FARMERS' PERCEPTION ON IMPROVED CASSAVA VARIETIES CULTIVATED IN ABIA STATE, NIGERIA

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Abstract
This study analyzed farmers' perception of improved varieties of cassava cultivated in Abia state, Nigeria. Multistage random sampling procedure was used to select 120 cassava farmers. Data were analyzed with descriptive and inferential statistics (Probit regression model). The result shows that majority (70.8%) of the farmers were females and practised mixed cropping (76.7%).The result also revealed that farmers had favourable perception of cassava attributes ($\overline{X}$ = 3.8) and mostly cultivated TME - 419 ($\overline{X}$=2.9), NR-8082 ($\overline{X}$=2.8) and TMS – 98/0505 ($\overline{X}$=2.8) cassava varieties. The Probit regression result showed that coefficients for high yielding, dry matter content, disease resistance, high stem ratio tolerant to moisture stress and intercropping with component crops resistance influenced farmers use of these improved varieties at different levels of probability. The result of Paired "t" test showed that there is no significant difference between perception and use of the cassava varieties by farmers in the study area. Poor extension contacts, literacy levels of farmers and type of farming system practiced were constraints to use of these varieties. The study therefore recommend development of high yielding, disease resistance and moisture tolerant varieties by breeders for increased cassava cultivation and value addition in the study area.

Keywords: Perception, Cassava, Varieties, Farmers and Attributes

Introduction

Cassava *(Manihot spp*) is one of the principal useful tropical plants and it is found on all the continents. Nigeria is the largest producer of cassava in the world; with a production record of about 34 million tons per annum which represents 37% and 19% of African production and total global production, respectively (Ikeorgu and Mbah, 2007). Many soils are used for growing cassava but high root yields can be obtained in friable and light soils. Recently, Federal Government of Nigeria has placed emphasis on cassava production in all the states because of its usefulness (Ajayi, 2012). Cassava is one of the most important root and root crops grown in Nigeria and most other countries of low land and sub-humid tropics. It is a preferred staple food that is highly cherished by many people in Nigeria because of its attributes. It is within the reach of rural people, tolerates some diseases, adapts to poor soil on which many other crops fail and with a relatively high yield. Further more, it is easily propagated by stem cuttings and resists drought making it a famine-reserve crop. It can be planted at any time of the year, provided there is enough moisture for stem cuttings to take root. Cassava is amenable to various processing forms (IITA, 2004). The rating of Nigeria as the world's leading producers of cassava may be due to the cultural and agronomic practices required for cassava cultivation through proper and thorough extension services. Cassava does well in poor soil with low rainfall. It is a perennial with wide harvesting window which allows it to act as a farming reserve (Weiev *et al.*, 2012). The crop is a dominant component in crop mixtures in South-Eastern Nigeria. It is a preferred food security crop among smallholder farmers, because it can tolerate drought, low soil fertility and its production requires minimum external inputs (Agwu and Anyaeche, 2007). Sub-Saharan Africa is expected to experience the most rapid growth in the

demand for roots and tubers (including cassava products) ranging from 2.7% per year through the year 2020. Nigeria's production is targeted at 60 million tonnes by 2020 (IITA, 2004). Selection of better improved cassava varieties by farmers has become an utmost priority owing the current awareness of the crop. The use of these varieties varies from one group of farmers to another the benefits derived from the attributes (Roger and Flemeining. 2010). Many varieties of cassava that are high yielding and Cassava Mosaic Disease resistant varieties have been developed by the National Root Crop Research Institute (NRCRI) Umudike and International Institute for Tropical Agriculture (IITA) Ibadan and disseminated by farmers through their extension outfits. Between 2002 and 2010, IITA implemented a Research and Development (R&D) project called Integrated Cassava Project (ICP) to support the presidential initiative (PI) for cassava launched in 2002 to boost cassava production. Through this project, IITA successfully introduced and promoted cassava varieties via the National Agricultural Research Services (NARSs) and Agricultural Development Programmes (ADPs). Through these efforts, more than forty (40) cassava varieties were successfully introduced and promoted to farmers in Nigeria (International Institute for Tropical Agriculture, 2004). These varieties are: TME 419, TMS 98/0581, TMS98/0510, TMS 98/0505, TMS 97/2205 and NR8082. Among these varieties, the most commonly cultivated are NR8082, TME 419 and TMS 98/0505. The attributes of these improved varieties of cassava are: canopy formations, dry matter content, disease resistant, early maturity, and field storage potentialities. Other includes: high yielding, high starch content, intercropping with component crops, tolerant to moisture stress, stem ratio (NRCRI, 2004; IITA, 2004). Though these varieties developed by research institutes has attributes that contribute to yield (output), farmers' perception to them seem to be not fully documented. The objective of the study is to analyse farmers' perception on improved cassava varieties cultivated in Abia State, Nigeria

