IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS)
e-ISSN: 2319-2380, p-ISSN: 2319-2372. Volume 13, Issue 3 Ser. II (March 2020), PP 27-32
www.iosrjournals.org

Factors influencing the use of Organic Farming Technology among small Scale Fluted Pumpkin Farmers in South-South Zone, of Nigeria.

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Abstract: *This study was carried out to examine the factors influencing theuse of organic farming technology among small scale Fluted Pumpkin farmers in south-south zone, of Nigeria. A multi-stage sampling technique was employed in the selection of location and respondents. The data were collected from 480 small scale organic fluted pumpkin farmers. The primary instrument used for data collected was structured questionnaire. Data obtained was analyzed by descriptive statistics and Logit model. The results of the types of organic farming technology practiced by small scale fluted pumpkin farmers showed that greater proportion (56.70%) of the respondents practiced soil nutrients management, (32.50%) practiced Resource recycling, (29.00%) practiced Ecosystem management and crop Diversity organic technology. The result of Logit model indicated that age, farm size, household access to extension services, access to credit and farming experience were major factors that influenced the use of organic farming technology among small scale fluted pumpkin farmers.*

Keywords: *Organic Farming Technology, Fluted Pumpkin, Small Scale, Vegetable Farmers*

Date of Submission: 13-03-2020 Date of Acceptance: 28-03-2020

I. Introduction

Vegetable production is mostly practiced on a small scale and fluted pumpkin (*Telfairiaoccidentalis*) is among vegetables cultivated in Nigeria [1]. Fluted pumpkin is widely used and is consumed by many Nigerians. Small scale farmers are resources poor and faced with several constraints in the use of modern technology due to its expensive nature. Therefore, the utilization of agricultural technologies is usually very low [2]. Technology adopted in vegetable farming determines the growth, dissemination and use of research information at farm level (IFOAM, 2013b). Organic Agriculture combines traditional knowledge and modern science to benefit the environment and promote fair relationship and a good quality of life for all involved, (IFOAM, 2013). The aim of Organic Agriculture is to enhance productivity without destroying the soil and harming farmers, consumers and the environment (UNCTAD, 2008). According to [3], organic farming is labour and knowledge-intensive whereas conventional farming is capital-intensive, requiring more energy and manufactured inputs.Organic farming practices are needed to increase yield and constant production (FOA, 2009). Despite the importance of organic production of vegetable none of these studies have stated the factors that influence the use of organic technology among small scale fluted pumpkin farmers in south-south zone of Nigeria. It is this gap that this study seeks to fill by focusing on the factors influencing the use of organic farming technology among small scale fluted pumpkin farmers in South-South zone of Nigeria.

The study specifically stands to:

i. identify the various types of organic farming technologies practiced by small scale fluted pumpkin farmers

ii. determine the factors that influence the farmers' decision to use organic technology in fluted pumpkin production in the study area.

Research Hypothesis

The hypothesis below was formulated and tested to guide the study.

Ho1: There is no significant relationship between the factors that influence farmers' decision and use of organic technology in the study area

II. Materials And Methods

Study Area

The study was in South-South zone of Nigeria. The zone is made up of six states out of the thirty-six states of the Federal Republic of Nigeria. The six states were Akwa- Ibom, Bayelsa, Cross River, Delta, Edo,

and Rivers States. The region has potential for large opportunities in agriculture and tourism. The zone enjoys tropical climate with two distinct seasons namely; the rainy season and dry season, Rainy season is between March – November and dry season December-February. Rainfall is at its highest peak in the month of July. It has average annual rainfall of 2000mm to 2500mm. The temperature varies between 20^{O}C and 34^{O}C. The natural vegetation of the zone varies from mangrove swamps along the coastal areas to ever green forest in the fresh water zone and derived savannah in the north. Crops widely grown in the region are leafy vegetables including fluted pumpkin, waterleaf, spinach and garden egg. Other crops include maize, cassava, cucumber, pineapple, plantain, yam, banana among others. The zone has common boundary with the states in the South - East and South - West zone.

Sampling Procedure and Sample Size

A multistage random sampling technique was adopted in the selection of states, agricultural zones, local government areas, communities and respondents.

In the First stage,three states in the south –south zone were randomly selected. These were Cross River, Delta and Rivers state.

In the second stage, twoagricultural zones each were randomly selected from each of the selected states, giving a total of 6 agricultural zones that were selected. For Cross Rivers State (Calabar zone and Ogoja Zone), Delta State (Delta central and Delta north zone) and Rivers State (zone 1 and zone 11).

In the third stage, four LGAs from each of the selected agricultural zones were randomly selected, giving a total of 24 LGAs.

In the fourth stage, five communities each were randomly selected from each of the selected agricultural zones, giving a total of 120 communities.

