



ADOPTION OF IMPROVED CASSAVA (*Manihot spp*) PRODUCTION
TECHNOLOGIES IN ISOKO NORTH AND SOUTH LOCAL GOVERNMENT AREAS
OF DELTA STATE, NIGERIA

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ABSTRACT

The study examined the adoption of improved cassava production technologies in Isoko North and South Local Government Areas of Delta State, Nigeria. Simple random and snowball sampling techniques were used to select 297 cassava farmers. Data were collected using a structured interview schedule. Data were analyzed using frequency counts, percentages, mean, and multiple regression. Majority (61.60%) were females. The mean age of the farmers was 41.20 years. Majority of the cassava farmers completed their secondary school education. Majority (63.40%) of the farmers adopted planting date. The cassava farmers agreed that improved cassava cultivars have a higher yield than local cultivars ($\bar{x} = 2.88$), they are disease resistant ($\bar{x} = 2.50$), improved cassava cultivars have more tuber yield per stand ($\bar{x} = 2.73$) and improved cassava cultivars mature very fast ($\bar{x} = 2.91$). The constraints facing cassava farmers on the adoption of improved cassava technologies include inadequate access/unavailability of planting materials ($\bar{x} = 3.49$), lack of agricultural inputs like fertilizers, herbicides, and pesticides ($\bar{x} = 3.01$) and irregular visits by extension agents ($\bar{x} = 3.14$). There was a significant difference between the adoption of improved cassava technologies and education ($t = 2.793$, $p = 0.006$). The study concluded that most cassava farmers were middle age, meaning they could carry out manual farming. Adoption of improved cassava production technologies was low. Thus, there was a large difference between the technologies and adoption. It was recommended, among others, that the Delta Agricultural Development Project intensify efforts at making farmers adopt cassava production technologies.

Keywords: Adoption, Cassava, Improve, Production and Technologies

INTRODUCTION

Cassava (*Manihot spp*) is a widely grown root crop in Africa, particularly in Nigeria, where it is the largest producer in the world. Nigeria's cassava production surpasses that of Brazil, Indonesia, and Thailand. It is a crucial crop for food security, with the capacity to yield well under marginal soil conditions and tolerate drought. Cassava is a cheap and reliable food source for over 700 million people in the developing world (Ukpong-Umo, 2022).

According to Mtunguja *et al.* (2019), in Nigeria, cassava is consumed as food and used for industrial purposes such as starch, alcohol, pharmaceuticals and confectioneries production. Most cassava produced is consumed as food, while a smaller portion is utilized for industrial purposes. Different regions in Nigeria have varying consumption patterns based on ecological zones (Chiaka *et al.*, 2022). Cassava is processed into popular products like *garri* and *fufu*, which are widely consumed nationwide. The demand for cassava and its products is expected to grow rapidly particularly in sub-Saharan Africa. The Nigerian government has significantly emphasized cassava production to meet the target of 60 million tons by 2030. Improved cassava technologies, including



cultivars with high yield, disease resistance and low cyanide acid content have been introduced to farmers alongside traditional practices. However, farmers' adoption of these improved cassava technologies has been limited leading to low output and challenges in cassava production. Farmers often face constraints such as inadequate information, limited access to efficient markets and poor infrastructure. These constraints result in selling unprocessed cassava tubers at lower profit margins. Furthermore, small-scale farmers who predominantly rely on traditional farming systems face difficulties in meeting the country's food production needs. Environmental hazards, population growth and climate change also contribute to food crises in Nigeria.

The study aims to evaluate the adoption of improved cassava technologies in Isoko North and South Local Government Areas of Delta State, Nigeria. The specific objectives were to.

- i. describe the socioeconomic characteristics of cassava farmers
- ii. determine the level of adoption of improved cassava production technologies,
- iii. examine farmers' perceptions on improved cassava technologies, and
- iv. identify constraints related to their use.

