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Willingness to Adopt Organic Farming Practices among Arable Crop Farmers in Oyo State, Nigeria

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Abstract

Organic farming practices (OFP) are key components of sustainable agriculture. However, the adoption of OFP is not yet widespread. Therefore, this study examined the willingness to adopt OFP among arable crop farmers in Oyo State, Nigeria. A multi-stage and proportionate sampling technique was used to select 333 arable crop farmers with the aid of a structured questionnaire. Mean, percentages, Chi-square, and Pearson Product Moment Correlation α 0.05 were used to analyse the results. Fifty percent (50%) of the respondents had high knowledge, and 46.1% had a moderately favourable perception of OFP. The majority (71.5%)

were willing to adopt OFP. Inadequate credit facilities ($\bar{x}$ =1.79) and lack of access to organic inputs ($\bar{x}$ =1.57) were major barriers to adopting OFP. Farm size (r = -0.114), household size (r = -0.180), farmer's knowledge (r = 0.128), and perception of OFP (r = 0.122) were significantly related to farmers' willingness to adopt OFP. Arable crop farmers were willing to adopt OFP. They should therefore be equipped with the requisite knowledge and skills through training programmes.

Introduction

Agriculture is a significant sector in the Nigerian economy as it is expected to produce safe food for the increasing population. This calls for increased attention to organic farming and its benefits. The International Federation of Organic Agriculture Movements (IFOAM) defines organic farming as "a production system that sustains the health of soils, ecosystems, and people. It relies on ecological processes, biodiversity, and cycles adapted to local conditions rather than using inputs with adverse effects. Organic farming combines tradition, innovation, and science to benefit the shared environment and promote fair relationships and good quality of life for all involved" (IFOAM, 2021).

According to the Department for Environment, Food, and Rural Affairs (DEFRA), the key components of an organic farming system include; the prevention of synthetic fertilizers, pesticides, the use of crop rotations and other forms of husbandry to maintain soil fertility and control weeds, pests and diseases (DEFRA, 2021). However, unlike conventional arable crop farming, organic farming places a strong emphasis on soil health and biodiversity conservation through the use of natural inputs and management practices. Studies have shown that organic farming can be a viable alternative to conventional arable farming in terms of yields and profitability.
A study compared the long-run net returns of conventional corn/soybean crop rotation to that of an organic corn/soybean/wheat rotation. The authors found that the gross revenue for the organic crop rotation was significantly higher than the gross revenue for a corn/soybean rotation and a corn/soybean/wheat rotation (Langemeier et al., 2020). Another study conducted in Thailand indicated that organic rice farming was more profitable than conventional farming, which was attributed to the higher prevailing market price for organic rice (Suwanmaneepong et al., 2020). These studies suggested that organic farming can be a sustainable and profitable alternative to conventional arable farming.

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. Organic farming is proven to be environmentally friendly as it supports the reuse of farm and household waste products as organic fertilizers (Singh, 2021). Consequently, it improves the soil's physical and chemical characteristics; enhances plant growth and physiological activities; allows for healthier farmworkers; reduces the risk of global warming and chemical residues in food; reduces groundwater pollution, protects biodiversity; helps combat erosion; produces optimal conditions for high yields and good quality crops (Meemken & Qaim, 2018).
According to Sanchi et al. (2022), the majority of farmers in Nigeria are used to practicing conventional farming which is characterised by heavy reliance on chemicals and synthetic inputs and also poses challenges like soil degradation, water pollution, high input costs, climate change impacts, and health impacts that make it difficult for

farmers to achieve sustainable agriculture. Small-scale, conventional arable crop farmers are responsible for the production of the bulk of food consumed by the citizenry of the nation. They are characterised by the smallness of acreage holdings (Olaniyi & Ogunkunle, 2018) and predominantly practice mixed cropping (Ayodele & Akindele, 2018). According to Akintonde et al. (2022), maize, cassava, and leafy vegetables are the major crops planted by the farmers; inadequate finance and land were the highest-ranked challenges encountered.

There has been a tremendous awakening to the negative impact of conventional farming systems (FA0, 2018) and it has become crucial to mitigate these effects. 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.

Several factors can affect the farmer's willingness to adopt organic farming practices. It could be a result of the farmers' socio-economic characteristics. It could be inadequate information on organic techniques, time constraints, the weight of some organic inputs, or the risk involved in switching to another farming system. However, it is difficult to generalize without any empirical evidence. Willingness in this context is the farmer's inclination or readiness to adopt organic farming practices. While adoption is the state of the farmers taking up a practice and eventually utilizing it over some time.

