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AWARENESS AND WILLINGNESS TO ADOPT YELLOW FLESHED CASSAVA VARIETY BY FARMERS IN ONDO STATE, NIGERIA

Mafimisebi, O. E.
Department of Agricultural Extension and Management; Rufus Giwa Polytechnic, Owo, Ondo State, Nigeria
E mail: ojuseni@yahoo.com

Abstract
The study evaluated the awareness and willingness to adopt yellow fleshed cassava variety by farmers in Ondo State, Nigeria. Data for this study were collected through the use of validated interview schedule. Descriptive and inferential statistics were used to analyze the data collected. Empirical results showed that majority (75%) of the farmers were male whose ages ranged between 20 and 60 years with mean age of 50.8years. This indicates that respondents were still economically active. A greater percentage (80%) of the farmers passed through basic and advanced education at different levels. The result of the Chi square analysis revealed that education (0.003) and household size (0.036) significantly influenced the willingness of farmers to adopt yellow fleshed cassava. This was because they were more knowledgeable and more easily realized the benefits accrued from adopting the yellow fleshed cassava. Further empirical results showed that as family size increased, the probability of adopting the yellow fleshed cassava also increased. The study revealed that the yellow fleshed cassava variety had a low level of awareness among rural farmers nevertheless, farmers are willing to adopt the variety when its qualities were explained to them. The major challenge militating against the adoption of yellow fleshed cassava was found to be lack of knowledge about the variety, and lack of access to the cuttings. It was recommended that Government should create more awareness about the yellow fleshed cassava by making the cuttings available and financing transportation of extension agents in the state to pay more farm visits to distribute samples of the stem cuttings. This will enhance access in order to enhance information about the yellow fleshed cassava. Trainings on technology packages to ensure maximum yield should be organized for farmers.
Keywords: Yellow Cassava, Adoption, Awareness, Willingness

Introduction

Cassava once a neglected crop in some places is fast becoming an elite food crop in sub-Saharan Africa (Ukpe and Mustapha, 2016). Cassava's combined abilities to produce high yields under poor conditions and store its harvestable portion underground until needed make it a classic "food security crop" (Sanni, Onadipe, Ilona, Mussagy, Abass and Dixon, 2009). Cassava is a staple crop in tropical countries and is relied upon by 300 million people for at least 10% of their daily caloric intake in 15 African countries (Parmar, Sturm and Hensel, 2017).

Africa now produces more cassava than the rest of the world combined. The producing nations are Nigeria (35% of total African production and 19% of world production), the Democratic republic of Congo, Ghana, Tanzania, and Mozambique (Abate, Alene, Bergvinson, Shiferaw, Silim, Orr and Asfaw, 2012). Cassava production in West Africa has doubled from 25.8 million tonnes in 1990 to 53.3 million tonnes in 2004 (Tollens, 2010). Nearly two-third of total cassava production in Africa (38.3 million tonnes) is grown in Nigeria (Joshi, 2018), making it the largest producer of cassava in the world, harvesting from 3.81 million hectares, it produced 45.72 million tonnes in 2006 (Ogunleye, Adeyemo, Bamire and Binuomote, 2014) and this came about as a result of the retentions of the Nigerian government and some developmental agencies.

Nigeria has shown remarkable success in cassava processing at both domestic and commercial scales, although to varying degrees (Olaosebikan, Abdulrazeq, Owoade, Ogunade, Aina, Ilona and Parkes, 2019). The introduction of machines for most unit operations of processing has greatly eased the labour intensiveness of the trade, releasing time for women into other income-generating activities and allowing them to attend family responsibilities (Ntawuruhunga, *et.al*; 2012). Annual population growth is about 2.8% in most West African countries while annual urban growth is generally significantly higher (about 5%) than rural growth (1%) (Ntawuruhunga, James, Sanni, Sandifolo, Tarawali, Okechukwu and Leone, 2012). An annual urban growth rate of 5% for a 10 year period implies a 63% increase

in the urban population and the demand for food (Fenta, Yasuda, Heregeweyn, Belay, Hadush, Gebremedhin and Mekonnen, 2017). To feed the urban dwellers, food supply from every farm household has to increase by at least 63% in 10 years (Orsini, Kahanne, Nono-Womdim and Gianquinto, 2013). An increasing trend emerging across Africa is the consumption of cassava as a basic urban food staple and an important cash crop for rural farmers. Therefore, high yielding cultivars and labour – saving technologies are required (Smale, *et.al*; 2013).