Hypothesis

Ho: There is no significant relationship between adoption of improved cassava production technologies and the selected socioeconomic characteristics of cassava farmers.

MATERIALS AND METHODS

The Study Area

The study was carried out in Isoko North and South Local Government Areas of Delta State. The Isoko South and North Local Government Areas of Delta State lie approximately between latitudes 5°10'N and 5°35'N and Longitudes 6°00'E and 6°25'E. The area falls within the rainforest belt of 5°N in the Niger Delta region in Nigeria. Cassava is the most cultivated arable crop, and its cultivation is restricted to the upland communities in the study area. This is because most of the Local Government Area is waterlogged because of the low elevation level. ([wikipedia.org/wiki/Isoko region](http://wikipedia.org/wiki/Isoko_region)). The communities in Isoko North noted for cassava cultivation include Aradhe, Ellu, Emevor, Idheze, Ofagbe, Okpe-isoko, Otor-igho, Owhelogbo, and Ozoro. The communities in Isoko South known for cassava cultivation include Oleh, Emede, Olomoro, Igbide, Enhwe, and Uzere.

Sampling Procedure

The population for the study consisted of all the cassava farmers registered and unregistered with the Delta State Agricultural Development Programme. Purposive sampling was used to select the cassava farming communities. Twenty percent of the registered farmers were randomly selected. Snowball sampling was used to select the unregistered cassava farmers. One registered farmer was made to identify two (2) unregistered cassava farmers by snowball sampling technique. This gave a sample size of two 297 cassava farmers.

Method of Data Analysis

Data collected were analyzed using descriptive and inferential statistics. Socioeconomic characteristics, adoption, perception and constraints were analyzed using frequency, percentage, and mean while multiple regression was used to analyze the hypothesis.

The regression equation is stated thus:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + e \quad \dots(1)$$

Where Y dependent variable = Adoption (index)

a = Constant



X₁= Gender (Male=1, Female=0)

X₃= Educational level (Years)

X₅= Farm Income (Naira)

X₇= Extension Contact (Yes=1, NO=0)

X₂= Age (Years)

X₄ = Farm Size (Ha)

X₆= Household size (No. of person)

X₈=Cosmopolitan behavior (Yes=1, NO=0)

RESULTS AND DISCUSSION

Sex Distribution of Farmers: The results in Table 1 showed that majority (61.60%) were female. This implies that the proportion of females was higher than male cassava farmers. This finding agreed with Okonya (2014) who observed that women in sub-Saharan Africa contributed 70 to 75% of agricultural food production in rural areas.

Age Distribution: The highest percentage distribution of respondents according to age in Table 1 was 31-40 years (35.69%) and the lowest was 60 years (6.40%). The mean average of 41.20 indicated that the cassava farmers were relatively young. This is an advantage for adopting and spreading innovation practices since young people are more likely to accept new innovations than older people. Consequently, they could serve better as agents of innovation transfer. This finding agreed with Iyagba and Ovai (2015); Owigho *et al.* (2023) who posited that there is a high level of involvement of young people farmers in Nigeria.

Marital Status: Table 1 shows that majority of the cassava farmers were married (71.72%) while others were single (20.20%) and widow (8.08%). This result agreed with Eromedoghene and Owigho (2019); Odjebor *et al.* (2022) found that rural areas have a high proportion of married farmers, and the need to support the family's needs explains why married households predominate in farming.

Educational Level of Cassava Farmers: The percentage distribution of cassava farmers according to level of education was presented in Table 1. The result shows that 22.90% of farmers had non-formal education, 0.67% had attained primary education, 45.45% had secondary education and 30.98 % had attained Post-secondary education. Education gives an advantage for the adoption and transfer of technologies, and it is also a crucial factor in promoting the adoption of successful innovations (Onyemma *et al.*, 2020).

