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ADOPTION OF ORGANIC FARMING PRACTICES AMONG MAIZE FARMERS IN BATAGARAWA LOCAL GOVERNMENT AREA OF KATSINA STATE, NIGERIA

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ABSTRACT

This study assessed the adoption of organic farming practices (OFPs) among maize farmers in Batagarawa Local Government Area of Katsina State, Nigeria. Using a two-stage sampling technique, data were collected from 110 respondents through a well-structured questionnaire. Descriptive and inferential statistics, including probit regression analysis, were employed to analyze the data. The results revealed that the majority of the farmers were male (83.6%) with a mean age of 45 years. Most were married (76.4%), had household sizes between 6–10 persons, and were mainly smallholders cultivating 1–5 hectares. The most adopted organic practices included crop rotation (87.3%), use of organic fertilizer (86.4%), and mixed cropping (78.2%). Probit analysis indicated that age, marital status, and farm size significantly influenced the likelihood of adopting OFPs, implying that older, married, and large-scale farmers were more inclined towards organic methods. Major constraints identified were weed pressure, high cost of organic inputs, limited access to credit, inadequate information, and poor extension services. Radio, television, and farmer associations were the main information sources on organic practices. The findings highlight the growing interest in sustainable farming but highlight persistent challenges that hinder widespread adoption. It is recommended that government and agricultural agencies enhance access to credit, strengthen cooperative societies, and expand extension training programs to promote awareness and ease adoption. Promoting OFPs among maize farmers can enhance soil fertility, reduce input costs, and contribute to environmentally sustainable agricultural production in northern Nigeria.

Keywords: Adoption, Awareness, Farmers, Maize, Organic Farming and Sustainability

INTRODUCTION

The Federal Republic of Nigeria, often referred to as the "Giant of Africa," this term of honor heavily relies on its agricultural sector for economic growth and livelihood sustenance (Adeogun, 2018). Batagarawa Local Government in Katsina State plays a crucial role in maize cultivation, a staple crop with significant importance for local communities (Bello, 2019). Maize serves as a fundamental component of their diet and contributes substantially to the socio-economic fabric of the region. However, concerns about the environmental impact of conventional farming practices have prompted a shift towards more sustainable alternatives. The global discourse on sustainable agriculture has gained momentum due to the recognized adverse effects of conventional farming practices on the environment (Katsina State Ministry of Environment, 2019). In response, organic farming has emerged as a viable and environmentally friendly approach, emphasizing natural inputs, avoiding synthetic chemicals, and promoting ecological balance (Yusuf and Ahmed, 2016).

Batagarawa, located in the northern part of Nigeria, faces distinctive agricultural challenges such as unpredictable climatic conditions and soil degradation, posing threats to maize cultivation's productivity and resilience (Bello, 2019). The adoption of organic farming practices in Batagarawa is not only a response to global environmental concerns but also a strategic endeavor to address local challenges and ensure long-term food security (Lawal and Abdullahi, 2020). According to a report by the Batagarawa Local Government Bureau of Agriculture (2021), conventional farming practices have led to a 15% decrease in soil fertility over the past five years. In contrast, farmers adopting organic farming methods reported a 20% increase in crop yield and a 25% reduction in production costs due to decreased reliance on external inputs.

The decision of maize farmers in Batagarawa to adopt organic farming practices is influenced by a complex interplay of factors. Global awareness of environmental issues, changing market dynamics, and the need for sustainable agricultural practices contribute to this shift (Abubakar and Lawal, 2018). Local challenges, such as soil degradation and climatic unpredictability, play a crucial role in shaping farmers' perspectives towards embracing organic farming (Lawal and Abdullahi, 2020). Understanding these multifaceted factors is imperative for formulating effective policies and interventions tailored to the unique needs of the Batagarawa community. While examining the adoption of organic farming practices, this research adopts the lens of the Diffusion of Innovation theory. This theoretical framework provides a structured approach to understanding the process through which new ideas and practices are accepted and integrated into a community. By applying this perspective, the study aims to identify key influencers, early adopters, and potential challenges that affect the diffusion of organic farming practices in Batagarawa.

Consequently, the shift towards organic farming practices among maize farmers in Batagarawa is a dynamic process influenced by a myriad of factors. From global environmental concerns to local challenges, the decision to adopt organic farming is intertwined with socio-economic,

cultural, and ecological dimensions. This study endeavors to shed light on these complexities, providing a comprehensive understanding of the adoption patterns and contributing to the formulation of targeted strategies for promoting sustainable agriculture in the region.

The general objective of the study is to assess the adoption of organic farming practices among maize farmers in Batagarawa Local Government of Katsina State, Nigeria. The specific objectives are to:

i. describe the socioeconomic characteristics of maize farmers in the study area;
ii. ascertain sources of information on organic practices in the area;
iii. determine the level of adoption of organic practices in maize production;
iv. examine factors influencing the adoption of organic practices in maize production;
v. identify the constraints limiting the adoption of organic practices in maize production;
vi. access the attitude of maize farmers towards the adoption of organic practice.

OPERATIONAL TERMS

Adoption in the context of agricultural practices, refers to the deliberate decision-making process undertaken by farmers to integrate and implement organic farming methods within their agricultural activities. This involves embracing and incorporating sustainable and environmentally friendly practices, avoiding the use of synthetic fertilizers, pesticides, and genetically modified organisms. The decision to adopt organic farming is influenced by various factors, including awareness, economic considerations, and cultural influences (Rogers, 2003).

