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Essential Factors Associated with Growing of Improved Cassava Varieties as Food Security Crop in Oyo State, Nigeria

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Abstract

Essential factors which influenced the growing of the improved cassava varieties as food security crop were appraised in this study. Multistage sampling procedure was employed. Purposive selections of two (2) agricultural zones were carried out within Oyo State. At the second stage, two (2) Local Government Areas within the two zones were randomly selected. 27% of the populations of registered full-time cassava farmers were randomly selected for interview giving a total of 201 cassava farmers. Tobit regression model was the analytical tool employed to isolate the critical factors. The results show that the growing of improved cassava varieties as food security crop among cassava farmers were averagely practiced and done. Eight groups of factors were isolated with 55.60% contribution to growing of improved cassava varieties. However, factors such as location of farmer, educational status of the household head, annual income realized from cassava sold, membership in a farmer based organization; favourable price and type of labour used by household have significant positive effect, while farm size and farming experience of the cassava house hold have significant negative effect as factors associated with growing of improved cassava varieties. The findings from this study suggests that there is urgent need for relevant stakeholders in agriculture and government to consider the factors associated with growing of improved cassava varieties by cassava farmers, if cassava

tuber production will continue to leverage and promote our economy and serve as beneficial crop in term of food security and safety.

Keywords: Agribusiness, Food Security, Poverty alleviation, Technologies, Varieties.

Introduction

Cassava cultivation as food crop plays a vital role in food security and entire economy of both rural and urban dwellers (Agwu, and Anyaeche, 2007). Cassava has been recognized not only as a food crop alone but also as a "cash crop" because it serves has a major source of cash income for the producing households (Nweke, 1997). In the past, the bulk of cassava tubers produced in developing countries are mainly for consumption with little use of it in agro-allied industries (Kenyon *et al*., 2006, and Adebowale and Adebowale, 2008), cassava has now turned into highly demanded crop not only locally but internationally in the world export market.

African countries produce over 103 million metric tonnes cassava per annum (FAO, 2014), with Nigeria been the highest producer of cassava in the world and has maintained the rank with annual output of approximately 55 million tons in year 2013 (FAO 2014). Its production need to keep pace with its demand so that there will be little or no demand-supply gap in the cassava production and utilization. Currently, cassava is been utilized for two main purposes: for human consumption and industrial usage. Estimates for the percentage of cassava used for industrial utilization range from 5-16% while the rest is used directly for human consumption (Oti *et al*., 2011).

Improved technology is the most important factor that contributes to growth in agricultural productivity and its adoption is very important (Donkor *et al.*, 2011). However in order to improve production through the growing of improved technologies, it is important to understand the factors which determine the acceptance and intensity of use of the improved technologies (Abdoulaye *et al.,* 2014). With the potentials of cassava in addressing the increase food demand of the growing population in Africa as well as the diverse uses to which it is subjected, farmers

need to take full advantage of the benefits of cultivating improved cassava stem cuttings which translate into increased income and poverty reduction (Amao and Awoyemi, 2008). The most important factors affecting adoption and growing behavior of farmers are their personal and socio- economic characteristics (Onu and Madukwe, 2002). Despite the rapid growth in cassava production, the cassava subsectors in developing countries are still constrained by a number of factors, namely pests and diseases, agronomic problems, shortage of planting materials, inconsistent policy measures, poor market access, limited diversification of processing options, inefficient extension delivery system and inadequate access to improved processing technology (FAO, 2014).

Cassava demand is estimated to grow at 2.0% annually for food and 1.6% per year for feed in developing countries while total cassava production is projected to reach 840 million tons by 2020 based on the current production rate. However, this amount can be far surpassed if there are right policies concerning the growing of improved cassava varieties in the developing countries (Ukoha, *et al.*, 2005). However, one of the ways through which demand- supply gap can be minimized is the effective growing of the improved cassava varieties as food security crop among the cassava farmers, because the central aim of any improved technology is to bring an improvement in agricultural productivity and ensure increase in standard of living (Ajala *et al*., 2011).

Tracing the link between the growing of improved cassava varieties and its influence on food production, one can easily conclude that it is essential to carry out more study on the growing of improved cassava varieties; significantly for its far reaching beneficial implications on food security, income generation and economic promotion of the citizens. This study therefore, examines essential factors associated with growing of improved cassava varieties as food security crop in Nigeria using Oyo State.