Farm Size: The average farm size of respondents in the study area was 1.23 hectares. This implies that the cassava farmers were small-scale farmers. This finding agrees with Eromedoghene *et al.* (2023) that average farm holdings were between 1-2 hectares, and Ajieh (2014) stated that the small-scale farmers had between 0.5 to 3.5 hectares. As a result of the land tenure system in Africa, and Nigeria in particular, lands are fragmented. The crude implement used by our farmers limits the scale of production.

Household Size: In Table 1 the average household size was 3 persons. Ntege-Nanyeenya *et al.* (1997) observed that household size was important in providing rural farmers with labour required for agricultural activities.

Farm Income: The results in Table 1 show an average income of ₦165, 168.35 to cassava farmers per annum in the study area. This indicates that the cassava farmers were mainly small-scale farmers with attendant low income.

Extension contacts: In Table 1, majority 67.70% had contact with extension agents. This is at variance with realities on the ground currently. Umar *et al.* (2022) posited that there is an inadequate supply and number of extension workers who might affect the level of adoption of the improved technologies production leading to low yield.

Table 1: Socioeconomic Characteristics of Respondents



Variable (n=297)	Frequency/year	Percentage	Mean
Gender			
Male	114	38.40	
Female	183	61.60	
Age			
20-30	63	21.21	
31-40	106	35.69	
41-50	64	21.55	41.20
50-60	45.00	15.15	
Above 60	19	6.40	
Marital Status			
Married	213	71.72	
Single	59	20.20	
Widowed	25	8.08	
Education Level			
No formal education	68	22.90	
Primary education	2	0.67	
Secondary education	135	45.45	
Post-secondary	92	30.98	
Farm size (ha)			
0.50-1.00	175	58.92	
1.01-2.49	98	33.00	1.23ha
2.50-4.49	20	6.73	
4.50 and above	4	1.35	
Farm Income (₦)			
10,000-50,000	82	27.60	
50,001-100,000	62	20.80	
100,001-150,000	37	11.50	
150,001-200,000	27	9.0	
>200,000	99	28.9	₦165,708.35
Household size (no. of persons)			
1-3	236	79.5	3 persons
4-6	60	20.2	
7-9	1	0.30	
Extension contacts			
Yes	201	67.70	
No	96	15.50	
Yes	201	67.70	

Source: Field survey, 2019

Percentage Level of Adoption of Improved Cultural practices.

Table 2 showed that the technologies which cassava farmers adopted included planting space (55.5%), planting date (63.4%), intercrop with cover crops (63.3%) and weeding (41.1%). Technologies in which cassava farmers recorded low adoption included fertilizer application



(40.3%), disease control (40.6%), pest control (36.9%), length of stem cuttings of 25cm (27.9%) and planting depth (29.56%).

Table 2: Distribution of cassava farmers according to recommended Cultural practices.

S/N	Improved Cultural Practices (n=297)	Frequency of adopters	Frequency of non-adopters	Remark
1	Planting space 1m×1m	162 (54.5)	133(44.5)	Moderate
2	Planting date (April-June & Aug.-Oct.	165(55.6)	132(44.4)	Moderate
3	Intercrop with cover crops melon, cowpea	188(63.3)	109(36.7)	High
4	Planting depth 10-15cm	153(51.5)	144(48.5)	Moderate
5	Length of stem cutting (25cm)	87(29.3)	210(70.7)	Low
6	Pest control using Scientific/chemical method	83(27.9)	214(72.1)	Low
7	Disease control using the Scientific/Chemical method	109(36.7)	188(63.3)	Low
8	Fertilizer application (Organic)	121(40.7)	176(59.3)	Low
9	Weeding (first weeding manually followed by herbicides	122(41.1)	175(58.9)	Low

Source: Field survey (2019). Values in parenthesis are percentage.

Very Low (0 – 25%), Low (26 – 49%), Moderate (50 – 60%), High (61 – 70%), Very High (71% and above).