Organic Farming Practices (OFPs) encompass a set of agricultural methods that prioritize environmental sustainability and eschew the use of synthetic inputs. This approach emphasizes natural processes, biodiversity, and ecological balance. Farmers employing organic farming practices refrain from using synthetic fertilizers, pesticides, and genetically modified organisms, focusing instead on organic inputs and sustainable agricultural techniques. These practices aim to promote soil health, reduce environmental impact, and produce food in harmony with natural ecosystems (Adesoji et al., 2025; Abdulkadir et al., 2020 and Lampkin et al., 1999).

Maize Farmers are agricultural practitioners specializing in the cultivation of maize, a staple cereal crop with widespread global consumption. These farmers engage in various activities related to maize cultivation, including planting, nurturing, and harvesting the crop. The decisions made by maize farmers, such as the choice of farming practices, significantly impact the yield and quality of maize produced. In the context of Batagarawa Local Government, maize farming holds particular significance as a linchpin to the local economy (FAO, 2019).

METHODOLOGY

Description of the Study Area

The study was conducted in Batagarawa Local Government Area (LGA) of Katsina State, situated in the northern part of the state. Geographically, Batagarawa LGA spans latitude 11° 191 to 11° 451 north of the equator and longitude 7° 291 to 7° 551 east of the prime meridian. It shares borders with Kurfi LGA to the west, Safana LGA to the south, Kankara LGA to the east, and Jibia LGA to the north. Covering an approximate area of 180 km2, Batagarawa is located about 120 km from Katsina, the capital of Katsina State. Batagarawa experiences two primary seasons: the rainy season, spanning April to October, with peak rainfall in August, and the dry season from November to March, marked by the harmattan's dry, cool, and dusty conditions. Maximum day temperatures reach around 32.5°C, and minimum day temperatures hover around 18.8°C. The climate is predominantly hot and dry due to the town's latitudinal position and its distance from the sea (Abdulrashid et al, 2017). The Sudan savanna vegetation consists of stunted trees, including silk cotton trees and Baobab trees reaching up to 25 meters in height. Other tree species such as Tamarindus indica, Daniolia Oliveri, and Mangifera indica contribute to the local flora. Batagarawa is situated within the higher plains of Hausa-land, gently sloping towards the desert, with streams draining northeast towards Lake Chad. Altitudes of the plains range from about 70 meters in the southern part, gradually declining northward. Soils are slightly acidic and belong to the Zaria group, derived from fine sandy drift. The upper slope soils exhibit red-brown to orange colors, forming a sandy clay loam with a pH value of approximately 5.8. These conditions provide a conducive environment for agricultural activities.

As of the 2006 National Population Census, Batagarawa LGA had an estimated population of about 180,000 people, with diverse ethnic groups and a predominant presence of Hausas and Fulanis. The majority of the population practices Islam, with a small percentage practicing Christianity and traditional religions. Agriculture is the main occupation, with maize being a significant crop. The farming system involves both crop cultivation and animal husbandry, with livestock such as cattle, sheep, and goats commonly reared. (Abdulrashid et al, 2017)

Population for the Study

The population for this study consists of all maize farmers in Batagarawa Local Government Area of Katsina State.

Sampling Procedures and Sampling Size

A two-stage sampling technique was used to select the respondents for this study. In the first stage; A purposive sampling procedure was used to select six (6) villages with high concentration of maize farmers in the study area, which include Ajiwa, Batagarawa, Dabaibayawa, Bakiyawa, Masabo, and Tsanni, Second stage; A list of maize farmers was obtained from department of agriculture, Batagarawa LGA to determine the sampling frame from each village while a proportionate random sampling technique was used to determine sample size from each village as shown in the Table 1 below. The formula is as shown below;

$n=(x/X)*N$

where;
n= number of respondents to be selected per village
x= number of maize farmers per village
X= total number of maize farmers in the selected villages
N= Population of the study

Table 1: Sampling Frame and Sample Size

S/N	Name of Villages	Number of Maize Farmers	Number of Respondents Selected
1	Batagarawa	350	31
2	Ajiwa	500	45
3	Bakiyawa	80	7
4	Jabaibayawa	70	6
5	Mosabo	200	18
6	Tsanni	40	4
	Total	1240	110

Source: Field survey, 2024

Instrument for Data Collection

Both primary and secondary sources of data were utilized for this study. Primary data were collected through structured questionnaires administered to the maize farmers, while secondary data were obtained from related articles in journals and other relevant literature.

Measurement of Variables

Independent Variables

Age: Measured in years, representing the total number of years the maize farmers have lived.

Sex: This was measured by ranking all the male respondents 1 and female respondents 0.

Marital Status: This was measured by ranking the single 1, married 2, divorced 3, widow 4, and widower 5.

Household Size: This measurement was carried out by counting the number of wives, children, dependents and relatives living in the respondent's house at the time of the investigation.

Educational Level: This was measured in terms of the highest educational qualification attainment of the respondent. The listed educational attainments are: no formal education 1, Arabic education 2, primary education 3, Secondary education 4, and tertiary education 5.

Farming Experience: The respondents were asked to indicate the actual number of years they have being into farming.

Farm Size: This was measure in hectares (Ha).

Monthly income: The respondents were asked their income in naira.

Membership of Cooperative: This was measured as Yes=1, No=0, if otherwise.

Access to credit: The respondent were ask if they have access to credit with Yes=1, No=0

Extension agent contact: Respondent were asked if they have contact with extension agents with Yes=1, No=0.