Materials and Methods

The study on essential factors associated with growing of improved cassava varieties was carried out in Nigeria. Nigeria lies between latitude $4^0$16' and $13^0$53' north and between longitudes $2^0$40' and $14^0$41' east. It

is located in West Africa and bordered in the west by the Republic of Benin, on the east by the Republic of Cameroon and on the north by the Republic of Niger. It is bordered to the south by about 800 kilometres of the Atlantic Ocean. Nigeria occupies a land area of 923,738 kilometres (91 million hectares) and the vegetation ranges from mangrove forest on the coast to desert in the far north (The World Fact Book, 2007). The country comprises the Federal Capital Territory and thirty-six (36) states. Vegetation ranges from tropical forest in the south to the Sahel savannah in the north. Nigeria has five agricultural zones namely; South-West Zone, South-East Zone, Central Zone, North-West Zone and North-East Zone (FMANR, 1997). The cassava-growing belt falls within three agricultural zones of the southwest, southeast and the central zones (FAO, 2000). The population of the study was all the registered cassava farmers in the study areas.

Multi-stage sampling technique was employed to draw sample for the study. The first stage involved purposive selection of Oyo State in South-west because is one of the major cassava-growing zone in Nigeria (FAO, 2000). The second stage involved purposive sampling of two agricultural zones which were Ibadan and Oyo. The third stage was random sampling of four (4) Local Government Areas (LGAs) in the zones and twenty (20) wards in the selected areas. The last stage was the selection and compilation of list of cassava farmers. Through random sampling, twenty percent (20%) of members of sampled units were selected to give a sample size of 201.

Analytical Techniques

The analytical techniques used for this study include descriptive statistics and regression models. Descriptive statistics such as frequency and percentage distribution were employed to describe the socio-economic characteristics of the cassava producing households and the extent of use of improved cassava stem cuttings among the households. Tobit Regression model (Tobin 1958), a hybrid of the discrete and continuous

models was used in determining the factors that influence the use of improved cassava stem cuttings among the cassava farming households.

Explicitly, Tobit model is expressed as

$Y_i = \hat{a}_0 + \hat{a}Xi + U_i$
$Y_i^* = \hat{a}X_i + U_i$

$Y_i = Y_i^*$ if $Yi^* > 0$
$Y_i = 0$ if Y_i^* d" 0
where: Y_i is the observed dependent variable;
Y_i^* is the latent dependent variable
$\hat{a}$ is a vector of unknown parameters.
$\hat{a}_0$ is a constant term

X_i is a vector of independent variables

U_i is a stochastic error term which is normally distributed with a constant mean and variance.

i is the number of respondents (i.e. 1,2,3,…, 201)

However, Tobit regression model can be expressed implicitly as follows:

$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, X_{10},) \text{———} X_{17}$

where:

Y= Use of improved cassava stem cuttings measured as the proportion of farm land cultivated to improved cassava stem cuttings.

X_1 = Farming experience of cassava farmers (years)

X_2 = Farm size in hectares (a continuous variable)

X_3 = Yield of cassava (tones/ha)

X_4 = Extent of output commercialization (cassava sold by cassava farmer/ total output of cassava)

X_5 = Household size (number)

X_6 = Educational status of cassava farmers (Formal = 1, 0 otherwise)

X_7 = Age of cassava farmers (years)

X_8 = Gender of cassava farmers (Male=1, otherwise= 0)

X_9 = Marital status (Married= 1, otherwise=0)

X_{10} = Membership in farm-based organization by cassava farmers (Yes=1, otherwise=0)

X_{11} = Access to extension agents {Regularly (at least thrice in a week) =1, otherwise=0}

X_{12} = Location of farmer (Rural=1, otherwise=0)

X_{13} = System of land acquisition (Land owned by farmer =1, otherwise=0)

X_{14} = Source of labor (Family labor= 1, otherwise = 0)

X_{15} = Involvement of cassava farmer in off- farm activities (Yes=1, otherwise=0)

X_{16} = Market situation of last growing season (Favourable= 1, otherwise=0)

X_{17} = Access to credit (Yes= 1, otherwise=0)