Cassava farmers' perception of the improved cassava cultivars

Cassava farmers' perception of the improved cassava cultivars was presented in Table 3. The cassava farmers agreed that improved cassava cultivars have a higher yield than local cultivars ($\bar{x} = 2.88$); they are disease resistance ($\bar{x} = 2.50$), improved cassava cultivars have more tuber yield per stand ($\bar{x} = 2.73$) and improved cassava cultivars mature very fast ($\bar{x} = 2.91$). The findings corroborate the view of Babasanya *et al.* (2013) that the benefits of improved cassava to farmers were higher yield, weed suppressors and high starch content. However, the cassava farmers disagreed with the statement that improved cassava cultivars are susceptible to pests ($\bar{x} = 2.16$); improved cassava cultivars are good for *garri*, tapioca and fufu ($\bar{x} = 1.71$), improved cassava cultivars have high fibre content ($\bar{x} = 1.71$), improved cultivars produce high quantity *garri* ($\bar{x} = 1.73$), the tubers does not get rotten even long after harvesting ($\bar{x} = 1.57$) and are not drought tolerant like local cultivars ($\bar{x} = 2.01$). The implications of these findings suggest that technology developers should evaluate the perception of beneficiaries after introducing the technology. Victor *et al.* (2021); Adrian *et al.* (2005) and Enyong *et al.* (1999) noted that while introducing new technology to farmers, understanding their attitudes and views can provide light on the reasons behind their adoption. Oladeji (2011) argued that the perceived advantages were closely related to farmers' attitudes towards innovations.



Table 3: Farmers' perception of improved cassava technologies.

S/N	Statement	Standard Deviation	Mean	Remark
1.	Improved cassava cultivars produce higher yield than local cultivars	1.5379	2.88	Agreed
2.	Improved cassava cultivars are more disease resistant compared to local cultivars	1.3952	2.50	Agreed
3.	The improved cassava cultivars are drought tolerant compared to local cultivars	1.3668	2.01	Disagreed
4.	Improved cassava cultivars are susceptible to pest	1.3667	2.16	Disagreed
5.	The improved cassava cultivars are good for garri, tapioca and fufu	1.2366	1.71	Disagreed
6.	The number of tubers per stand are usually more for improved cassava cultivars compared to local cultivars	1.5233	2.73	Agreed
7.	The improved cassava cultivars mature very fast	1.5375	2.91	Agreed
8.	The improved cassava cultivars have high fibre content.	1.4239	1.71	Disagreed
9.	Improved cassava cultivars produce high quantity of garri	1.3330	1.73	Disagreed
10.	The tuber of the improved cassava does not get rotten even long after harvesting.	1.1694	1.57	Disagreed

Source: Field survey (2019) Cut-off mean 2.50

Socio-economic factors that influence the adoption of improved cassava technologies

The multiple regression analysis in Table 5 shows that 63.4 % variation in adoption was explained by socioeconomic characteristics of farmers. However, farm income, household size and extension contact had a significant relationship with adoption of improved cassava technologies at $P \leq 0.05$. The positive sign borne by the coefficient indicates that an increase in the level of formal education, led to an increase in the level of adoption. Education gives an advantage for adopting and transferring technologies and is also a crucial factor in promoting the adoption of successful innovations (Onyemma *et al.*, 2020). Extension contact has a positive and significant relationship with the adoption of improved cassava technologies ($t=2.011$, $P \leq 0.05$). This is in accordance with a priori expectation that extension contacts influence adoption of technologies. In view of this, the higher the number of extension contacts, the higher the level of adoption of improved cassava technologies. Ebewore and Isiorhovoja (2019) found that the frequency of extension contacts enhanced the adoption of improved technologies in Delta State, Nigeria.