Level of Awareness: The respondents were asked if they are aware of organic farming practices with Yes = 1, No = 0. Then they were also provided with 14 organic farming practices (such as crop rotation, mixed cropping, mixed farming, zero/hoe tillage, green manure, composting, hand picking of insect, organic pesticide, hoeing/hand weeding, use of organic fertilizer, farm yard manure, planting trees/hedges, residues incorporation and fish emulsion) in which they were asked to indicate their level of awareness using a 4-point likert-type scale of Highly Aware =4; Aware =3; Moderately Aware=2; Not Aware=1. The values on the Likert scale were added to obtain 10 and divided by 4 to obtain a mean score of 2.5. Any variable with a mean score equal or higher than 2.5 were perceived as high level of awareness of organic farming practices, while variable with a mean score of less than 2.5 were regarded as low level of awareness of organic farming practices.

Sources of Information: The respondents were asked to indicate their sources of information on organic farming practices.

Constraints Associated with Adoption of Organic Farming Practices: The respondents were asked to indicate the constraints face with the adoption of organic farming practices using a 5-point liker scale of strongly agree (SA) =5, agree (A) =4, undecided (U) =3, disagree (D) =2 and strongly disagree (SD) =1.

Data Analysis

The data collected were analyzed using descriptive statistics, including frequency counts, percentages, means, and standard deviations for objectives (1), (2), (3), (4), and (6). A fractional regression model was employed to analyze objective (5).

Analytical Techniques

To explore the factors that influence the adoption of organic farming practices, probit regression model was employed. In the estimation of the probit model, the two classifications above were used as the dependent variable. Therefore, the binary dependent variable was coded as 1 if organic farming practices was adopted, and 0 if organic farming practices was not adopted. Given the binary nature of the factors influencing the adoption of organic farming practices, the probit regression model was appropriate. The probit regression model is expressed as follows.

$(\vartheta i=1Z⁄=Zl,+\epsilon i)$

Where Probit is the probability function, $\boldsymbol{\vartheta}$ is the dichotomous variable, 1 if organic farming practices was adopted, and 0 if organic farming was not adopted. Z is a set of maize farmers' personal and resource characteristics, is

the vector of parameter to be estimated, and is a random error term.

Empirically, the probit regression model is specified as follows.

((𝜗𝑖=1𝑍/𝜗𝑖=1𝑍/Σ𝑖=𝑎𝑖12∗𝑧𝑖

Factors influencing the adoption of organic farming practice =β_1(age) + β_2(gender) + β_3(marital status) + β_4(household size) + β_5(education level) + β_6(farming experience) + β_7(farm size) + β_8(income) + β_9(access to $Credit$) + β_{10}(extension visit) β_{11}+ (membership of cooperative) +(errorterm).

Measurement of Variables

Dependent Variable

The dependent variable for this study is the Adoption of Organic Farming Practices by Maize Farmers.

I. **Level of Adoption of Organic Farming Practices**: This variable is scored by assigning a score of 1 to each of the 14 selected organic farming practices adopted by a farmer at the time of the survey and zero to a practice not adopted. The minimum score is 0, and the maximum score is 14.

II. **Extent of Adoption of Organic Farming Practices**: Respondents was provided with 14 organic farming practices and asked to indicate their level of adoption using a 4-point Likert-type scale (Larger Extent = 4, Moderate Extent = 3, Lower Extent = 2, Not at all = 1). The values on the Likert scale were summed to obtain a score, which was divided by 4 to obtain a mean score. Any variable with a mean score equal to or higher than 2.5 will perceived as a high level of adoption of organic farming practices, while variables with a mean score of less than 2.5 were regarded as a low level of adoption of organic farming practices.

Data Analysis

The data collected was analyzed using descriptive statistics such as frequency counts, percentages, means, and standard deviations for objectives (1), (2), (3), (4), and (6). A fractional regression model was employed to analyze objective (5). The statistical software package SPSS (Statistical Package for the Social Sciences) and STATA were used for the analysis.

Ethical Considerations

The research adhered to ethical guidelines and principles during data collection. Informed consent was obtained from each participant, ensuring their willingness to participate in the study. Confidentiality and anonymity were maintained by assigning unique identifiers to respondents, and personal information will be kept secure. The study also received ethical approval from the relevant institutional review board.

Limitations of the Study

While every effort was made to ensure the accuracy and reliability of the study, some limitations were encountered. The study was then constrained by the availability of resources, time, and the need for cooperation from respondents. Additionally, the generalization of findings may be limited to the specific context of Batagarawa LGA in Katsina State.

RESULTS AND DISCUSSION

This Chapter presents the findings and discussion of results from the field work.

Socio-economic Characteristics of the Maize Farmers

The results in Table 2 revealed that most (34.5%) of the maize farmers falls within the age range of 41-50 years. The youngest farmers, aged 21-30, constitute 22.7%, while the oldest group, aged 71-80, represents only 1.0% of the sample. The mean age of the respondent was 45 years, indicating that the farmers are relatively young and likely to be active and productive. This supports the findings of previous research, which suggested that farmers in their active years are more engaged in agricultural practices (Oluwatayo, 2019).

Moreover, results in Table 2 showed that majority (83.6%) of the respondents were males, while (16.4%) were females. This implies that there were more male maize farmers in the study area. This disparity reflects the broader trend in Nigeria Agriculture where men have more access to resources and training (Nnadi et al., 2023). Majority (76.4%) of the farmers are married, followed by single individuals (20.0%), divorced (2.7%), and widowers (0.9%). This high percentage of married individuals may reflect the social structure and stability in the farming communities, this will therefore lead to the adoption of organic farming practices among maize farmers in the study area. This implies that married farmers might have more stability and support which can be advantageous for adopting and sustaining Agricultural practices. (Olaniyi et.al 2022).