In light of the foregoing, it becomes imperative to assess the willingness to adopt organic farming practices among arable crop farmers. The following objectives were set to: determine the farmers' level of knowledge of organic farming practices; ascertain their perception of organic farming practices; determine arable crop farmers' willingness to adopt organic farming practices; and investigate the barriers to adopt organic farming practices.

Methodology

The study was carried out in Oyo State, located geographically in the southwest region of Nigeria between latitudes $7^{o}02^{1}$N and $9^{o}10^{1}$N and longitude $2^{o}04^{1}$E and $4^{o}30^{1}$E. It is made up of 33 local government areas (LGAs). The state has four agricultural zones under the Oyo State Agricultural Development Programme (OYSADEP) namely; Ogbomoso, Ibadan/Ibarapa, Oyo, and Saki Zone.

The population for this study consisted of all arable crop farmers in the study area. Primary data was collected with the aid of a structured questionnaire. A multi-stage and proportionate sampling procedure were used to select the respondents. The first stage was a random selection of 3 agricultural development programme (ADP) zones out of 4; Ibadan/Ibarapa, Oyo, and Ogbomosho. The second stage consisted of a random selection of 35% of the 20 blocks in the study area making seven blocks (Ido, Ibarapa East (IE), and Ibarapa Central (IC) in Ibadan/Ibarapa zone; Oyo West (OW) and Afijio in Oyo zone; Ogbomosho south (OS) and Ogooluwa in Ogbomosho zone.

The third stage involved a random selection of 25% of the 52 cells in the selected blocks, resulting in a total of 13 cells (Akufo, Batake, Eruwa, Lanlete, Igboleke, Araromi, Egunbiyi, Onilefun, Akinola, Ibapon, Osuru, Odo-oba, and Idi-Ori). The fourth stage was a random selection of 20% of the arable crop farmers in the 13 cells making Three hundred and forty (340) respondents. However, only 333 questionnaires were retrieved from the respondents.

Farmers' knowledge of organic farming practices was measured using fourteen knowledge statements over a five-point Likert-type scale. Each item was summed and a composite score of the knowledge index was obtained. The mean and ± standard deviation was utilized to divide respondents' knowledge into three categories: high (≥4.05), moderate (4.04 - 3.38), and low (≤3.39). Respondent's perception of organic farming practices was assessed by proffering thirteen perception statements on organic farming practices across a five-point Likert-type scale. The mean and ± standard deviation was used to categorize respondents' perception into favourable (≥3.98), moderately favourable (3.97 – 3.38), and unfavourable (≤3.39).

To investigate the perceived barriers to adopting organic farming practices, a list of possible barriers affecting the adoption of organic farming practices was presented across a three-point, Likert-type scale. The mean for each constraint was generated. Arable crop farmers' willingness to adopt organic farming was measured using twenty-eight organic practices on a two-point scale of willing (1) and not willing (0). The mean was used to categorize respondents' willingness to adopt organic farming into high and low.

Data collected were analysed using Statistical Product and Service Solution, IBM SPSS Statistics Software. Percentages, mean and standard deviation, Chi-square, and Pearson Product Moment Correlation (PPMC) was used to analyse the data while the statistics were tested at p≤0.05 (5% significant level).

Results and Discussion

Knowledge of Organic Farming Practices among Arable Crop Farmers

Data in Table 1 show that the farmers had high knowledge of the following statements; the use of chemicals are prohibited in organic farming ($\bar{x} = 4.42$), organic farming uses natural products ($\bar{x} = 4.35$), manure puts the soil particles together for better soil structure ($\bar{x} = 4.35$), green manuring helps to increase soil fertility ($\bar{x} = 4.30$), crop rotation helps to control pest attacks ($\bar{x} = 4.29$), chemically treated seeds are prohibited in organic farming ($\bar{x} = 4.14$), compost should stay for some time before use ($\bar{x} = 4.11$). The farmers' knowledge of the following statements means that they had a good understanding of some organic practices. Wasil et al. (2022) findings support the idea that knowledge is an important factor in the adoption of organic agricultural techniques.