In the fifth stage, from each of the selected communities, 5 respondents each were randomly selected giving a total of 480 respondents that were selected for the study.

Method of Data Analysis

Descriptive statistics such as frequency distribution table, mean, percentage and standard deviation were used to describe the various types of organic farming technologies practiced by the vegetable farmers.

Logit regression model were used to determine the factors that influence the farmers' decision to use organic technology in fluted pumpkin production in the study area.

Model Specification

Logit Model

OTd=f (x_s)

OTd= (dummy of 1 if yes, 0 otherwise)

DTd = $\beta_0 + \beta_1 ACF + \beta_2 SEX + \beta_3 HHS + \beta_4 IFA + \beta_5 MS + \beta_6 FMS + \beta_7 YEXP$

Where:

DTd = Decision to use organic technology
ACF = Access to credit facilities
SX = Sex of farmer (dummy of 1 if male, 0 otherwise)
IFA = Irrigation facility available
HHS = House Hold access to extension services
MS = Marital Status
FMS = Farm Size
Y EXP = Years of Experience

III. Results And Discussion

Table 1. Types of Organic Farming Technology practiced by Fluted pumpkinfarmers

S/N	Types of organic Technology	Frequency	Percentage
1.	Soil nutrient management organic Technology	408	56.70
2.	Ecosystem management and Crop diversity Protection Organic Technology	209	29.00
3.	Resource Recycling organic technology	234	32.50

4.	Energy/ Feed organic Technology	88	12.20
5.	Weed, pest and disease control organic technology	93	12.90

(Source: field survey 2019).
*- Multiple Responses were recorded from the sample size.

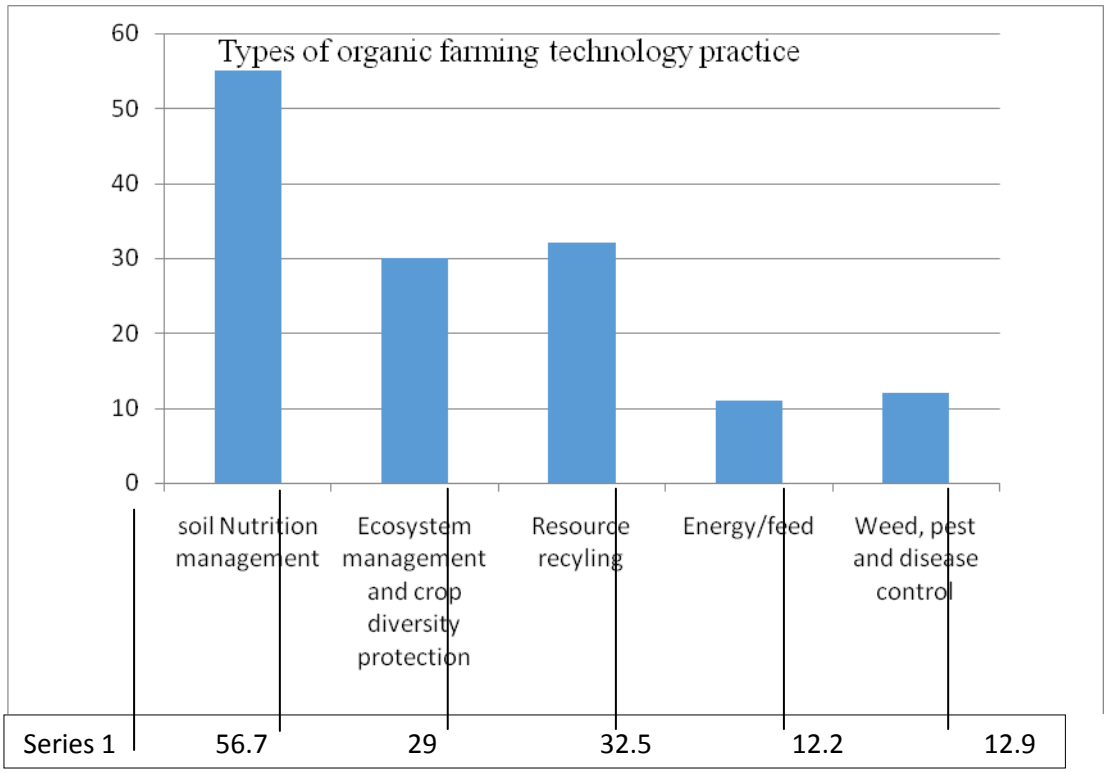

Figure 1: Organic Farming Bar Chart.