Methodology

The study was conducted in Abia state, Nigeria. Abia state lies between Longitudes $7^0 23^1$ and $8^0 2^1$East of the Equator and Latitudes $4^0 47^1$ and $6^0 12^1$ North of the Greenwich Meridian. The state is located East of Imo state and shares common boundaries with Anambra, Enugu and Ebonyi States on the North West, North and North East respectively. On the East and Southeast it is bounded by Cross River and Akwa Ibom States and by Rivers State to the South. It occupies a land mass of 5833.11 km^2 (ABSPC, 2006). The annual rainfall ranges between 2000mm to 2400mm per annum. Relative humidity falls between 75% and 90%, while temperature ranges from 20^oC to 30^oC. Abia state is made up of three agricultural zones namely; Umuahia, Aba and Ohafia. Most of the people in Abia state, especially the rural dwellers are engaged mainly in subsistence farming. The major farm crops grown include yam, cassava, cocoyam, rice, maize, plantain, Okra and Melon (ABSPC, 2006). The study comprised of cassava farmers in Abia State. Purposive and multi-stage random sampling was used in the study. First, two Agricultural zones namely; Umuahia and Aba were purposively selected because they are the major cassava producing area of the state. From the selected zones, four (4) blocks each were randomly selected to give a total of eight (8) blocks. Furthermore, three (3) circles each were randomly selected from the selected blocks to give a total of sixteen (24) circles. Finally, five (5) cassava farmers each were randomly selected from the selected circles to give a total of one hundred and twenty (120) cassava farmers. Data for the study were collected through a structured questionnaire and analyzed with descriptive statistics such as frequency distribution, percentages, mean count and tables, as well as Probit regression and paired "t" -test analysis. Specifically objectives i, ii, iii, and iv, were achieved using descriptive statistics, while the hypotheses 1 and 2 were tested with Probit regression analysis and paired t-test respectively. Perception of cassava attributes by farmers was measured using perception 12 - item statements rated on a 4-point Likert type scale of strongly agree = 4 agree = 3 disagree = 2 strongly

disagree = 1. A mid-point was obtained thus 4+ 3 + 2 + 1 = 10 divided by 4 = 2.5. The mean score of greater than or equal to 2.5 implied favourable perception and less than 2.5 unfavourable perception. The levels of cultivation of these cassava varieties in order of preference was achieved using a 3-point Likert type scale of always= 3, occasionally = 2, fairly = 1. A mid-point was obtained thus 3 + 2 + 1 = 6 divided by 3 = 2.0. Based on the mid score, decision rule of any score greater than or equal to 2.0 implied cultivation of improved varieties of cassava, while less than 2.0 denotes non-cultivation.

Model Specification

The Probit regression analysis was used to determine the attributes of cassava varieties that influenced farmer's perception in cultivating cassava varieties. The variable can be written using an index function approach.

$Li=B^T X+ ei$……. (i)

Yi= 0 if li =T……. (ii)

Yi=1if 1>T…… (iii)

Y represents a limited dependent variable, which simultaneously measure the perception of farmers on cassava attributes. X is the vector of independent variables affecting perception of cassava attributes.

β is a vector of parameters to be estimated.

ei =error term.

If the non variable1 becomes a continuous function of the independent variables and otherwise for the generated case, the value of log livelihood function is given as empirical model are represented thus.

$Y=f(X_1,X_2\ X_3\ X_4\ X_5\ X_6\ X_7\ X_8\ X_9\ X_{10}+ei)$

Y= perception of respondents on cassava attributes (perceived = 1, not perceived = 0).