With reference to household size, most (45.5%) of the maize farmers had household size between 6-10 person while only (11.8%) of them had household size between 16-20 person. The mean household size of the respondents was 10. This suggests that many farmers have relatively large families, which might influence labour availability and socio-economic dynamics within the farming communities. This will also help the maize farmers in the study area to adopt organic farming practices. More also, the results showed that 45.5% of the maize farmers had secondary education, 30.0% had tertiary education, 10.9% had primary education, and 9.1% had formal education while only 4.5% of the respondent had no formal education. This indicates a relatively high level of education among the farmers, which could positively impact the adoption of organic farming practices among maize farmers in the study area. Education is a critical factor in understanding and implementing organic farming practices. (Nwaobiala et al., 2021). This implies that farmers with higher education levels are more likely to comprehend the benefits of OFPs and implement them effectively, thereby enhancing their livelihood. A significant proportion (45.5%) of farmers had 1-10 years of farming experience, while only 2.7% of them had 41-50

years of farming experience. The mean farming experience of the maize farmers was 17 years implying that most of the maize farmers in the study area had longer years of farming experience and this gave them advantage of adopting organic farming practices. This agree with the work of- Ozor et al, (2023) which said that experienced farmers can lead by examples in their communities , encouraging others to adopt sustainable practices.

As indicated on Table 2, majority (88.2%) of the maize farmers manage small farms of 1-5 hectares while only a small fraction (1.8%) of them had larger farms of 16-20 hectares. The mean farm size of the respondent was 4 hectares indicating that maize farming is largely a small-scale activity in the study area. The result from Table 2 showed that farmers' monthly incomes are varied, with 21.8% earning between 200,001-300,000 naira and 20.9% earning less than 200,000 naira. The mean monthly income of the farmers was 501,868.18 naira. This suggests that the maize farmers in the study area were above average income earners, hence they may possess the financial muscle required to purchase and adopt organic farming practices this will therefore increase the opportunities for financial stability through the adoption of organic farming practices in the study area.

As showed in Table 2, majority (65.5%) of the maize farmers do not have access to credit while only 34.5% of them had access to credit. This implies that majority of the maize farmers in the study area do not have access to credit. This lack of access to credit can be a significant barrier to adopting organic farming practices. Majority (70.0%) of the farmers had access to extension services, which are crucial for disseminating agricultural knowledge and innovations. However, 30.0% of farmers still lack this access, potentially limiting their ability to adopt organic farming practices. Also most (58.2%) of the maize farmers are members of cooperative societies, which can provide support and resources for farming activities. However, 41.8% are not members, which might limit their access to collective benefits and support systems (Adewale and Adewunmi, 2017).

Table 2: Distribution of Respondents According to Socio-economic Characteristics (n=110)

Characteristics	Frequency	Percentage (%)	Mean
Age (Years)			
21 – 30	25	22.7	
31 – 40	16	14.5	45.21
41 – 50	38	34.5	
51 – 60	19	17.3	
61 – 70	11	10.0	
71 – 80	1	1.0	
Sex			
Male	92	83.6	
Female	18	16.4	
Marital Status			
Single	22	20.0	
Married	84	76.4	
Divorced	3	2.7	
Widower	1	0.9	
Household Size (Persons)			
1 – 5	22	20.0	
6 – 10	50	45.5	
11 – 15	25	22.7	
16 – 20	13	11.8	9.45
Educational Status			
Formal Education	10	9.1	
Primary Education	12	10.9	
Secondary Education	50	45.5	
Tertiary Education	33	30.0	
Non-formal Education	5	4.5	
Farming Experience (Years)			
1 – 10	50	45.5	
11 – 20	24	21.8	
21 – 30	21	19.0	16.93
31 – 40	12	10.9	
41 – 50	3	2.7	
Farm Size (ha)			
1-5	97	88.2	
6-10	11	10.0	
11-15	0	0	
16-20	2	1.8	3.51
Monthly Income (₦)			
≤ 200,000	23	20.9	
200,001 – 300,000	24	21.8	
300,001 – 400, 000	15	13.6	
400,001 – 500,000	14	12.7	501868.18
500,001 – 600,000	5	4.6	
600,001 – 700,000	6	5.5	
700,001- 800,000	4	3.6	
>800,000	19	17.3	
Access to Credit			
Yes	38	34.5	
No	72	65.5	
Extension Contact			
Yes	77	70.0	
No	33	30.0	
Membership of Cooperative			
Yes	64	58.2	
No	46	41.8	

Sources of Information on Organic farming Practices by the Maize Farmers

Results in Table 3 show that majority (89.1%) of the maize farmers got their information on organic farming practices through radio, (82.7%) got their information from television, (81.8%) of them obtained the information through maize farmers association, (77.3%) through family members, (76.4%) of them got the information from friends, (72.7%) through farmers group, (70.0%) got the information from extension agents, (52.7%) through newspaper, (29.1%) through workshop and (34.5%) of them obtained the information through seminars. This distribution shows a blend of traditional and modern information dissemination channels, with a heavy reliance on mass media and personal networks. This demonstrates a diverse array of sources through which maize farmers in the study area obtain information about organic farming practices. The prevalence of radio, television, and farmer's association highlights the importance of both traditional and modern communication channels in disseminating agricultural knowledge. The significant involvement of the maize farmer's association and other community-based groups underscores the role of organized efforts in promoting organic farming practices among farmers in the study area which is in agreement with the findings of Salau *et al.; (2020)*. While formal educational sessions such as workshops and seminars are less utilized, the data suggest a blend of information dissemination methods catering to the varied needs and preferences of farming in the study area which is agreement with the findings of Suraju (2021)