However, the farmers had low knowledge of the following negative statements; synthetic fertilizers can be used to fertilize organic plants ($\bar{x} = 2.46$), use of chemical fertilizers would enhance the growth of organic crops ($\overline{x} = 2.34$), chemical pesticides can be used to control pests in organic farms ($\bar{x} = 2.03$). This could be because of lack of proper understanding of organic farming. The implication is that there is a knowledge gap among the arable crop farmers on organic farming practices. This

aligns with Farouque and Sarker (2018) report that vegetable farmers had a low level of knowledge of some of the organic farming practices.

Furthermore, the table shows that 50% of the farmers had a high knowledge of organic farming practices, while 29% had moderate knowledge, and 21% had a low-level knowledge of organic farming practices. Slightly contrary to this result, Sankangoudar and Hiremath (2020) reported that certified organic farmers had a medium level of knowledge regarding organic practices. This is a source of concern because efforts should be made to increase the knowledge level of aspiring organic farmers to avoid having mediocre farmers.

Table 1: Knowledge of organic farming practices among arable crop farmers

Knowledge	Mean	Standard deviation
The use of chemicals is prohibited in organic farming	4.42	0.883
Organic farming uses natural products	4.35	0.614
Manure puts the soil particles together for better soil structure	4.35	0.525
Green manuring helps to increase soil fertility	4.30	0.612
Crop rotation helps to control pest attacks	4.29	0.681
Chemically treated seeds are prohibited in organic farming	4.14	0.980
Compost should stay for some time before use	4.11	0.753
Manuring using animal waste should be left to decompose before being used in organic farming systems	4.00	0.944
Conversion to organic farms requires a long transition period	3.88	0.847
Tillage disturbs the activity of soil microbes	3.82	1.007
Chemical herbicides cannot be used to control weeds in organic farmlands	3.59	1.473
Synthetic fertilizers can be used to fertilize organic plants	2.46	1.415
The use of chemical fertilizers would enhance the growth of organic crop	2.34	1.340
Chemical pesticides can be used to control pests in organic farms	2.03	1.318

Source: Field survey, 2021

Perception of Organic Farming Practices Among Arable Crop Farmers

Data in Table 2 show arable crop farmers' perception of organic farming practices. The farmers had a favourable perception towards the following statements; having livestock farming in organic farming is an advantage for soil fertility ($\bar{x}$ =4.36), organic farming is environmentally friendly ($\bar{x}$ = 4.16), farm produce from organic farming will be healthier than produce from conventional systems ($\bar{x}$ = 4.12), organic farming is the best way to ensure sustainable future farming ($\bar{x}$ = 4.05), and organic farming is culturally accepted ($\bar{x}$ =3.98). Oyedele et al. (2018) reported that arable crop farmers have a positive perception of organic farming.

However, the farmers in this study had an unfavourable perception of the following statements; Obtaining information regarding organic farming is difficult ($\bar{x}$ =2.87), and organic farming is time-consuming ($\bar{x}$ = 2.02). This aligns with the findings of Ighoro

et al. (2019) that vegetable farmers perceived organic farming as time-consuming. Furthermore, the table shows that almost an average (46.1%) of the farmers had a moderately favourable perception of organic farming practices, while 38.5 % had a favourable perception, and 15.4% had an unfavourable perception of organic farming practices. This implies that the farmers that had a favourable and moderately favourable perception of organic farming, might likely lead to the future adoption of the practice in the study area.

Table 2: Perception of organic farming among arable crop farmers

Perception	Mean	Standard deviation
Having livestock in organic farming is an advantage for soil fertility	4.36	0.734
Organic farming is environmentally friendly	4.16	0.902
Farm produce from organic farming will be healthier than produce from conventional systems.	4.12	0.987
Organic farming is the best way to ensure a sustainable future for farming	4.05	0.954
Organic farming is culturally accepted	3.98	0.881
Organic farming leads to high yields	3.72	1.282
Organic farming inputs are bulky	3.57	1.284
Organic farming is expensive	3.36	1.406
The organic standards are too complicated to follow	3.16	1.358
Conventional farming is better than an organic farming system	3.15	1.358
Organic farming inputs are scarce	3.03	1.458
Obtaining information regarding organic farming is difficult	2.87	1.344
It is time-consuming	2.02	1.091