X_1= High Yielding (yes = 1, otherwise = 0)

X_2= High Dry matter content (yes = 1, otherwise = 0)

X_3= Good Plant canopy (yes = 1, otherwise = 0)

X_4= Early maturing (yes = 1, otherwise = 0)

X_5= Disease Resistant (yes = 1, otherwise = 0)

X_6= Field Storage Potentialities (yes = 1, otherwise = 0)

X_7= High Starch Content (yes = 1, otherwise = 0)

X_8 = High Stem Ratio (yes = I, otherwise =1)

X_9 = Tolerant to moisture stress (yes = I, otherwise = 0)

X_{10} = Intercropping with component crops (yes =1, otherwise = 0)

ei = error term.

The paired treatment test was used to test for difference between farmers' perception of cassava attributes and cultivation of cassava varieties are stated thus.

$$\text{"t"} = \frac{\overline{X}_1 - \overline{X_2}}{\sqrt{\frac{S^2_1}{n_1} + \overline{n_2}}}$$

$n_1 + n_2$ - 2 degrees of freedom

Where "t" = Student "t" statistic

$\overline{X}_1$ = sample mean for farmers' perception of cassava attributes

$\overline{X}_2$ = sample mean for farmers' cultivation of cassava varieties

S^2_1 = sample variance for farmers' perception of cassava attributes

S^2_2 = sample variance for farmers' cultivation of cassava varieties
n_1 = sample size for farmers' perception of cassava attributes
n_2 = sample size for farmers' cultivation of cassava varieties

Results and Discussion

The socio-economic characteristics of farmers are shown in Table 1. The result indicates that most (73.33%) of the respondents were females. This implies that females were involved more in cassava farming in the study area.

Table 1: Distribution of Socio-economic cassava farmers in Abia State, Nigeria (n = 120)

Variables	Frequency	Percentage	Mean
Gender			
Male	88	73.33	
Female	32	26.67	
Age (years)			
21 – 30	12	10.00	
31 – 40	15	12.50	
41 – 50	37	30.83	**48.1 years**
51 – 60	47	39.17	
61- 70	9	7.50	
Marital Status			
Single	13	10.83	
Married	83	69.17	
Widowed	24	20.00	
Household Size (numbers)			
1 – 5	57	47.50	
6 – 10	63	52.50	**7 persons**
Education (years)			
No formal education	16	13.33	
Primary education	40	33.33	
Secondary education	41	34.17	
Tertiary education	33	27.50	
Farm experience (years)			
1-10	17	14.17	
11-20	48	40.00	
21-30	34	28.33	**22.4 years**
31-40	21	17.50	
Farm size (hectares)			
0.1- 0.5	50	41.67	
1.1 - 1.0	39	32.50	
1.1- 1.5	26	21.67	**0.97 hectare**
1.6- 2.0	5	4.16	
Extension contact (numbers)			
Weekly	12	10.00	
Forth nightly	61	50.83	
None	47	39.17	
Farming Systems			
Alternate cropping	53	44.17	
Mixed cropping	67	55.83	

Source: ***Field Survey, 2015.***

The result disagrees with the findings of Tokula *et al.,* (2007) as he found that males dominate cassava farming in Kogi State, Nigeria. The mean age of the respondents was 48.4 years as against 69.17% that were married,. This shows that the cassava farmers were still strong and agile being in their productive age. This age group according to Asiabaka (2002) is motivational, innovative and

adaptive to agricultural innovations. Onwubuya *et al.,* (2012) affirmed that married people dominate agricultural production activities in Nigeria. The mean household size of the respondents is 7 persons. Larger household sizes are found to be source of cheap labour in any agricultural activity carried out by rural households (Nwaobiala, 2013). The respondents had secondary education (34.17%). Educated farmers were expected to be more receptive to farming techniques and perception to improved crop varieties (Okoye *et al.,* 2009). The mean farming experience and farm size for the respondents was 22.4 years and 0.9 hectare respectively. This implies that the farmers in the study area is dominated by cassava farmers who were experienced and can easily perceive new improved ideas and varieties disseminated through extension. A farmer can become less averse to the risk implies by either perceiving or accepting a new variety of technology Nwaobiala and Uchechi, (2016). The farm size of the farmers indicates they had small farm holding which in turn affects their production. With small farms, it has been argued that a large fixed cost becomes a constraint towards the perception of new and improved varieties to be used in farming, especially if it is costly (Nwaru, 2004). The result shows that 50.83% of the respondents had extension contact fortnightly. Farmers contact with extension facilitates adoption of improved farming technologies (Nwaobiala, 2015). The result shows that 55.83% of the farmers practiced mixed-cropping. Mixed cropping as practiced by the farmers may be as a result of producing varieties of crops for family needs and income. Buyinza (2008) stated that mixed cropping is a common practice among resource poor farmers in the tropics.