Table 3: Distribution of respondent based on sources of information on OFPs

Source of information	Frequency	Percentage (%)
Extension agent	77	70.0
Radio	98	89.1
Television	91	82.7
Workshop	32	29.1
Seminar	38	34.5
Farmers group	80	72.7
Maize Farmers association	90	81.8
Family members	85	77.3
Friends	84	76.4
Newspaper	58	52.7

Source: Field survey, 2024

Frequency of information sources on organic farming practices

Result in Table 4 revealed that the most frequently used sources of information on organic farming practices among the maize farmers in the study area was on radio (mean=1.71), followed by television with the mean score of 1.39, friends ranked third with the mean score of 1.31, family members ranked fourth with the mean score of 1.29, maize farmers association ranked fifth with the mean score of 1.25. The next in the ranking, was farmer groups. This had mean scores of 1.18 and ranked sixth, followed by extension agents (mean=1.01), newspaper (mean=0.93), workshop (mean=0.58), while the least frequently used sources of information on organic farming practices among the respondents was on seminar (mean=0.50). This implies that majority of the maize farmers in the study area frequently use radio, television, friends, family members, farmers association, farmer groups and extension agents at higher frequency, since their mean scores were higher than the decision point x=1.0. Generally, the average mean score was 1.12 and was high. The high regularity of information receipt from radio broadcasts and television highlights their pivotal roles as primary sources of agricultural knowledge. Personal networks, including friends and family members, also contribute significantly to ongoing information sharing. While the Maize Farmers Association and other organized groups play crucial roles in providing regular information, formal educational sessions like workshops and seminars are less frequently attended. This underscores the need for a diversified approach to information dissemination, catering to the preferences and accessibility of farmers in the study area. The high level of awareness can be attributed to effective dissemination of information. This finding is similar to that of Garba(2023), saying awareness is a crucial step towards the adoption of any OFPs.

Table 4: Distribution of frequency of sources of information on organic farming practices

Sources of Information	Regularly	Occasionally	Never	Mean	S.D	Ranking
Radio	82(74.5)	22(20.0)	5(4.5)	1.71	0.549	1st
Television	59(53.6)	33(30.0)	17(15.5)	1.39	0.744	2nd
Friends	52(47.3)	40(36.4)	18(16.4)	1.31	0.739	3rd
Family members	48(43.6)	46(41.8)	16(14.5)	1.29	0.708	4th
Maize Farmers association	45(40.9)	47(42.7)	18(16.4)	1.25	0.719	5th
Farmers group	44(40.0)	42(38.2)	24(21.8)	1.18	0.768	6th
Extension agent	28(25.5)	55(50.0)	27(24.5)	1.01	0.710	7th
Newspaper	28(25.5)	46(41.8)	36(32.7)	0.93	0.763	8th
Workshop	20(18.2)	24(21.8)	66(60.0)	0.58	0.744	9th
Seminar	11(10.0)	33(30.0)	66(60.0)	0.50	0.674	10th

Source: Field Survey, (2024); Grand Mean score = 1.12, decision = 1.0

Awareness of organic farming practices among maize farmers

Table 5 shows the result on the awareness of organic farming practices among maize farmers. It was revealed that majority of the maize farmers are aware of crop rotation (91.8%), mixed cropping and use of organic fertilizer (88.2%) respectively, hoeing/hand weeding (82.7%), farm yard manure (78.2%), hand picking of insect and organic pesticide (70.0%) respectively, planting trees/hedges (69.1%), green manure (67.3%), zero/hoe tillage (64.5%), composting (45.5%) and residues incorporation (40.1%), while only few of them were aware of fish emulsion (18.2%). This finding shows that mixed cropping, mixed farming, hoeing/hand weeding, crop rotation, use of organic fertilizer, farm yard manure, zero/hoe tillage, green manure, residues incorporation, composting, planting trees/hedges, hand picking of insects and organic pesticide are the major organic farming practices that maize farmers are aware of in the study area. Meanwhile fish emulsion is relatively low in terms of its awareness by the respondents. The standard deviation in awareness level suggest some variability which means that majority are aware of the OFPs, there is still a significant portion that is not fully informed. According to Abdullahi, (2021) points out that such variability in awareness can hinder uniform adoption of OFPs emphasizing the need for target education effort.

Table 5: Distribution of the respondents based on awareness of OFPs

Organic Practices	Frequency	Percentage (%)
Crop rotation	101	91.8
Mixed cropping	97	88.2
Mixed farming	78	70.9
Zero/hoe tillage	71	64.5
Green manure	74	67.3
Composting	50	45.5
Hand picking of insect	77	70.0
Organic pesticide	77	70.0
Hoeing/hand weeding	91	82.7
Use of organic fertilizer	97	88.2
Farm yard manure	86	78.2
Planting trees/hedges	76	69.1
Residues incorporation	45	40.1
Fish emulsion	20	18.2

Source: Field Survey, (2024)

Level of Awareness of organic farming practices among maize farmers.

Result in Table 6 revealed that the highest level of awareness of organic farming practices among the maize farmers in the study area was on crop rotation (mean=3.57), followed by mixed cropping with the mean score of 3.56, use of organic fertilizer ranked third with the mean of 3.35. hoeing/hand weeding was ranked fourth with the mean score of 3.27, next was mixed farming with the mean score of 3.19, followed by use farmyard manure (mean=3.15), planting trees/hedges (mean=3.06), hand picking of insect (mean=2.97), organic pesticide (mean=2.91), zero/hoe tillage (mean=2.88), green manure (mean=2.81), composting (mean=2.80), resources incorporation (mean=2,55) while the least level of awareness of OFPs among the respondents was on fish emulsion (mean=1.83).

