



## COMPLIANCE WITH RECOMMENDED PRODUCTION PRACTICES AMONG CASSAVA FARMERS IN EPE LOCAL GOVERNMENT AREA OF LAGOS STATE, NIGERIA

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### ABSTRACT

The study was carried out to investigate the factors influencing compliance with recommended production practices among cassava farmers in Epe Local Government Area of Lagos State, Nigeria. A multistage sampling procedure was used to collect data from 107 cassava farmers. Data were analyzed using descriptive statistics such as percentage, mean and standard deviation, and inferential statistics such as compliance index, and probit regression model. The study revealed that the mean age, household size, years of education, years of cassava farming experience and farm size were approximately 48 years, 6 people, 9 years, 14 years and 3 acres, respectively. The findings also revealed that almost all (98.9%) cassava farmers complied with intercropping cassava with maize or cowpea, while majority (72.0% and 58.1%) complied with the use of improved variety of cassava and planting population density of 10,000 per hectare. The results similarly revealed that majority (64.5%) of the cassava farmers fully complied with the recommended production practices. The study also showed that sex ( $P < 0.01$ ), years of formal education ( $P < 0.05$ ), primary occupation ( $P < 0.10$ ), and visitation by extension agent ( $P < 0.10$ ) were the factors that significantly influenced their full compliance with the recommended production practices. The study concluded that majority of the cassava farmers complied with recommended production practices and their compliance was influenced by sex, years of formal education, primary occupation and extension visit. The study therefore recommended that female cassava farmers should be motivated and encouraged to obtain information that will boost their output, and be enlightened on the importance of education to their farming activities.

**Keywords:** Cassava, Recommended, Practices, Production, Farmers, Compliance

### INTRODUCTION

Cassava (*Manihot spp*), is an economically valued root crop that plays numerous role in food security, diversification programs in different world economies, revenue generation, and is an excellent and inexpensive source of calories for humans. It is a rich source of vitamins A and C, iron, potassium and calcium (Bahekar and Kale, 2013). Cassava, according to Bahekar and Kale (2013) is also known to have therapeutic effects against several diseases such as cancer, diabetes and cardiovascular diseases. The global production of cassava in 2020 was estimated to be about 303 million metric tonnes (Onyediako and Adiele 2022), with Africa producing about 194 million metric tonnes. In addition, Nigeria with a total harvested area of 7.7 million hectares in 2020, produces about 60 million metric tonnes, making her the largest producer of cassava not only in Africa but in the world (Food and Agriculture Organization (FAO), 2022). Despite being the largest global producer of cassava, cassava output in Nigeria is far from being able to meet the domestic needs of different sectors in the country (Poverty, Oxford and Human Development Initiative, 2017; and FAO, 2018). This, on one hand is due to the ever growing population, while on the other hand, is due to cassava farmers' heavy reliance on traditional method of production, which is further associated with farmers' cultivation of marginal lands, lack of proper crop management skills, dependence on rain-fed farming, among others (Waidi, 2023). In addition, the consistent use of low yielding varieties, limited use of fertilizer and low plant population, which are common features of the traditional method of farming (National Root Crop Research Institute (NRCRI), 2016), continue to result in a reduction in the output of cassava, which thus continue to widen the supply-demand gap and reduce the export potential of the crop.

Also, while Ajeih (2014) have shown that there are improved production practices that cassava farmers can use to reduce the demand-supply gap, there still exist a non-compliance or very low rate of



compliance with these production practices, which is very worrisome. In addition, Michael (2022), submitted that the major reasons for low or non-compliance of farmers with some or all of the recommended production practices in Nigeria are limited scale, uneven distribution of farmland, insufficient funds and complex nature of technologies disseminated to farmers. This thus predisposes farmers to using ineffective agronomic practices, which consequently continue to adversely contribute to the challenges experienced or observed in the cassava production sector (Fakayode *et al.*, 2008; Tadele and Assefa, 2012). In the quest to improve the export potential of cassava and reduce the demand-supply gap, the Federal government of Nigeria introduced the National Development Plan (NDP) in 2021 and had cassava as one of its crops of focus. The plan, which identified that the low yields experienced in production was due to the use of poor production practices such as limited use of improved inputs, little use of irrigation facilities, heavy reliance on rain-fed agriculture, low levels of mechanization among others (Federal Ministry of Finance, Budget and National Planning, 2021), consequently implies that for cassava production to reach its full potential as an economic crop, farmers must comply with improved production practices. Moreover, Abass *et al* (2014), opined that using only improved cultivars will necessarily not sufficiently boost cassava production in the country, it is therefore necessary for cassava farmers to not only use, but comply with a combination of different recommended production practices.