Results and Discussion

As shown on Table 1, majority (78.61%) of the respondents were male while few (21.39%) were female. Male farmer's percentage was high in the study. This is in accordance with the study of Nweke et al. (2002) that more male are involved in cassava farming in Nigeria. Majority of the cassava farmers in the study area, (77.11%) had farm size between ranges of 1.00-2.00 ha. The average farm size was 2.0 hectares. Cassava is a traditional cultivated crop in which both young and old farmers

cultivate. But financial constraints, land issues and some other ecological factors can result to the average farm size reported in this work. This is close to the work of Udensi *et al* (2007) on improved cassava varieties in South-Western Nigeria. However, among cassava farmers who have farm size between range 1.00-2.00 hectares, only 36.77% are users of improved cassava stem cuttings. This indicates that a large percentage of cassava farmers who have farm size between 1.00-2.00 hectares are non-users of improved cassava stem cuttings. 77.11% of the cassava farmers were rural dwellers while 22.89 were urban dwellers. This might be because most of the rural dweller's occupation naturally is farming and those living in urban areas prefer white collar jobs to farming. Majority of the cassava farmers (64.18%) fell between the age ranges of 36-50 years. This might be because majority of the cassava farmers that are parents especially in rural areas do train their wards to take over farm activities from them and therefore directly or indirectly promote young farmers participation in cassava farming. This supports the study of Ogunleye and Oladeji (2011). A large percentage of the cassava farmers (50.25%) have formal education while 49.25 do not have formal education. Educational status of the household head is expected to influence the adoption of improved cassava varieties positively. Therefore, the higher the educational status of a farmer, the better and faster he is expected to understand the benefits of adopting improved varieties of crop. Sheikh *et al.,* (2006) reported that education is known to play a positive role in adoption of improved technologies among farmers.

In the study, 73.63% of the respondents have household size 6-10 while the average household size was seven (7) persons per household. Majority of the cassava farmers in the study area were of the opinion that a large household size could be a factor that would help them cultivate more farm land. About 87.56% of the cassava farmers in the study areas are married with only about 1.00% being single, while 10.45% are widow/widower. This might be because the farmers in the study area believed that joint effort of a farmer and his/her spouse would help to promote cassava production and other farming activities. Higher percentage that is, 44.28% of the cassava farmers in the study area

Table 1: Socio-Economic Characteristics of the Respondents

	Users		Non-users		All respondents		Mean
Variables	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage	
Gender							
Female	18	23.68	25	20	43	21.39	
Male	58	76.32	100	80	158	78.61	
Farm Size							
1.00-2.00	57	36.77	98	48.76	155	77.11	
3.00-4.00	15	39.95	23	11.44	38	18.91	
5.00-6.00	3	42.86	4	1.99	7	3.43	
7.00-8.00	1	100	0	0.00	1	0.50	
Location							
Rural	31	40.79	124	99.2	155	77.11	
Urban	45	59.21	1	0.8	46	22.89	
							49.00
Age group							
Less than 35	3	3.95	0	0	3	1.49	
36 – 50	52	68.42	77	61.6	129	64.18	
51 – 65	20	26.32	47	37.6	67	33.33	
Above 65	1	1.31	1	0.8	2	1	
Educational status (formal)	11	14.47	88	70.4	99	49.25	
None	65	85.53	37	29.6	102	50.75	
Yes							
Household size	17	22.37	4	3.2	21	10.45	8.00
1 – 5	55	72.37	93	74.4	148	73.63	
6 – 10	4	5.26	27	21.6	31	15.42	
11 – 15	0	0	1	0.8	1	0.50	
Above 15							
Marital status	11	14.47	10	8	21	10.45	
Widowed	2	2.63	0	0	2	1	
Divorced	61	80.26	115	92	176	87.56	
Married	2	2.63	0	0	2	1	
Single							

have farming experience between the ranges 11-20 years. The average farming experience was 19 years. This might be because majority of the cassava farmers in the study areas are from the rural areas, which were introduced into farming work at the early stage of their lives. This report is similar to the study of Muhammad-Lawal *et al.*, (2012) where they reported that the average farming experience of farmers in Oyo State was about 20 years.

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Results of Tobit regression Analysis

Tobit Regression model analysis results are presented in Table 2 on essential factors associated with the growing of improved cassava varieties as food security crop in the study area. The Maximum Likelihood Estimates of using Tobit model gave a Pseudo R-square of 0.55 which implies that 55 % of the variability in the dependent variable was explained by the independent variables included in the model. Eight variables were found to be significant among the seventeen variables considered. The significant variables included; location of farmer, educational status of the household head, annual income realized from cassava sold, membership in a farmer based organization, favourable price in the last growing season, and type of labour used by household, farm size and farming experience of the cassava farming household head.