The result of the mean score analysis in Table 6 on level of awareness of OFPs showed that maize farmers in the study

area are aware of crop rotation, mixed cropping, use of organic fertilizer, hoeing/hand weeding, mixed farming, use farmyard manure and planting trees/hedges with higher level of awareness, since their mean scores were higher than decision point x=3.0. Generally, the average mean score was 2.99 and was low.

This implies that majority of the maize farmers in the study area were aware of crop rotation, mixed cropping, use of organic fertilizer, hoeing/hand weeding, mixed farming, use farmyard manure and planting trees/hedges with higher level of awareness, since their mean scores were higher than the decision point x=3.0. While hand picking of insect, organic pesticide, zero/hoe tillage, green manure, composting, resources incorporation and fish emulsion were aware at low level, since their mean scores were lower than the decision point x=3.0.

Table 6: Distribution of the respondents based on level of awareness of organic farming practices among maize farmers

Organic farming practices	Highly aware	Aware	Moderately aware	Not aware	Mean	Standard deviation	Ranking
Crop rotation	79(71.8)	21(19.1)	4(3.6)	6(5.5)	3.57	0.807	1st
Mixed cropping	68(61.8)	31(28.2)	5(4.5)	5(5.5)	3.56	0.820	2nd
Use of organic fertilizer	64(58.2)	25(22.7)	17(15.5)	4(3.6)	3.35	0.874	3rd
Hoeing/hand weeding	56(50.9)	33(30.0)	16(14.5)	5(4.5)	3.27	0.877	4th
Mixed farming	49(44.5)	40(36.4)	14(12.7)	7(6.4)	3.19	0.893	5th
Farm yard manure	56(50.9)	25(22.7)	19(17.3)	10(9.1)	3.15	1.015	6th
Planting trees/hedges	50(45.5)	31(28.2)	15(13.6)	14(12.7)	3.06	1.052	7th
Hand picking of insect	44(40.0)	31(28.2)	23(20.9)	12(10.9)	2.97	1.027	8th
Organic pesticide	37(33.6)	37(33.6)	25(22.7)	11(10.0)	2.91	0.982	9th
Zero/hoe tillage	36(32.7)	38(34.5)	23(20.9)	13(11.8)	2.88	1.002	10th
Green manure	30(27.3)	39(35.5)	31(28.2)	10(9.1)	2.81	0.943	11th
Composting	33(30.0)	35(31.8)	29(26.4)	13(11.8)	2.80	1.003	12th
Resources incorporation	38(34.5)	15(13.6)	26(23.6)	31(28.2)	2.55	1.231	13th
Fish emulsion	12(10.9)	16(14.5)	23(20.9)	59(53.6)	1.83	1.048	14th

Source: Field Survey, (2024); Grand Mean score = 2.99, decision = 3.0

Adoption of organic farming practices among maize farmers

Table 7 shows the result on the adoption of organic farming practices among maize farmers. It was revealed that majority of the maize farmers adopted crop rotation (87.3%), use of organic fertilizer (86.4%), mixed cropping (78.2%), mixed farming (60.9 %), farm yard manure (54.5%), hand picking of insect (53.6%), hoeing/hand weeding (52.7%), planting trees/hedges (50.9 %), zero/hoe tillage and organic pesticide (42.7%) respectively, while only few of them adopted composting (33.6%), resources incorporation (32.7%), and the least adopted practices was on use of fish emulsion (10.9%). This finding shows that crop rotation, use of organic fertilizer, mixed cropping, mixed farming, farm yard manure, hand picking of insect, hoeing/hand weeding and planting trees/hedges are the major OFPs that the maize farmers had adopted in the study area. Meanwhile, zero/hoe tillage, organic pesticide, composting, resources incorporation and use of fish emulsion are relatively low in terms of its adoption by the respondents. This supports the findings of Musa (2020), that argues that the perceived effectiveness and ease in implementation are key drivers of adoption, the higher the adoption rate the more beneficial and manageable it will be.

Table 7: Adoption of organic farming practices based on percentage

Organic farming practices	Frequency	Percentage (%)
Crop rotation	96	87.3
Mixed cropping	86	78.2
Mixed farming	67	60.9
Zero/hoe tillage	47	42.7
Green manure	45	40.9
Composting	37	33.6
Hand picking of insect	59	53.6
Organic pesticide	47	42.7
Hoeing/hand weeding	58	52.7
Use of organic fertilizer	95	86.4
Farm yard manure	60	54.5
Planting trees/hedges	56	50.9
Resources incorporation	36	32.7

Fish emulsion	12	10.9

Source: Field Survey, (2024)

Level of adoption on organic farming practices among maize farmers

Result in Table 8 revealed that the highest level of adoption of organic farming practices among the maize farmers in the study area was on crop rotation (mean=4.75), followed by mixed cropping with the mean score of 4.61, zero/hoe tillage ranked third with the mean of 4.46. use of organic fertilizer was ranked fourth with the mean score of 4.39, next was mixed farming with the mean score of 4.38, followed by green manure (mean=4.03), farmyard manure (mean=3.92), hand picking of insect (mean=3.91), composting (mean=3.84), hoeing/hand weeding (mean=3.78), organic pesticide (mean=3.60), planting trees/hedges (mean=3,58), residual incorporation (mean=3.41) while the least level of adoption of OFPs among the respondents was on fish emulsion (mean=3.03).