Furthermore, for the plan towards making cassava reach its export potential to be effective, FMARD (2016) submitted that farmers must not only use quality seeds and planting implements but must use them following the recommended specifications, that is, they must fully comply with the regulations upholding these practices. Thus, one way of addressing this issue is by understanding if cassava farmers comply with these recommended agronomic practices and whether their compliance with the practices is full. This is because knowledge of farmers' compliance with the recommended practices is an important step in solving the problem of food shortages of the nation on one hand and increasing farmers' income and living standard on the other hand. It is against this backdrop that this study addressed the factors influencing compliance with recommended cassava production practices in Epe Local Government Area of Lagos State, Nigeria.

## **METHODOLOGY**

### **Study Area**

This study was carried out in Epe Local Government Area (LGA) of Lagos State. Epe LGA, which has a total land area of 121km<sup>2</sup> (Olujide, 2008), shares its boundary with Ogun State in the east and north, with Ikorodu LGA in the west and also with Ibeju-Lekki LGA in the south (Ademiju *et al.*, 2019). The LGA consists of three Local Council Development Areas (LCDAs) which are: Epe, Eredo and Ikosi-Ejirin (Abasilim *et al.*, 2019). It lies between a longitude of 2° 0' and 4° 30'E and a latitude of 6° 20' and 6° 40'N of the equator and has a population of 181,409 (Omenai and Ayodele, 2014). The climate can be described as having year-round precipitation with a mean annual rainfall of 400mm. It has a relatively high humidity which ranges from 60% in January to 80% in July, and it has an estimated yearly maximum temperature of 30°C with an average minimum of 23.8°C (Okosodo and Sarada, 2022). While the LGA is known for its bubbling fishing activities due to its numerous water bodies and fishing villages (Ojetoro and Akiboye, 2010), it is also a major producer of agricultural produce such as palm produce, firewood, corn and cassava which are sources of income for its inhabitants.

### **Sampling Technique and Sample Size**

A multistage sampling procedure was used for this study. In the first stage, one LCDA was randomly selected from the LGA, while the second stage involved a random sampling of four communities from the selected LCDA. In the third stage, a cassava farmers' cooperative was randomly selected from each community, while in the fourth stage, all the cassava farmers in each cooperative were sampled to arrive at a sample size of 107 farmers.

### **Data Collection**

Primary data were collected with the use of a well-structured questionnaire. Data were collected on farmers' socio-economic and farm characteristic (such as age, sex, education, farm size and experience in cassava production), and the various recommended cassava production practices as spelt out in literature. Although 107 copies of questionnaires were distributed and administered, only 93 copies of questionnaires were found useful for data analysis and discussion.

## Data Analysis

For this study, the data collected were analysed using different analytical techniques. This include descriptive statistics, compliance index, and probit regression model. The descriptive statistics was used to describe the socio-economic characteristics of cassava farmers and identify the compliance of cassava farmers with recommended production practices, a compliance index was further used to generate the level of compliance with recommended cassava production practices, while probit regression model was used to determine the factors that influenced the compliance with recommended production practices.

### Compliance Index

The level of compliance with the recommended practices was estimated using a compliance index. For this to be done, a compliance index was calculated for the farmers and it was generated from the formula below:

$$\text{Compliance index} = \frac{\text{number of recommended practices complied with}}{\text{total number of recommended practices introduced}} \times 100 \quad (1)$$

The average compliance level was calculated using the formula below:

$$\text{Mean compliance level} = \frac{\sum fx}{N} \quad (2)$$

Where,  $f$  = frequency of each value observed;  $N$  = number of observations of the variable  $x$ .

