age group of 31-50years and an average age of 41.67±8.27years. This implied that the farmers were in their active working age. The domination of male in farming activities had been attributed to the use of strength and energy in performing farm operations and major ingredients for successful agricultural operations tend to favour male farmers than female farmers as male and female farmers operate under dramatically different conditions in Nigeria. Bello et al. (2021) also affirmed that men are actively engaged in farming as their primary source of livelihood as compare to women in Nigeria. Majority of the farmers were married (72.00%) with no formal education (78.87%). Marriage is hold into high esteem in most agrarian communities and no adult is considered responsible without it. This finding is in tandem with the result of Muhammad et al. (2024). Education has been recognized as an important ingredient in aiding adoption of natural resource management technologies such as organic agricultural practices (Kirui and Njiraini, 2019). Almost 60% of the farmers had 4-6 persons in their households and an average household size of 4±2persons. This is contrary to the findings of Muhammad et al. (2019). More than half of the farmers were Christians (55.40%) and Yoruba by tribe (61.30%).

Enterprise characteristics of farmers

The enterprise characteristics of the farmers presented in Table 3 revealed that 72% of the farmers surveyed were involved in vegetable production. Over 50% of the farmers were involved in maize production. Almost half of the farmers were involved in cassava production. About 41% and 28% of the farmers were involved in yam and plantain production. Less than 20% of the farmers were involved in the production of tree crops while about 25% of the farmers were involved in the production of other crops such as cucumber, watermelon, soybeans, potatoes, millet, sorghum etc. Almost 65% and 35% of the farmers cultivated less than two acres and greater than two acres of land respectively. The average acres of land cultivated by the farmers were 2.39±1.26acres. This implies that all the farmers considered in the study are smallholders. This is not surprising as Mbenkah and Mbah (2016) asserted that 80% of farmers in Nigeria are considered smallholders because they own less than 5 hectares of land. Majority of the farmers had 1-3 production cycles per year with an average of ₦173,820±64,956.40 income per production cycle. Anderson et al (2017) affirmed that income from the farming activities enables farmers to provide

monthly needs of their families despite the fact that majority of them live below the poverty line.

Table 2: Socio-economic characteristics of the farmers (N=150)

Variable	Frequency	Percentage
Sex of Farmers		
Male	114	76.00
Female	36	24.00
Age of Farmers		
20 – 30	18	12.00
31 – 40	60	40.00
41 – 50	54	36.00
>50	18	12.00
Mean	41.67±8.27	
Marital Status		
Single	26	17.30
Married	108	72.00
Widowed	16	10.70
Educational Status		
No Formal Education	118	78.87
Primary	5	3.33
Secondary	24	16.00
Tertiary	3	2.00
Household Size		
1 – 3	52	34.70
4 – 6	89	59.30
7 – 9	8	5.30
Mean	4±2	
Religion		
Christian	83	55.40
Muslim	56	37.30
Traditional	11	7.30
Ethnicity		
Yoruba	92	61.30
Igbo	25	16.70
Hausa	33	22.00

Table 3: Enterprise Characteristics of the Farmers (N=150)

Variable	Frequency	Percentage
Type of Crop Grown****		
Vegetable	108	72.00
Plantain	42	28.00
Tree crops	27	18.00
Maize	84	56.00
Cassava	72	48.00
Yam	61	40.70
Others	37	24.70
Areas of Land Cultivated (Acres)		
<=2	97	64.67
>2	53	35.33
Mean	2.39±1.26	
Production Cycle per Year		
1 – 3	134	89.30
4 – 6	16	10.70
Mean	2±1	
Income per production Cycle (₦)		
20,000 – 50,000	5	3.36
50,001 – 100,001	31	20.81
100,001 – 150,000	43	28.86
150,001 – 200,000	46	30.87
>200,000	24	16.11
Mean	173,820±64,956.40	

Types of organic agricultural practices adopted by farmers and frequency of use of the practices

The types of organic agricultural practices adopted by farmers and frequency of use of such practices were presented in Table 4. Over 70% of the farmers adopted tillage (78.00%) and use of animal manure (72.00%). More than 60% of the farmers adopted crop rotation (68.67%); use of natural pesticides such as spraying neem leaf solution (68.00%); use of organic fertilizer (67.33%); farm sanitation (66.33%) and integrated management system (65.33%). More than 50% of the farmers adopted mulching (58.00%); use of green manure (55.33%); biocontrol system (54.67%) and bush fallowing (52.00%). It was also revealed that over 40% of the farmers adopted intercropping system (46.00%) and planting of cover crops (43.33%). The three top adopted organic agricultural practices adopted by farmers in the study area were tillage, use of animal manure and crop rotation while the least adopted organic agricultural practice was planting of cover crops. The high adoption of tillage among the farmers may be due to the benefits of tillage in aerating the soil to permit moisture and air to permeate allowing seeds to germinate, encouraging root growth, controlling weed growth and integrating fertilizers into the soil (Malheur Experiment Station, 2022). The high utilization of crop rotation among farmers was also reported by Fanu *et al.* (2024).