Source: Field Survey, 2021

Farmers' Willingness to Adopt Organic Farming Practices

Data in Table 3 show the majority of the farmers were willing to adopt organic certified seeds (96.7%), and crop rotation (96.7%). Farmers were also eager to embrace mulching (96.1%), cover cropping (96.1%), green manuring (96.1%), storage without the use of chemicals (94.9%), composting (95.8%), poultry manuring (95.2%), and use of a physical mechanism to terminate weeds (94.6%). Furthermore, farmers also indicated willingness in farmyard manure (94%), intercropping (93.7%), use of bio-fertilizers (93.1%), shifting cultivation (91.9%), use of natural enemies (88.9%), use of neem extract (88%), use of locust beans extract (84.7%), use of wood ash (86.2%), kitchen waste (82.9%) and the use of trap crops (80.5%). This finding agrees with Toungos and Bulus (2019) who reported that manure application, mulching, planting of cover crops, and crop rotation are practiced by most farmers.

However, a lower percentage of the farmers were willing to adopt the use of bio-herbicide (5.4%); cow dunging (8.1%); hermetic storage (10.2%); minimum tillage (11.7%), use of beneficial insects (12.0%), zero tillage (14.7%), pig manuring (30.9%), use of biopesticide (41.1%), and the use of lemongrass extract (40.5%). This could be due to the knowledge gap in these organic practices. El-Shater et al. (2020) reported low adoption of zero tillage. Mobolade et al. (2019) also stated that the use of hermetic storage is not widely practiced. Even though it has been known for some time, it is still

not commonly employed as an effective cost-efficient system for grains produced in the rural areas of developing countries.

In addition, the low willingness to adopt bio-pesticide could be due to a lack of proper awareness of bio-pesticide. According to Fenibo et al. (2020), the use of bio-based insecticides in conjunction with integrated pest management (IPM) has proven to be the most effective strategy to affect most areas of sustainable agriculture. As a result, bio-pesticide-driven IPM, when combined with the necessary knowledge, skills, and research, can help to ensure the long-term sustainability of agriculture.

Table 3: Willingness to adopt organic farming practices amongst arable crop farmers

Willingness	Willing
Use of Bio- herbicide	5.4
Cow dunging	8.1
Hermetic storage	10.2
Minimum tillage	11.7
Use of beneficial Insects	12.0
Zero tillage	14.7
Pig manuring	30.9
Use of trap Crops	80.5
Kitchen waste	82.9
Use of Locust-beans extract	84.7
Use of wood ash	86.2
Use of Neem extract	88.0
Use of Natural Enemies	88.9
Use of biopesticide	41.1
Use of Lemon grass extract	40.5
Shifting cultivation	91.9
Use of bio-fertilizers	93.1
Intercropping	93.7
Farmyard manure	94.0
Physical mechanism to terminate weeds	94.6
Poultry manuring	95.2
Storage without the use of chemicals	94.9
Green manuring	96.1
Composting	95.8
Cover cropping	96.1
Mulching	96.1
Organic certified seeds	96.7
Crop rotation	96.7

Source: Field survey, 2021

Perceived Barriers to Adopt Organic Farming among Arable Crop Farmers

Table 4 shows the perceived barriers that influenced farmers' willingness to adopt organic farming. Inadequate credit facilities ($\bar{x}$ =1.79) ranked highest amongst various barriers, lack of access to inputs to produce organically ($\bar{x}$ =1.57) ranked second, labour intensiveness of organic farm practices ($\bar{x}$ =1.53), poor production due to inability to address weeds and pests using organic methods ($\bar{x}$ =1.51) were ranked

third, and fourth respectively. The implications of these challenges may pose severe effects on farmers willing to adopt organic farming practices.

For instance, farmers who choose to adopt organic farm practices may be unable to access the credit they need to purchase the inputs required or may be unable to afford the labour required for organic farm practices. Without access to inputs, production will be limited and yields may be lower than expected. Also, without the ability to address weeds and pests using organic methods, farmers may have to resort to chemical pesticides, leading to environmental contamination. All of these factors can lead to a decrease in profit for the farmer, which could impede their ability to remain financially viable. Abdullahi et al. (2018) reported that inconsistency in maize farmers' adoption level for organic farming practices was mainly economic reasons which involve limited financial resources to adopt inputs and limited technical and financial support from both the government and financial institutions which could have come in the form of loan or subsidy to organic inputs

Table 4: Perceived barriers to adopt organic farming amongst arable crop farmers

Perceived barriers	Mean	Standard Deviation
Inadequate credit facilities	1.79	0.435
Lack of access to inputs to produce organically such as biofertilizers, bio−pesticides, and seeds.	1.57	0.624
Labour intensiveness of organic farm practices	1.53	0.652
Poor production due to inability to address weeds and pests using organic method	1.51	0.657

Source: Field Survey, 2021

Relationship between Socio-economic Characteristics and Willingness to Adopt Organic Farming.