If a farmer's score is equal to or higher than the mean compliance level, then the farmer fully complied with the practices; if a farmer's score is less than the mean compliance level, the farmer partially complied with the practices but if a farmer's score is zero, then the farmer has not complied with the practices. However, for this study, no zero compliance was obtained, hence farmers either fully complied or partially complied with the recommended practices.

### Probit Regression Model

To determine the factors that influenced compliance with recommended cassava production practices, a probit regression model was used. This is because the likelihood function of a probit model is well-behaved as it gives consistent Maximum Likelihood Estimate (MLE) coefficients ( $\beta$ ) and standard error of the estimate(s) (Maddala, 1992). The model estimates the probability of complying with recommended production practices for an individual respondent and measures this likelihood after controlling the relevant variables used in the model. It should be noted that as earlier submitted, all cassava farmers complied with some or all of the recommended production practices and as such there are no non-compliance, hence the dependent variable was defined as a dichotomous variable with the values of 1 for cassava farmers who fully complied and 0 for those who partially complied. The probit regression model is stated below as:

$$y^* = \beta_i X_i + \varepsilon_i \quad (3)$$

$$y = \begin{cases} 1 & \text{if } y^* > 0 \\ 0 & \text{if otherwise} \end{cases} \quad (4)$$

Where  $y^*$  is the unobserved latent variable assuming value (that is, 1 if the cassava farmer fully complied with the recommended production practices and 0 if cassava farmer partially complied with the recommended production practices),  $X_i$  represents a vector of independent variables,  $\beta_i$  represents the parameters to be estimated and  $\varepsilon_i$  represents the random error term.

The independent variables estimated are as follows:

$X_1$  = age of cassava farmer (years);

$X_2$  = sex of cassava farmer (dummy 1 = male and 0 = female);

$X_3$  = marital status of cassava farmer (dummy 1 = married and 0 = single);

$X_4$  = household size of cassava farmer (number);

$X_5$  = years of formal education (years);

$X_6$  = primary occupation of cassava farmer (dummy 1 = farmer and 0 = others);

$X_7$  = years of experience in cassava farming (years);

$X_8$  = cassava farm size (acres);

$X_9$  = visitation by extension agent (dummy 1 = yes and 0 = no).



The coefficients of each independent variable in the estimated probit model only represents the direction, through the sign and not the magnitude or size of change. Therefore, for this to be possible, the marginal effects were estimated to show the magnitude of change in the dependent variable when the independent variable change (Goktolga *et al.*, 2005).

## **RESULTS AND DISCUSSION**

### **Socio-economic Characteristics of the Cassava Farmers**

The results of the socio-economic characteristics of cassava farmers as presented in Table 1 revealed that the mean age of cassava farmers was approximately  $48 \pm 11$  years, implying that they are active, full of energy required for carrying out agricultural activities, and should be more willing to try out newer practices. The results also showed that majority (80.6%) of the cassava farmers were married and that most (59.1%) of them were males. The implication of this is that majority of cassava farmers are expected to have family responsibilities, which may likely endear them to be more focused in cassava production. Also, the results showed that the mean household size of cassava farmers is approximately  $6 \pm 2$  individuals, implying that cassava farmers have a moderate household size and are more likely to get assistance from their families, which will reduce their reliance on hired labor and lower the cost of hiring labor. In addition, the results showed that majority (82.8%) of the cassava farmers were literate who had spent an average of approximately  $9 \pm 5$  years in attaining formal education. The results in Table 1 also showed that majority (61.3%) of the cassava farmers had farming as their primary occupation, with the remaining few (38.7%) being engaged in cassava production as a means of income diversification – a bid to improve their level of living. The results further showed that cassava farmers had an average of approximately  $14 \pm 9$  years of experience in cassava production, and cultivated an average of approximately  $3 \pm 2$  acres of cassava farmland. The results finally revealed that while all (100.0%) the cassava farmers were members of a cooperative association, only some (45.2%) of the cassava farmers had contacts with extension agents.