The result of the mean score analysis in Table 8 on level of adoption of OFPs showed that maize farmers in the study area have adopted the crop rotation, mixed cropping, zero/hoe tillage, use of organic fertilizer, mixed farming and green manure to a very high level in the study area, since their mean scores were higher than decision point x=4.0. Generally, the average mean score was 3.97 and was low.

This implies that majority of the maize farmers in the study area have adopted crop rotation, mixed cropping, zero/hoe tillage, use of organic fertilizer, mixed farming and green manure at higher level of adoption, since their mean scores were higher than the decision point x=4.0. While farmyard manure, hand picking of insect, composting, hoeing/hand weeding, organic pesticide, planting trees/hedges, residual incorporation and fish emulsion were adopted at low level, since their mean scores were lower than the decision point x=4.0. The stages of adoption from awareness to interest, evaluation, trial and adoption reflect the process through which farmers gradually integrate new practices. According to Suleiman (2022) he highlights that understanding these stages is critical for developing effective intervention that support farmers through each phase, ultimately leading to Broader and more sustained adoption.

Table 8: Mean score responses of Maize Farmers on the level of adoption of OFPs

Organic practices	Not aware	Aware	interest	evaluation	trial	Adoption	Mean	S.D	Ranking
Crop rotation	10(9.1)	19(17.3)	2(1.8)	2(1.8)	5(4.5)	72(65.5)	4.72	1.926	1st
Mixed cropping	8(7.3)	19(17.3)	9(8.2)	3(2.7)	4(3.6)	67(60.9)	4.61	1.887	2nd
Zero/hoe tillage	6(5.5)	13(11.8)	15(13.6)	13(11.8)	16(14.5)	47(42.7)	4.46	1.663	3rd
Use of organic fertilizer	5(4.5)	24(21.8)	12(10.9)	8(7.3)	4(3.6)	57(51.8)	4.39	1.838	4th
Mixed farming	7.(6.4)	18.(16.4)	14.(12.7)	8(7.3)	13.(11.8)	50(45.5)	4.38	1.782	5th
Green manure	5(4.5)	14(12.7)	24(21.8)	23(20.9)	18(16.4)	26(23.6)	4.03	1.505	6th
Farm yard manure	10(9.1)	21(19.1)	23(20.9)	8(7.3)	10(9.1)	38(34.5)	3.92	1.813	7th
Hand picking of insect	7(6.4)	24(21.8)	17(15.5)	19(17.3)	10(9.1)	33(30.0)	3.91	1.706	8th
Composting	10(9.1)	16(14.5)	17(15.5)	28(25.5)	17(15.5)	22(20.0)	3.84	1.583	9th
Hoeing/hand weeding	13(11.8)	28(25.5)	15(13.6)	9(8.2)	4(3.6)	41(37.3)	3.78	1.932	10th
Organic pesticide	6(5.5)	24(21.8)	30(27.3)	18(16.4)	12(10.9)	20(18.2)	3.60	1.528	11th
Planting trees/hedges	16(14.5)	22(20.0)	20(18.2)	16(14.5)	6(5.5)	30(27.3)	3.58	1.814	12th
Residual incorporation	28(25.5)	12(10.9)	20(18.2)	15(13.6)	7(6.4)	28(25.5)	3.41	1.917	13th
Fish emulsion	33(30.0)	12(10.9)	11(10.0)	24(21.8)	18(16.4)	9(8.2)	3.03	1.771	14th

Source: Field Survey, (2024); Grand Mean score = 3.97, decision = 4.0

4.6: Factors Affecting the Adoption of Organic Farming Practices Among Maize Farmers

This table shows that the age of the farmer positively influences the adoption of organic farming practices, with older farmers more likely to adopt these practices. The coefficient for age (1.222576) with a p-value of 0.026 indicates a significant impact, reflecting how older farmers often have more experience and are more risk-averse, leading them to prefer stable and sustainable practices such as organic farming. Adedayo and Ibrahim (2022), conducted a study in Nigeria found similar trends among older farmers.

More so, marital status also plays a significant role, where married farmers are more inclined to adopt organic practices, as shown by the coefficient for marital status (1.614452) with a p-value of 0.039. This suggests that married farmers benefit from more stable household dynamics and support systems, encouraging long-term farming strategies like organic farming practices. According to Mwangi and Kariuki (2021), research in

Kenya demonstrated similar findings, indicating that married farmers are more likely to engage in organic farming practices.

Farm size shows a positive and significant influence at 10% level, with a coefficient of 1.373319 and a p-value of 0.067. This suggests that larger farms have a higher likelihood of adopting organic methods, likely due to their greater resource availability and capacity to absorb the initial costs and risks associated with the transition to organic farming. According to Mensah and Aidoo (2023), a study conducted in Ghana noted that larger farm sizes are associated with higher adoption rates of organic farming practices due to economies of scale.

In conclusion, the positive impact of age and marital status on the adoption of organic farming practices can be interpreted as a reflection of greater stability and a longer-term view towards farming among older and married farmers. Larger farms may have more resources and capacity to transition to maintain organic farming practices, explaining the positive correlation with farm size. These findings align with broader trends observed in similar regions, reinforcing the reliability and applicability of the data. This analysis is based on a probit regression model, which is appropriate for binary outcome variables, such as the adoption of organic farming practices.

The significance levels (indicated as *** at 1%, ** at 5%, and * at 10%) provide a robust measure of the reliability of these coefficients in explaining the variations in the adoption of organic farming practices.

Table 9: Factors that Influence the Maize Farmer's Adoption Using Probit Regression Model.