Table 5 reveals a positive and significant association between the educational qualification of farmers (χ^2= 0.368) and farmers' willingness to adopt organic farming practices. The result further affirms that farmers with higher levels of education are more likely to adopt organic farming practices than those with lower levels of education. Higher levels of education can help farmers understand the benefits of organic farming and the techniques and strategies needed to successfully implement organic practices.

Education can also provide farmers with the knowledge and skills they need to make sound decisions when it comes to organic farming practices. Ikuerowo and Tehinloju (2021) reported that access to information and education positively increased the possibility of farmers adopting bio-organic technology. They also advocated for the promotion of advanced extension services that would appropriately support farmers, as well as extended education initiatives aimed at increasing farmers' knowledge of bio-organic technology.

Table 5: Relationship between the educational level of arable farmers and willingness to adopt organic farming practices

Variable	χ^2	Df
Educational level	0.368*	3

* P≤0.05. Source: Field survey, 2021

Data in Table 6 further show that there is a negative significant relationship between farm size (r= -0.114) and farmers' willingness to adopt organic farming. This implies that farmers with larger farm sizes are less likely to adopt organic farm practices than smaller farms. This could be due to larger farms having more established production systems that are difficult to transition to organic. This aligns with the finding of Sapbamrer and Thammachai (2021) that smallholder farmers exhibited a high level of willingness to adopt organic farming practices than farmers with large farm sizes.

Also, the household size (r= -0.180) shows a negative significant relationship with their willingness to adopt organic farming. This implies that larger households are less likely to adopt organic farm practices than smaller households. This could be due to a variety of factors, such as a larger household having a greater need for income and/or less reliance on traditional farming methods. Serebrennikov et al. (2020) reported a negative significant relationship between household size and the adoption of organic farming practices.

Table 6: Relationship between selected socio-economic characteristics of arable farmers and farmers' willingness to adopt organic farming practices

Variable	R
Farm size	-0.114*
Household size	-0.180*

* P ≤0.05. Source: Field survey, 2021

Relationship between farmers' knowledge, perception of organic farming, and willingness to adopt organic farming practices

Data in Table 7 show that a significant relationship exists between farmers' knowledge of organic farming and their willingness to adopt organic farming (r = 0.128). This implies that farmers who know organic farm practices are more likely to adopt organic farm practices than those who do not have knowledge of organic farm practices. This suggests that providing information and education about organic farm practices can be an effective way to increase the adoption of organic farm practices. Šūmane et al. (2018) asserted that farmers with increased knowledge of organic farming are better informed on the practices involved. Similarly, Hoque et al. (2022) reported that information acquisition has an effect on increasing the probability of farmers' willingness to adopt organic farming.

In the same vein, there is a significant relationship between arable farmers' perception of organic farming and their willingness to adopt (r = 0.122). This implies that farmers are more likely to adopt organic farm practices if they have a positive perception of the practices. This suggests that capacity building for the farmers on organic farming practices could lead to increased adoption of such practices. This result, however, is in contrast with the findings of Dapaah Opoku et al. (2020), that the willingness to produce organic vegetables is negatively and significantly influenced by the farmers' perception of their expertise in grading and standards in vegetable production and practices.

Table 7: Relationship between farmers' knowledge and perception of organic farming with their willingness to adopt organic farming practices

Variable	R
Knowledge vs. willingness to adopt organic farming	0.128*
Perception vs. willingness to adopt organic farming	0.122*

*P ≤0.05. Source: Field survey, 2021

Conclusion and Recommendation

The study revealed that the majority of the arable crop farmers were willing to adopt organic farming practices in Oyo State. An average of the farmers had a high knowledge of organic farming practices while slightly below-average of farmers had a favourable perception of organic farming practices. Inadequate credit facilities and lack of access to inputs were perceived by farmers as major barriers to adopting organic farming. Farmers should be equipped with the knowledge and skills required for organic farming practices through training programmes. Also, adequate credit facilities should be made available by Governmental, Non-Governmental Organisations and credit agencies. This could also be accompanied by good regulation and monitoring processes to avoid the diversion of funds.

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