**Table 1:** Socio-economic Characteristics of the Cassava Farmers

Variables	Categories	Frequency	Percentage
Age of farmer	20 – 39	21	22.6
	40 – 59	55	59.1
	60 – 79	16	17.2
	80 – 99	1	1.1
	<b>Mean (Standard Deviation)</b>	48.01 (11.481)	
Marital status	Single	18	19.4
	Married	75	80.6
Sex of farmer	Male	55	59.1
	Female	38	40.9
Household size	1 – 5	43	46.2
	6 – 10	50	53.8
	<b>Mean (Standard Deviation)</b>	5.99 (2.483)	
Highest level of education	No formal education	16	17.2
	Primary	23	24.7
	Secondary	38	40.9
	Tertiary	16	17.2
	0	16	17.2
Years of education	1 – 10	24	25.8
	11 – 20	53	57.0
	<b>Mean (Standard Deviation)</b>	9.44 (5.113)	
Primary occupation	Civil servant	6	6.5
	Farming	57	61.3
	Artisan	12	12.9
	Private salaried worker	6	6.5
	Marketer	12	12.9
Secondary occupation	None	37	39.8
	Farming	36	38.7
	Artisan	11	11.8
	Marketer	9	9.7
Years of cassava farming	21 – 40	16	17.2
	41 – 60	1	1.1
	<b>Mean (Standard Deviation)</b>	13.80 (9.122)	
Cassava farm size	0.10 – 5.09	85	91.6
	5.10 – 10.09	8	8.6
	<b>Mean (Standard Deviation)</b>	2.80 (1.994)	
Extension agent contact	Yes	42	45.2
	No	51	54.8
Membership of association	Yes	93	100.0

Source: Field Survey, 2023

### Compliance with Recommended Cassava Production Practices

The results of the compliance with recommended cassava production practices as presented in Table 2 revealed that all the farmers complied with some or all of the practices. This is however in contrast with the results of Nwaobiala and Anyanwu (2018), who reported that although cassava farmers were aware of recommended practices, not all of them used these practices. The results further showed intercropping with maize or cowpea (98.9%), use of improved cassava variety (72%), use of plant population density (58.1%), and spacing (49.5%), as the major recommended production practices that cassava producers complied with. This result is in congruence with that of Anyanwu (2018), who identified the use of improved cassava varieties, spacing and intercropping as the recommended practices cassava farmers in their study complied with. Furthermore, the results revealed that though all farmers complied with the recommended cassava production practices, their rate of compliance differs. The result therefore revealed that majority (64.5%) of the farmers fully complied with these recommended practices, while the remaining few (35.5%) partially complied with the recommended production practices.



**Table 2:** Cassava Farmers' Compliance with Recommended Production Practices

Compliance with recommended production practices	Frequency	Percentage
Intercropping with maize or cowpea	92	98.9
Use of improved cassava variety	67	72.0
Use of plant population density of 10,000 plants per hectare	54	58.1
Spacing at 0.9m X 0.9m or 1m X 1m	46	49.5
Application of Pre-emergence herbicides (such as Flumetoron, Diuron, Atrazine or Premextra) at 2.0mg/ha	33	33.5
Fertilizer application (NPK 15:15:15)	28	30.1
Use of pesticides such as Aldrin, Carbufuran or Nuvacron	21	22.6
Application of Post-emergence herbicides (such as Paraquat or Gramoxone) at 0.5 – 1.0 mg/ha	14	15.1
Weeding at least twice 30 and 60 days after planting	13	14.0
<b>Rate of compliance</b>	<b>Frequency</b>	<b>Percentage</b>
Partially complied	33	35.5
Fully complied	60	64.5

**Source:** Field Survey, 2023

### Factors Influencing Compliance with Recommended Cassava Production Practices

The results of the probit regression model as presented in Table 3 revealed that the log-likelihood function was -50.589739, the Pseudo R-squared was 0.1636 and that the Prob. > Chi<sup>2</sup> was 0.0172, indicating that the entire model was significant at the 5% level of significance. These diagnostic variables and the level of significance showed the fitness of the entire model. The results further revealed that sex of cassava farmers, years spent in attaining formal education, primary occupation of cassava farmer, and visitation by extension agent significantly influenced full compliance of cassava farmers with recommended production practices.