Location of cassava farmers was positive and significant at one percent. The marginal effect of location of cassava farmer was (0.1189). This signifies that, the location of a cassava farmer in urban area would increase the likelihood of growing improved cassava stem cuttings by 11.89%. In

other words, if a farmer could change his location from rural to urban area, there is every possibility of cultivating improved cassava stems cuttings because farmers in urban area tend to have close access to sources of distribution of improved cassava varieties (ICV) and information about them than their counterparts. The right information obtained at the right time could go a long way in influencing adoption of none and improved method of production.

Educational status of farmer was positive and significant at one percent. Its marginal effect was 0.3245. This implies that, household with formal education has a higher likelihood of growing improved cassava varieties (32.45%) than their counterpart who had non-formal education. Education has been an important factor recognized by studies on technology adoption literature (Donkor *et al* 2011 and Fadare *et al* 2012). Educational attainment enhances the ability of processing information about new innovation that comes the way of an individual, and then using such information for their benefits. Farm- families with higher level of education should be aware of more sources of information and are more efficient in evaluating and interpreting information about innovations than those who are less educated.

Annual income realized by farmer from cassava sold was significant at five percent and has a positive influence on the likelihood of using improved cassava stem cuttings. This suggests that an increase in the average income realized by cassava farmer will lead to an increase in the probability of growing ICV.

Table 2: Tobit Regression Results

Variables	Coefficient	Marginal Effect	Standard Error	t- values	P>|t|	(95% Conf. Interval
Gender	.0956945	0.0300	.0943048	1.53	0.450	-.0419754 .3301537
Location	.5132	0.1189	.1264656	0.76	0.000***	-.1538237 .3452126
Education	.5331	0.3245	.1071829	4.79	0.000***	.301817 .7247634
Household size	-.0349	-0.0088	.1175969	4.53	0.139	.3011488 .7651891
System of land acquisition	.02207	0.0146	.0369759	0.60	0.551	-.0813014 .0114147
Source of labour	-.2289	-0.1882	.0776202	-2.95	0.004***	-.3820853 .075794
Farm size	-.1806	-0.1271	.08613	-2.10	0.037**	-.3505909 .0107202
Annual income	1.52e-06	7.49e-07	6.89e-07	2.20	0.029**	1.60e-07 2.88e-06
Other source of Income	.00605	0.0461	.1081253	0.06	0.955	-.207277 .219388
Farming Experience	-.02248	-0.2074	.008161	-2.76	0.006***	-.0385881 .0063846
Marital Status	-.0191	-0.5141	.0763684	-0.25	0.802	-.1698064 .1315452
Yield of Cassava	.0201	0.0200	.1175641	1.06	0.290	-.0173466 .057672
Output Commercialization	.1524	0.2660	.1175641	-1.30	0.196	-.3844256 .079485
Access to Extension service	.0210	0.4602	.1014453	-0.00	1.000	-.2001923 .2001133
Access to Credit	-.0209	-0.0460	.16809	0.12	0.901	-.3106842 .352622
MOFBO	.4064	0.1712	.1267186	3.21	0.002***	.1564398 .6564742
Favourable price	.3806	0.2577	.1256	3.03	0.003***	.1328888 .6285089
Constant	-.5892	-0.4231	.3539862	-1.66	0.098	-1.287698 .1091399
Sigma	.4716284		.0426278			
Log likelihood	-85.284992					
No of Observation	201					
Pseudo R^2	0.5560					

Source: Field Survey data, 2014: *** = Significant at 1% level ** = Significant at 5% level

Membership of farmers in Farm Based Organizations (MOFBO) was positively significant at one percent. This conforms to the a-priori expectation because farmers who belong to one farmers' organization or the other are more likely to have access to information about new innovations in their groups than farmers who are lone rangers. It is also most likely that for a non-user of ICV who is member of a farmer based organization, the witnessed success resulting from the use of ICV by others can influence him. This could serve as a source of encouragement to such non-user when he begins to see the positive effects of the use of ICV on his fellow farmers' farm productivity. The marginal effect of membership of farmer in Farm Based Organization was (0.1712). This means that the likelihood of a farmer who is a member of a farmer based organization in using an improved cassava stem cutting would increase marginally by 17.12%. This empirical result is consistent with the earlier studies of Donkor *et al* (2011) in Ghana and Abdoulaye *et al.,* (2014) in Nigeria who reported that membership of a farmer in a farmer based organization is a very important factor that determines the probability of using an improved cassava stem cuttings by the farmer in their respective study areas.