Table 5: Socio-economic factors that influence the adoption of improved cassava technologies

Variables	Coefficient	Std. Error	T- Values
Constant	111.879	5.209	21.476 ^{***}
Gender	1.334	1.771	0.754 ^{NS}
Age	-0.027	0.092	-0.295 ^{NS}
Education	1.627	0.583	2.793 ^{**}
Farm Size	-0.565	1.792	-0.315 ^{NS}
Farm Income	1.113	0.654	1.701 [*]
Household size	1.709	0.518	3.299 ^{***}
Extension Contact	4.704	2.339	2.011 [*]
F-statistics	14.02 [*]		
Adj. R-square	0.412		
R ²	0.634		

Source: Field survey (2019) *** =Significant at 1% level of significance

* =Significant at 5% level of significance

Constraints to the use of improved cassava technologies

The constraints to the use of improved cassava technologies were presented in Table 4. All the constraints were serious factors affecting the use of cassava technologies. These constraints include inadequate access/unavailability of planting materials ($\bar{x} = 3.49$), long distance and poor transportation services to purchase improved cassava cultivars ($\bar{x} = 3.11$), high cost of improved cassava cultivars ($\bar{x} = 3.23$), problem of diseases and pests control for improved cultivars ($\bar{x} = 3.08$), lack of information on improved cassava cultivars ($\bar{x} = 3.23$), low level of farmers' education on improved cassava technologies ($\bar{x} = 2.89$), lack of agricultural inputs like fertilizers, herbicides and pesticides ($\bar{x} = 3.01$) and irregular visit by extension agents ($\bar{x} = 3.14$). Many researchers have devised similar constraints about cassava production in different locations. For instance, Sanusi *et al.* (2020) stated that lack of agricultural inputs, including fertilizers, herbicides and insecticides was one of the factors limiting cassava development, it was discovered. Victor *et al.* (2021) observed that the availability of farm input supplies and efficient transportation networks promotes agricultural development and encourages increased output. Mwangombe *et al.* (2013) found that diseases and pests have greatly threatened cassava production because the farmers' inability to identify the diseases and susceptible planting materials. Igbaifua *et al.* (2022) stated that inadequate information on innovation availability could limit farmers' adoption. Ebewore and Isiorhovoja (2019) reported that poor extension delivery would result in low adoption and effectiveness of extension delivery influences farmers' adoption. The findings also agreed with Igbaifua *et al.* (2022) who reported that price of agricultural inputs and farmers' lack of knowledge were the main barriers to adopting advised practices.

Table 4: Constraints related to the use of improved technologies.

S/N	Statements	Std	Mean	Remark
1.	Inadequate access/unavailability of planting materials	0.8586	3.49	Serious
2.	Lack of information on improved cassava cultivars	0.9271	3.23	Serious
3.	High cost of improved cassava cultivars	0.9271	3.23	Serious
4.	Irregular visits by extension agents	0.9682	3.14	Serious
5.	Lack of agricultural inputs like fertilizers, herbicides, and pesticides.	1.0701	3.01	Serious
6.	Low level of education on improved cassava technologies.	1.1164	2.89	Serious
7.	Long distance / poor transportation services to purchase improved cassava cultivars	0.9360	3.11	Serious
8.	Problems of diseases and pests' control for improved cassava cultivars.	1.0554	3.08	Serious

Source: field survey 2019 Cut-off mean = 2.50

CONCLUSION AND RECOMMENDATIONS

From the results of the study, it can be concluded that Most cassava farmers were middle Age, meaning they could carry out manual farming. Adoption of improved cassava production technologies was low. Thus, there was a large difference between the technologies and adoption. However, the cassava farmers have an unfavourable perception of the improved cassava cultivars hence they still depend on local cultivars. There are lots of constraints preventing cassava farmers from using the improved cassava production technologies. Based on the findings, the following recommendations were made:

- The Delta Agricultural Development Project should intensify efforts at making farmers to adopt cassava production technologies as there is large gap between the technology development and adoption.
- Cassava farmers should avail themselves of extension information and adult education because education enhances innovation adoption.
- The government should provide practical learning centers for cassava farmers to display the yield of improved cassava cultivars by farmers who have adopted the improved cassava technologies as a permanent solution to their production problems.

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