Perception of Improved Cassava Varieties by Farmers

Data on Table 2 shows the mean scores of perception of cassava varieties by farmers in Abia state, Nigeria. The Table indicate that the respondents agree that they use them because they were profitable($\overline{X}$= 3.8), because they know where to obtain them ($\overline{X}$= 3.8), and perceived that these cassava varieties can be used as fodder crop ($\overline{X}$= 3.8). The farmers also had high perception of these attributes because they have good quality for processing into other forms ($\overline{X}$= 3.8), and they strive well in homestead farm ($\overline{X}$= 3.8). However, the respondents perceived that they are highly yielding ($\overline{X}$= 3.8) and stem could be stored for long before planting ($\overline{X}$= 3.8), the root could be harvested all year round ($\overline{X}$= 3.8) and readily available in all seasons ($\overline{X}$= 3.7). Furthermore, they perceived that these cassava varieties has good field storage potential until harvest ($\overline{X}$=3.6), they were affordable ($\overline{X}$=3.6), and were highly resistant to disease ($\overline{X}$=3.3). The total mean of response of respondents had favourable perception on cassava varieties.

Table 2: Distribution of respondents according to their perception on cassava varieties

Perception statements	Mean
I use these varieties because I know where to obtain them	3.8
Readily available all season	3.7
They are affordable	3.6
They are highly yielding	3.8
They are profitable	3.8
They can be used as fodder crop	3.8
They do not rot until harvest	3.6
Highly resistant to Cassava Mosaic Disease (CMD)	3.3
Have quality food processing into other forms	3.8
Strive well in homestead farm	3.8
Stem could be stored for long before planting	3.8
The roots could be harvested all year round	3.8
Total mean	**3.7**

Source: ***Field Survey, 2015***

Levels of Cultivation Improved Cassava Varieties

The result in Table 3 shows that the respondents cultivated TME-419 ($\overline{X}$=2.9), NR-8082 ($\overline{X}$=2.8) and TMS-98/0505 ($\overline{X}$=2.7) as a planting material in their various farms. The total mean of cassava varieties cultivation by cassava farmers was 2.3 indicating that they had high cultivation of these varieties. The reason for the high cultivation of the three cassava varieties may be attributed to their attributes such as early maturity, disease and pest resistance and high yielding potentials. Ikeorgu and Odurukwe (1991) in their study found that improved cultivars of cassava had good contribution to yield of farmers in Nigeria.

Table 3: Distribution of respondents according to the levels of cultivation of cassava varieties in order of preference

Improved Cassava Varieties	Mean
TME-419	2.86
NR-8082	2.80
TMS-98/0505	2.75
TMS-98/0510	1.98
TMS-98/0581	1.80
TMS-97/2205	1.43
Total mean	**2.3**

Source: ***Field Survey, 2015***

Determinants of farmers' Perception on cassava varieties cultivated in Abia State, Nigeria

The result in Table 4 shows the Probit regression estimates of the determinants of perception of cassava attributes cultivated by farmers in the study area. The result shows a Chi^2value of 20.04, 15.98 and 13.92 for TME-419, NR-8082 and TMS-98/0505 respectively which were all significant at 1% level indicating that the Probit regression lines are of good fit. The pseudo R^2 values of 0.5324, 0.4712 and 0.4253 for TME-419, NR-8082 and TMS-98/0505 respectively indicate on 53.24%, 47.12% and 42.53% variability in perception of cassava used explained by the independent variable for TME-419, NR-8082 and TMS-98/0505 respectively. The results shows that the coefficients for high yielding were all positively signed and highly significant at 1% level of probability. This implies that the farmer perceived all the cassava varieties used as high yielding. As breeders outside West Africa incorporated the IITA Tropical Mosaic selection material into their breeding lines, they have attributed to a parallel productivity surge across the cassava growing middle belt of Africa (Mayong *et al*., 2000). The coefficient for disease resistant is positively signed and significant at 10% level for TME-419 and TMS-98/0505 and 5% for NR-8082. This implies that the farmer perceived these varieties as disease resistant. Improved disease tolerance and higher productivity combined with drought tolerance, low input cost and flexible harvesting colander-offer prospects for improving household and regional food security (Haggblode *et al*., 2012). The coefficient for field storage potentials was positively signed and significant at 10% level of probability for TME- 419. This implies that the farmers who planted TME-419 perceived it as crop with field storage potentials. The coefficient for high stem ratio was negatively signed for TME - 419 and significant at 5% level. The coefficient for high stem ratio was positively signed and significant at 1% and 10% level for NR- 8082 and TMS-98/0505 respectively. This implies that the farmers perceived TME-419 as a plant with low high stem ratio while TMS-98/0505 and NR-8082 were perceived with high stem ratio. This is true because the TME- 419 variety in non-branching while the NR-8082 and TMS-98/0505 were the branching type. More stem formation provides the household with a form of insurance against risk of farming and thus enables them to adopt new production methods and raise output (EL Oster and Morchart, 1999). The coefficient for tolerance to moisture stress was negatively signed for TME-419 and NR-8082 and significant at 10% level of