The results of the types of organic farming technology

The results of the distribution of types of organic farming technology in (Table 1) showed that greater proportion (56.70%) of the respondents practiced soil nutrient management organic technology, 32.50% practiced resource recycling organic technology, 29.00% practiced Ecosystem management and Crop Protection organic technology, 12.90% of the respondents practiced weed, pest and disease control organic technology, while (12.20%) of the respondents practiced energy/ feed organic technology. The bar chart showed that soil nutrient management took the lead followed by the resource recycling organic technology. This implied that organic fluted pumpkin farmers were interested in soil nutrients amendment technology, resource recycling organic technology, Ecosystem and Crop Protection technology and weed, pest and diseases for efficiency and high profitability. It indicates that the farmers in the study area are interested in promoting the healthy use of soil, water and air as well as minimize all forms of pollution. This result is in line with Codex Alimentarius Commission, (2007) which reported that organic production technologies are meant to promote the healthy use of soil.

Table 2: Logit model results of the factors that influence the use of organic technology by fluted pumpkin farmers.

Variables	coff.	Std. Error	Z-values	Df	Significant	Exp(B)
Age	**2.345**	**0.8345**	3.567	1	3.457***	12.450
Sex	**-1.041**	**0.639**	2.648	1	0.104	0.353
Mar.Sta	**0.507**	**0.739**	0.472	1	0.492	1.661

Farm size	**-0.225**	**0.524**	1.185	1	0.038**	0.799
Household Accessto ext. Service	**0.955**	**0.489**	3.815	1	0.041**	2.599
Irrig. facility Availability	**0.159**	**0.608**	0.965	1	0.793	1.173
Access to credit	**-0.501**	**0.945**	1.281	1	0.026**	0.606
Farming Experience	**0.652**	**0.431**	2.340	1	4.632***	3.122
Constant	**1.330**	**1.860**	4.512	1	0.074	3.783

Source: computed from field survey (2019)
R^2 = 0.635
***= Significant at 1% level of probability
**= Significant at 5% level of probability
Chi-Square =11.600
Df = 12
Sig = 0.047
Constant = 0.074

Results of Logit Regression model of the factors that influence the use of organic technology by fluted pumpkin farmers.

To determine the factors that influence the use of organic technology by fluted pumpkin farmers, logit regression estimators of socio-economic characteristics on the use of organic technology for fluted pumpkin production system were derived as shown in Table 2. The explanatory variables considered were; Age, Sex, Marital status, Farm size, House Hold access to extension services, Irrigation facilities and access to credit facility. The R^2(0.635) indicated the goodness of fit for regression estimators showing that they were able to explain about 64% of the participation probability. The value of R^2 indicated goodness of fit for regression estimators meaning that they were able to explain the participation probability. The values of $R^2$and Adjusted R^2as shown in (Table 3) were within the accepted range, and indicated that the model fitted the predicted variables. This was also confirmed by Pearson goodness of fit test that yielded large P- value. The model was also shown to have well and correctly specified predictor values with high percentages. In addition, correlation matrix for the coefficients reported weak relationships which can be interpreted to mean low or absence of multicollinearity.

Use of organic farming technology refers to a farmer's decision to implement principles and practices of organic production system. As shown in (Table 3), Age, Farm size, Household access to extension services and Access to credit facility significantly influence a farmer's decision to use organic technology, while sex, marital status, Irrigation facility availability and farming experience has an inverse relationship to the use of organic technology in fluted pumpkin production system. However, [4] established that men are seen to favour adoption of organic farming where he carried out gender influence on adoption in the study.

At this point the results of the statistical significance of the individual explanatory variables in the model are discussed as follows:

Age: Asshown in Table 3, Age of the farmers were statistically significant at 1% level of probability and is directly correlated with the farmers' decision to use organic technology in fluted pumpkin production in the study area. This implies that age is a significant factor in the choice of organic technology and that the older fluted pumpkin farmers were more likely to use organic technology in their farms than younger farmers. This finding is in line with observation of Republic of Kenya, (2010) that reported that the youths have negative disposition towards agricultural production enterprises due to its long gestation period.

Sex: Sex of the farmers was not statistically significant at any level of probability. This implies that sex of the farmers was not correlated with the farmers' decision to use organic farming technology in their fluted pumpkin production. This result could be possible due to the fact that sex cannot enhance the ability of farmers to use organic technology in fluted pumpkin production in the study area. This result contradicts the result of [5] that gender influence the use of technology and men are seen to favour use of technology.

Marital status: Marital status of the respondents was not statistically significant at any level of probability and not directly correlated with the farmers' decision to use organic farming technology in fluted pumpkin production in the study area. This implies that marital status is not a significant factor in the choice to

use organic farming technology does not affect the decision to use organic farming technology. This result disagrees with the result of [6] who reported that marital status was positive and statistically significant to organic technology use.