In terms of frequency of use among farmers that adopted one or more organic agricultural practices, over 75% of the farmers used tillage frequently. More than 50% of the farmers frequently used animal manure (59.26%); farm sanitation (58.00%); organic fertilizer (57.43%); intercropping system (56.52%); crop rotation (54.37%); green manure (54.22%); integrated management system (52.04%) and natural pesticide (51.96%). Less than 45% of the farmers frequently used bush fallowing (42.31%); biocontrol system (41.46%) and planting of cover crops (36.92%). The most frequently used organic agricultural practices among farmers that adopted one or more organic agricultural practices was tillage while the least frequently used was planting of cover crops. The high frequency of use of tillage may also be associated with the numerous benefits attached to the use of the practice.

Level of adoption of organic agricultural practices among farmers

The level of adoption of organic agricultural practices among farmers was presented in Table 5. Over 70% of the farmers fell in the moderate adoption level while about 11% and 12% of the farmers fell in the low and high levels of adoption. This implied that majority of farmers in the study areas adopted one or more organic agricultural practices. This is not surprising as more farmers are aware of the benefits of use of organic agricultural practices (Fanu *et al.*, 2024).

Table 4: Types of organic agricultural practices adopted by farmers and frequency of use

Types of Practices Adopted by the Farmers		Frequency of Use of Practices		
Variable	**Freq/ Percent (Yes)**	**Frequently**	**Often**	**Seldomly**
Tillage	117 (78.00)	89 (76.07)	21 (17.95)	7 (5.98)
Crop Rotation	103 (68.67)	56 (54.37)	36 (34.95)	11 (10.68)
Farm Sanitation	100 (66.67)	58 (58.00)	32 (32.00)	10 (10.00)
Intercropping System	69 (46.00)	39 (56.52)	22 (31.88)	8 (11.59)
Bush Fallowing System	72 (52.00)	33 (42.31)	26 (33.33)	19 (24.36)
Use of Organic Fertilizer	101 (67.33)	58 (57.43)	34 (33.66)	9(8.91)
Mulching	87 (58.00)	32 (36.78)	38 (43.68)	17 (19.54)
Use of Natural Pesticide	102 (68.00)	53 (51.96)	32 (31.37)	17 (16.67)
Use of biocontrol system	82 (54.67)	34 (41.46)	29 (35.37)	19 (23.17)
Planting of Cover crops	65 (43.33)	24 (36.92)	24 (36.92)	17 (26.15)
Use of Green Manure	83 (55.33)	45 (54.22)	30 (36.14)	8 (9.64)
Use of Animal Manure	108 (72.00)	64 (59.26)	31 (28.70)	13 (12.04)
Use of Integrated Management System	98 (65.33)	51 (52.04)	30 (30.61)	17(17.35

Figures in parenthesis ( ) are percentages
Source: Field Survey, 2023.

Level of adoption of organic agricultural practices across selected socio-economic characteristics

The level of adoption of organic agricultural practices across selected socio-economic characteristics was presented in Table 6. Higher percentage of farmers in the low adoption category were male (68.75%) that are over 30years of age (93.75%) with no formal education (75.00%) and household size of four and above (67.75%). A significant difference was observed between the age

of the farmers and their level of adoption of organic agricultural practices.

Table 5: Level of adoption of organic agricultural practices among farmers

Level of Adoption	Frequency	Percentage
Low	16	10.67
Moderate	116	77.33
High	18	12.00

Source: Field Survey, 2023.

This corroborated with the findings of Lapple and Van Rensburg (2011) who reported that age played a significant role in the adoption and non-adoption of organic farming. There was also a significant difference between the educational status of farmers and level of adoption of organic agricultural practices. This finding was corroborated with report of Mu and Jones (2024) who reported that education has a positive significant impact on adoption of agricultural technology.