The results showed that the coefficient of sex of cassava farmers was positive and statistically significant at 1% level of significance, implying that male cassava farmers will more likely fully comply with recommended production practices as compared to female cassava farmers. This could be because in many cultures, males through their freedom of participating in many social organizations have greater access to resource and information that gives them greater capacity to comply with new production practices. The results of the marginal effect showed that a change in the sex of respondents from female to male will increase their likelihood of fully complying with recommended cassava production practices by 27.4%. In addition, the results also showed that the coefficient of years of formal education was positively significant at 5% level of significance. This indicates that cassava farmers who spent more years in attaining formal education will more likely fully comply with recommended production practices as compared to cassava farmers who spent fewer years in attaining formal education. This means that the more educated a cassava farmer is, the greater is his/her chances of fully complying with recommended production practices. This could be due to the fact that education has the ability of facilitating adoption of improved technologies and farm practices (Abdullahi, 2011). The results of the marginal effect showed that an increase in the year spent in attaining formal education by 1 year will increase cassava farmers' likelihood of fully complying with recommended production practices by 1.8%.

The results further revealed that the coefficient of primary occupation of cassava farmers was negatively significant at 10% level of significance, thus implying that cassava farmers who take farming as their primary occupation will less likely fully comply with the recommended production practices as compared to their counterparts who take farming as a secondary occupation. This could be due to the fact that these set of producers are already used to the traditional or conventional production practices and are not ready to adjust or adapt to newer production practices. The results of the marginal effect revealed that a change in the primary occupation of cassava farmers from other occupation to farming will reduce their likelihood of fully complying with recommended production practices by 19.2%. Finally, the results revealed that the coefficient of visitation by extension agents was positive and statistically significant at 10% level of significance, indicating that cassava farmers who are visited by extension agents will more likely fully comply with recommended production practices as compared with those who are not visited by extension agents. This could be because the more farmers are visited by extension agents, the better



informed they are about newer practices or technologies (Berisso, 2008). The results of the marginal effect showed that an increase in the contacts cassava farmers have with extension agents by a day will increase their likelihood of fully complying with recommended production practices by 15.6%.

**Table 3:** Determinants of Compliance with Recommended Cassava Production Practices

Variables	Marginal effect	Coefficient	z
Age of farmer	0.0003	0.0009	0.05
Sex of farmer	0.2739***	0.8929***	2.79
Marital status of farmer	-0.0811	-0.2645	-0.74
Household size of farmer	-0.0034	-0.0112	-0.17
Years of formal education	0.0179**	0.0583*	1.88
Primary occupation	-0.1915*	-0.6242*	-1.90
Years of experience	0.0083	0.0269	1.23
Cassava farm size	-0.0237	-0.0774	-0.97
Visitation by extension agent	0.1556*	0.5073*	1.70
Constant		-0.3864	-0.41
Log-likelihood		-50.589739	
Prob.>Chi <sup>2</sup>		0.0172	
Pseudo-R <sup>2</sup>		0.1636	

**Source:** Data Analysis, 2023

Note: \*, \*\*, and \*\*\* represents 10%, 5% and 1% level of significance, respectively

## CONCLUSION AND RECOMMENDATIONS

The study concluded that majority of cassava farmers were aware of the recommended production practices and complied with some of them. In fact, their rate of compliance showed that majority of the cassava farmers fully complied with the practices. Also, sex of cassava farmers, years of formal education, primary occupation of cassava farmers, and visitation by extension agent significantly influenced their full compliance with the recommended production practices. The study therefore recommended that:

- Female farmers should be motivated and encouraged to obtain information that will boost their output. They should also be made to understand the benefits associated with complying fully with recommended production practices.
- Also, cassava farmers should not only be enlightened on the importance education has on their farming activities, but should regularly be educated on the need to follow or use recommended production practices. This can be achieved through sensitization, workshops, trainings and other form of activities that will ensure that adequate information is disseminated to farmers as and when due.
- Cassava farmers should be made to understand the disadvantages of sticking with old, conventional and traditional practices, and the numerous benefits embedded in using and complying to the regulations of use associated with newer production practices.
- Policies and programmes that would enhance a strong and virile information system should put in place. For this to happen, extension agents should be empowered, employed, and made available so that they can disseminate regular information to farmers. They should also endeavor to introduce every approach possible with the aim of convincing farmers to fully comply with improved practices.

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