Farm size: Farm size was statistically significant at 5% level of probability and positively correlated with the farmers' decision to use organic farming technology. This implies that farm size was a significant explanatory variable that influenced fluted pumpkin farmers' decision to use organic farming technology in their production. The positive correlation shows that increase in farm size will lead to increased probability of farmers' decision to use organic farming technology in their farms. This study agrees with the findings of [7] who reported that land size positively influence the use of organic technology among vegetable farmers.

Household access to extension services: Household access to extension services was statistically significant at 5% probability level and also positively correlated with decision to use organic technology. This implies that household access to extension services was a significant explanatory variable influencing fluted pumpkin farmer decision to use organic technology in their farms. The positive correlation shows that increased access to extension services will lead to increased probability of farmers' decision to use organic technology in their farms. This results agreed with the report of [8] that extension agent visit to households is one of the major policy variable available to encourage farmers to use organic technology.

Irrigation facility availability: Irrigation facility availability was not statistically significant at any level of probability and also negatively correlated with decision to use organic farming technology. This implies that irrigation facility was not a significant explanatory variable and does not influence the fluted pumpkin farmers' decision to use organic farming technology in their production [9]. The non-correlation shows that decreased in irrigation facility will lead to decreased probability of farmers' decision to use organic farming technology in their farms.

Access to credit facilities: Access to credit facilities was statistically significant at 5% level of probability and also positively correlated with decision to use organic farming technology. This implies that access to credit facilities was a significant explanatory variable influencing fluted pumpkin farmers' decision to use organic farming technology. The positive correlation shows that increased in access to credit facilities will lead to increased probability of farmers' decision to use organic farming technology in their production.This is in line with the report of [10] who stated that higher income will enable the farmers to employ organic production because of its labour intensity.

Years of experience: As shown in Table 3, years of experience was statistically significant at 1% level of probability and is positively correlated with the farmers' decision to use organic farming technology in their fluted pumpkin production. This implies that years of experience was a significant explanatory variable that determines fluted pumpkin farmers' decision to use organic farming technology in their farms [11]. The positive sign shows that increased years of experience will lead to increased probability of farmers' decision to use organic farming technology in their farms. Experienced farmers who have practiced agriculture for long time know the output yield and limitations in various technologies. Experience of failure in the past will lead them to the use of new technologies to know the more productive. [12] [13] reported that years of experience in farming affected technology use positively.

Hypothesis Testing

The result showed that the correlation analysis of the factors that influence farmer's decision to use organic farming technology in the study area. From the correlation analysis, it was observed that age, farm size, household access to extension service, access to credit and years of experience had positive significant relationship with farmer's decision and use of organic technology at 1% and 5% probability level respectively. This indicates that an increase in age, farm size, household access to extension service, access to credit and years of experience will lead to an increase in the farmer's decision to use organic technology hence null hypothesis one: there is no significant relationship between the factors that influence farmer's decision and use of organic technology in the study area is rejected. This means that there is significant relationship between the factors that influence farmers' decision and use of organic technology in the study area.

IV. Summary And Conclusion

Factors influencing the use of organic farming technology among small scale Fluted Pumpkin farmers was investigated in this study.The result showed that greater proportion (56.70%) practiced soil nutrient management organic technology, fairly good proportion (32.50%) practiced resource recycling organic technology, fair proportion (29.00%) practiced Ecosystem management and Crop Protection organic technology, (12.90%) of the respondents practiced weed, pest and disease control organic technology, while (12.20%) of the respondents practiced energy/ feed organic technology.

The results of Logit regression model of the factors that influence the use of organic technology by fluted pumpkin farmers.The coefficient of **Age** (3.457)was positive at significant at 1% probability level.The

coefficient sex of farmers (0.104) was not significant at any probability level. The coefficient of marital status of farmers (0.492) showed that marital status had an inverse relationship to the use of organic technology.The coefficient of farm size (0.038) was positive and significant at 5% probability level. The coefficient of household access to extension services (0.041) was positive and significant at 5% probability level. The coefficient of irrigation facility availability (0.793) was not significant in the model. The coefficient of access to credit facility (0.026) was positive and significant at 5% probability level. The coefficient of years of experience (4.632) was statistically significant at 1% probability level.

V. Recommendations:

It was therefore recommended that:

1. Extension services should be available for household access for easy direction on how organic technology will be use by fluted pumpkin farmers in south-south zone of Nigeria.
2. Credit should be made available to organic fluted pumpkin farmers by credit institutions to encourage the use of organic technology.

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Okonkwo-Emegha Kate,etal. "Factors influencing the use of Organic Farming Technology among small Scale Fluted Pumpkin Farmers in South-South Zone, of Nigeria." *IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS)*, 13(3), 2020, pp. 27-32.