Favourable price of cassava in the previous growing season was significant and positively related to use of improved cassava stem cuttings. The marginal effect was 0.2577. This suggests that favourable price of cassava in the previous growing season would cause 25.77% likelihood of farmers attempting to use improved cassava stem cuttings. The result follows suit with a- priori expectation. When a farmer is able to sell his produce at a good price, he is encouraged and thus looks for ways in which he can boost his productivity, and one of such ways is the adoption of improved technology.

Farming experience of cassava farmers was negatively significant at one percent with a marginal effect of (-0.2074). This connotes that a unit increase in farming experience of a cassava farmer will result to a decrease of 0.2074 in the probability of use of improved cassava stem cuttings. The negative influence is expected because farmers with long years of experience in cultivation of cassava tend to have absolute trust in the local ones they are used to in terms of expected output and the

agrological adaptation. However, another probable reason could be as a result of their unpalatable experience of poor marketability of the breeds of the improved cassava tubers as against the local breeds. Many farmers had lost substantial revenue in the past when ICU was tried on their farms. This tends to discourage farmers in further continuing in the use of ICV.

Farm size was negative and significant at five percent. Its marginal effect was -0.1271. This suggests that a unit increase in farm size of farmer will bring about a decrease of 0.1271 in the likelihood of cultivating improved cassava stem cuttings. This may be explained in terms of the crucial problem of inadequate access to planting materials of improved cassava varieties usually encountered by farmers. When a farmer gains access to more cultivable land for cassava cultivation, he may be virtually unable to get the required ICV to cover the cultivable space. This finding is similar to the finding of Udensi *et al* (2007) who worked on adoption of selected improved cassava varieties among smallholder farmers in South-Eastern Nigeria.

Source of labour used on farms was significant at one percent but has a negative relationship with the likelihood of using improved cassava stem cuttings. Its marginal effect was -0.1882. This was observed because famers use more of hired labour than family labour since they prefer that their wards go to school instead of accompany them to work on farms during the school period. The use of excessive hired labour has financial implication on the income of users since such labour is scarce and costly. Hence, if farmers could have access to cheaper labour, either it from family or hired source, the more likely they could be in spreading their tentacles to cultivate more improved cassava stem cuttings. The use of simple hand operated tools to enhance labour could be to the advantage of the farmers and also in favour of growing of ICV.

Conclusion and Recommendations

The results of this study indicate that farming experience, farm size and source of labour as economic factors have significant negative influence on the growing of improved cassava varieties. On the other hand, membership of farmer in Farm Based Organization, and favourable price

of cassava in the last growing season have a significant positive effect on growing of ICV.

Measures to educate well experienced farmers who are used to cultivation of local cassava varieties must be put in place so as to encourage them to adopt improved cassava varieties. In the same vein, in order to profitably increase farm size by farmers, all the factors that inhibit them from obtaining improved cassava varieties after acquiring more farmland must be effectively and efficiently controlled. This would help to assist farmers with large farm size to have access to planting materials of improved cassava varieties to crop their land.

Policies which promote a cheaper source of labour will influence positively the adoption of improved cassava varieties. This could be in form of subsidizing the cost of labour or introduction of handy labour assisting technologies. .

The positive relationship between membership of farmer in Farm Based Organization and growing of improved cassava varieties implies that farmers who belong to one farmers' organization or the other will have better access to information about new innovations in groups than a farmer or farmers who are lone rangers. Policy makers should at this juncture intervene by supporting, promoting and encouraging participation in farm based organization by farmers.

Favourable price has a significant positive influence on growing of improved cassava varieties. This affirms that when a farmer is able to sell his produce at a good price, he is encouraged and looks for ways in which he can further boost his productivity, and one of such ways is through the growing of improved technology.

In conclusion, research institutes who are partners with the federal government in the production and introduction of improved cassava varieties should ensure that they design a good multiplication process for any newly improved cassava stem cuttings. This will allow a quick circulation of the improved cassava varieties among the cassava farmers who are mainly rural dwellers. None-the-less this cannot be achieved solely by research institutes. There is therefore the need for active support of extension agents who serve as intermediary between the farmers and the research institutes. These recommendations if well

implemented will go a long way in facilitating the acceptance and adoption of improved cassava varieties.

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