probability. This implies that the farmers did not perceive these varieties as tolerant to moisture stress. The coefficient for intercropping with component crop was positively signed and significant at 10% level of probability for TME-419 and NR-8082. This implies that the farmers perceived these varieties as a crop that can be intercropped with component crops.

Table 4: Probit Regression estimates of the determinants of perception of improved cassava Varieties cultivated among farmers in the study area

Variables	TME419	NR8082	TMS 90/0505
Constant	6.610	5.211	4.497
	(2.53**)	(2.56**)	(2.40**)
High yielding (X_1)	1.552	1.245	1.105
	(4.77**)	(3.92***)	(3.73***)
High Dry Matter Content (X_2)	-0.326	-0.373	-0.280
	(-0.83)	(-1.05)	(-0.83)
Good Plant Canopy (X_3)	-0.326	-0.255	-0.176
	(-1.48)	(-1.36)	(-1.04)
Early Maturity (X_4)	-0.612	-0.994	-0.125
	(-0.53)	(-0.86)	(-0.13)
Disease Resistant (X_5)	2.629	2.891	1.970
	(2.29*)	(2.86**)	(2.14*)
Field Storage Potential (X_6)	1.032	0.638	0.596
	(1.72*)	(1.23)	(1.16)
High Starch Content (X_7)	0.457	0.458	0.393
	(1.15)	(1.12)	(1.03)
High Stem Ratio (X_8)	-0.539	0.605	0.514
	(-2.49**)	(3.27***)	(1.86*)
Tolerant to Moisture (X_9)	-1.397	-1.191	-0.988
	(-1.76*)	(-1.75*)	(-1.52)
Intercropping with Component Crops (X_{10})	1.306	0.435	-
	(2.24*)	(1.87*)	-
LR Chi^2	20.04***	15.98***	13.92***
Pseudo R^2	0.5324	0.4712	0.4253
Log likelihood	-20.1227	-21.4624	-23.1827

Source: *STATA 4A Results*
Values in parentheses are t-values+ = lead equation P≤ 10*, P≤ 0.5 and P≤ 0.1*****

Difference between perception and cultivation of improved cassava varieties by farmers

The result in Table 5 shows the t-test analyses of perception and cultivation of cassava varieties in the study area. The results show that there were significant difference in perception and cultivation of improved varieties among cassava farmers in the study area. The mean value for perception and cultivation was 45.55 and 13.60 respectively. The standard deviations for perception and cultivation was 4.5225 and 2.0475 respectively which were less than their means indicating that there were no wide variations in the cultivation and perception of improved cassava varieties by farmers in Abia State, Nigeria.

Table 5: T - test Analysis for Perception and Use of Cassava Varieties

Variables	Mean	Standard Error	Standard Deviation	t - test	*p*
Perception	45.55	0.5056	4.5225	57.5634***	0.1
Cultivation	13.60	0.2289	2.0475		
Combined	29.575	1.2967	16.6027		
Difference	31.95	0.5550			

Source: STATA 4A Results

Conclusion

Results from the study have shown that farmers had high perception of cassava attributes which led to their utilization of the crop. The result indicate that there was no significant difference between farmers perception of those attributes and there use. The study recommends increased research effort in breeding for elite varieties that are high yielding, disease resistant, shelf life, high stem ratio, tolerant to moisture stress and can be intercropped with other crops.

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