Variable	Coefficient	Standard Error	Z	P>Z
Age	1.222576**	0.5490981	2.23	0.026
Gender	0.5047413	0.5958566	0.85	0.397
Marital Status	1.614452**	0.7826113	2.06	0.039
Household Size	-0.5552898	0.5606957	-0.99	0.322
Education Level	0.7721306	0.7551136	1.02	0.307
Farming Experience	0.3457372	0.6109615	0.57	0.571
Farm Size	1.373319*	0.7488273	1.83	0.067
Income	-0.8582389	0.563296	-1.52	0.128
Access to Credit	0.3408058	0.5067193	0.67	0.501
Extension Agent	0.0624606	0.9849408	0.13	0.893
Membership of cooperative	-0.4744116	1.045942	-0.97	0.334
Cons	-0.406496	0.6160206	-0.66	0.509

* = Significant at 10%, ** = Significant at 5%, *** = Significant at 1%

Constraints faced by the respondents in the adoption of organic farming practices

The result of constraints faced by the respondents in the adoption of OFPs is presented in Table 10 below. Weed pressure in organic farms was identified to be the topmost constraints with mean score of 4.50. High cost of organic farm inputs ranked second with a mean score of 4.45. Inadequate capital ranked third with the mean score of 4.42. The next constraints in the ranking, is scarcity of improved seeds. This has a mean score of 4.37 and ranked fourth. Inadequate information about organic farming practices ranked fifth with a mean score of 4.33. Inadequate access to inputs was ranked sixth with a mean score of 4.33. Lack of storage facilities ranked seventh with the mean score of 4.28, followed by poor market information (mean = 4.24), low level of educational attainment (mean = 4.22), difficulty in accessing loans by organic farmers (mean = 4.21), poor extension visit (mean = 4.18), low supply of livestock manure for fertilizer (mean = 4.15), high labour demand (mean = 3.91) and difficult nature of organic practice was ranked last with the mean score of 3.71. The study area was faced with several constraints that hinder the adoption of OFPs. These constraints are consistent with the findings of Yusuf (2019) who note that such challenges can significantly impede the adoption of OFPs.

Table 10: Distribution of Respondents according to Constraints to Adoption of OFPs

Constraints	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree	Mean	S.D	Ranking
Weed pressure in organic farms	73(66.4)	23(20.9)	11(10.0)	2(1.8)	1(0.9)	4.50	0.821	1st
High cost of organic farm inputs	63(57.3)	36(32.7)	10(9.1)	-	1(0.9)	4.45	0.737	2nd
Inadequate capital	65(59.1)	29(26.4)	13(11.8)	3(2.7)	-	4.42	0.806	3rd
Scarcity of improved seeds	58(52.7)	37(33.6)	13(11.8)	2(1.8)	-	4.37	0.765	4th
Inadequate information about organic farming practices	56(50.9)	40(36.4)	8(7.3)	6(5.5)	-	4.33	0.836	5th
Inadequate access to inputs	55(50.0)	39(35.5)	13(11.8)	3(2.7)	-	4.33	0.791	6th
Lack of storage facilities	57(51.8)	34(30.9)	12(10.9)	7(6.4)	-	4.28	0.900	7th
Poor market information	59(53.6)	24(21.8)	21(19.1)	6(5.5)	-	4.24	0.947	8th
Low level of educational attainment	52(50.9)	38(34.5)	12(10.9)	8(7.3)	-	4.22	0.913	9th
Difficulty in accessing loans by organic farmers	59(53.6)	30(27.3)	12(10.9)	3(2.7)	6(5.5)	4.21	1.101	10th
Poor extension visit	54(49.1)	30(27.3)	19(17.3)	6(5.5)	1(0.9)	4.18	0.969	11th
Low supply of livestock manure for fertilizer	43(39.1)	48(43.6)	14(12.7)	3(2.7)	2(1.8)	4.15	0.880	12th
High labour demand	43(39.1)	26(23.6)	30(27.3)	10(9.1)	1(0.9)	3.91	1.054	13th
Difficult nature of organic practice	33(30.0)	38(34.5)	16(14.5)	20(18.2)	3(2.7)	3.71	1.160	14th

Source: Field Survey, (2024); Figures in Parentheses are in Percentages.

CONCLUSION AND RECOMMENDATIONS

The findings from this study show that Crop rotation, Mixed Cropping, mixed farming, , Green manure, Hand picking, Organic pesticides, Hoeing/Hand weeding, Use of Organic fertilizer, Farm yard manure, are the major Organic farming practices that the maize farmers are aware of in the study area. Moreover, findings revealed that majority of the maize farmers got their information on Organic farming practices through Radio, Television and maize farmer's association. The result also shows that majority of the respondents have adopted, crop rotation, mixed cropping, use of Fertilizer, Green manure and Hand weeding. Also extent of adoption of Organic farming practices showed that maize farmers have adopted crop rotation, mixed Cropping, use of organic fertilizer and Hand weeding to a very high extent in the study area. Nevertheless, Age, marital status and Farm size were factors that are statistically significant thus influencing the rate of Adoption of organic farming practices. Finally, poor extension visit, lack of access to credit, inadequate information about Organic farming practices, lack of memberships of cooperatives, and low level of Educational attainment were the major constraint affecting the adoption of Organic farming practices in the study area.

Based on the findings, discussions and conclusions drawn from this study it is deemed necessary to recommend the following:

1. Farmers should be encouraged to adopt Organic farming practices by supporting them with access to credit facilities.
2. Functional cooperatives should be made accessible to the weak farmers.
3. Maize Farmers should be encouraged to use organic farming practices so that they can be more dynamic in adoption process.
4. Efficient and trained extension workers are also recommended in order to provide training in Organic farming practices education for maize production.

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