Table 6: Level of adoption of organic agricultural practices across selected socio-economic characteristics of farmers

Variable	Level of Adoption of Organic Agricultural Practices (%)		
	Low	**Moderate**	**High**
Sex			
Male	68.75	75.00	88.89
Female	31.25	25.00	11.11
χ^2		2.1640	
Age of Farmers			
20 – 30	6.25	14.66	0.00
31 – 40	43.75	41.38	27.78
41 – 50	25.00	32.76	66.67
>50	25.00	11.21	5.56
χ^2		12.5816**	
Educational Status			
No Formal Education	75.00	82.76	55.56
Primary	6.25	2.59	5.56
Secondary	12.50	12.93	38.89
Tertiary	6.25	1.72	0.00
χ^2		10.9140*	
Household Size			
1 – 3	31.25	34.48	38.89
4 – 6	56.25	60.34	55.56
7 – 9	12.50	5.14	5.56
χ^2		1.5015	

Notes: **, * denote Significant at 5% and 10% respectively
Source: Field Survey, 2023

Level of adoption of organic agricultural practices across selected enterprise characteristics

In Table 7, the level of adoption of organic agricultural practices across selected enterprise characteristics of farmers was presented. Half of the farmers that fell in the low adoption category earned less than equal to 100,000 naira per production cycle. Over 50% of farmers that fell in the low adoption category cultivated less than or equal to two acres of land (56.25%) while 100% of farmers that fell in the low adoption category produced 1-3 times per year. A significant difference was observed between the level of adoption of organic agricultural practices and income of farmer per production cycle. This agreed with the findings of Keil *et al.* (2019) who reported that adoption of sustainable agricultural practices such as tillage improved profitability and wellbeing of farmers.

Constraints associated with adoption of organic agricultural practices

The constraints associated with adoption of Organic Agricultural practices are presented in Table 8. Over 70% of the farmers associated it to lack of credit facilities/ intervention fund to boost the adoption of the practices. More than 60% of the farmers identified inadequate market for organic products (64.70%); inadequate supporting infrastructure (64.00%); less functional farm settlements (61.30%) and low yields of organic farming (60.70%) as constraints to adoption of organic agricultural practices. The most serious constraint identified by most of the farmers was lack of intervention

fund/credit facilities to boost the adoption of the practices while the least constraint identified was lack of adequate security. Lack of credit facilities as a constraint hindering adoption of organic agricultural practices among farmers had been previously reported by Okonta *et al.* (2023).

Table 7: Level of adoption of organic agricultural practices across selected enterprise characteristics of farmers

Variable	Level of Adoption of Organic Agricultural Practices (%)		
	Low	**Moderate**	**High**
Areas of Land Cultivated (Acres)			
<=2	56.25	63.79	77.78
>2	43.75	36.21	22.22
χ^2		1.8890	
Production Cycle per Year			
1 – 3	100.00	87.93	88.89
4 – 6	0.00	12.07	11.11
χ^2		2.1536	
Income per production Cycle (₦)			
<=100,000	50.00	37.50	12.50
100,001-200,000	37.50	62.93	14.66
>200,000	12.50	55.56	27.78
χ^2		8.2646*	

Notes: **, * denote Significant at 5% and 10% respectively
Source: Field Survey, 2023.

Table 8: Constraints associated with the adoption of organic agricultural practices among farmers

Constraints	Yes	No	Rank
Inadequate Market for organic products	97(64.7)	53(35.4)	2nd
Lack of Credit facilities/ Intervention Fund to boost the practices	113(75.3)	37(24.7)	1st
Access to Extension Agent/Services	83(55.3)	67(44.7)	7th
Less Functional Farm Settlement	92(61.3)	58(38.7)	4th
Unavailability of Organic Farming materials	75(50.0)	75(50.0)	8th
Inadequate Supporting Infrastructure	96(64.0)	54(36.0)	3rd
High Cost of Inputs	88(58.7)	62(41.3)	6th
Low Yield of Organic Farming	91(60.7)	59(39.3)	5th
Inadequate Security	74(49.3)	76(50.7)	9th

Figures in parenthesis ( ) are percentages
Source: Field Survey, 2023

Conclusion

The study assessed the adoption of organic agricultural practices among smallholder crop farmers in Ibarapa Agricultural Zone Oyo State Nigeria. Data of 150 smallholder farmers were collected with the aid of well structured questionnaire. Data were analysed using descriptive statistics, composite score analysis and Chi-Square analysis. The results revealed that majority of the farmers were young married male with an average household size of 4±2persons. Higher percentage of the farmers cultivated an average of 2.39±1.26acres of land with an average 2±1 production cycles per year and income of ₦173,820±64,956.40 per production cycle. The top three adopted organic agricultural practices were tillage, use of animal manure and crop rotation while the least adopted practice was planting of cover crops. The result further revealed that majority of the farmers fell in the moderate and high adoption categories. A significant difference was found between farmer's characteristics namely age, educational status, income per production cycle and level of adoption of organic agricultural practices.

Recommendations

It is thus recommended that agronomists, agricultural and extension officers from governmental and non-governmental organizations should provide more education inform of training, knowledge sharing and extension education on the benefits of adoption of organic agricultural practices most especially among older and low-income farmers. Government should also allocate and disburse intervention funds and make credit readily available to farmers to enhance adoption of the

practices and promote sustainable agricultural production.

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