Yellow cassava is a new, yellow fleshed breed of one of the most popular root crops in the tropics (Eyinla, *et.al*; 2018). It is similar to ordinary varieties of cassava (Manihot esculentum), but it has a yellow flesh inside the root, which is generally white in ordinary varieties. The new yellow varieties have high yields and are resistant to many pests and diseases (Crespo-Herrera, *et.al*; 2017). Like ordinary cassava, it does not need nutrient rich soils or extensive land preparation and does not suffer during droughts.

Three yellow root cassava varieties, UMUCASS 36, UMUCASS 37 and UMUCASS 38, are being grown (under the Harvest plus project) (Egezi, 2011), in Nigeria for their high concentration of β-carotene which is a precursor to Vitamin A. Vitamin A deficiency is a major issue, especially in Africa (Rice, *et.al*; 2004). Since cassava is a major staple food, yellow cassava shows great potential to alleviate Vitamin A deficiency in Africa. Vitamin A deficiency is common in sub-Saharan Africa. In Nigeria, it affects about 20% of pregnant women and 30% of children under five (Maziya-Dixon, *et.al*., 2006). It can impair immune systems and vision which could cause blindness and in some cases, death. Yellow cassava contains high levels of β-carotene, which is a precursor to vitamin A. cassava is also a major source of carbohydrates, 80% of which are starches. The new, yellow cassava can provide up to 25% of daily recommended vitamin A intake (Ilona, *et.al*; 2017). Since cassava is a major part of many people's diets, introducing cassava bio-fortified with Vitamin A is an excellent innovation to improve health on a large scale (Olatade, *et.al*; 2016).

The review of adoption studies by Kaguongo, *et.al* (2012) indicated that, adoption decisions are influenced by a number of socioeconomic, demographic, ecological and institutional factors and are dependent on the nature of the technology. (Ajayi, et.al; 2007) reported that the major reasons for not adopting farm-level technology in East Africa were: (1) farmers‟ lack of awareness of the improved technologies or a lack of information regarding potential benefits accruing from them; (2) the unavailability of improved technologies; and (3) unprofitable technologies, given the farmer's agro-ecological conditions and the complex set of constraints faced by farmers in allocating land and labor resources across farm and off-farm activities. The mismatch between technology characteristics and farmers‟ technology preferences has also been identified as the most important factor for the low level of technology adoption in Ethiopia (Kelebe, *et.al*; 2017). To improve availability of relevant information for increasing adoption, many development agents have devised several approaches and innovations. When the innovation system is linked to farmers to promote effective communication, problem identification, problem solving and personal interactions of a formal or informal nature, higher adoption of technology is apt (Rogers, 2010).

It is normally risky to change the colour of a staple crop because colour preference can negatively affect consumer adoption rates (Hutchings, 2011). This is not the case with yellow cassava. Since local consumers often add palm oil to white cassava flour in their foods, they are normally accustomed to the golden colour. Cassava can reproduce sexually or by propagation. Yellow cassava cannot be purchased from any producers currently, but a distribution system is being implemented in Nigeria providing 25,000 local households with stems under the conditions that they share their stems with other rural farmers the next season. This is the main approach to widen the distribution of yellow cassava. Since cassava does not have a critical time of harvest, it is recommended to grow a lot of cassava and harvest it the day of consumption. This makes cassava a good insurance crop for times when food is scarce.

The broad objective of the study is to evaluate the awareness and willingness to adopt yellow fleshed cassava variety by farmers. The specific objectives are to;

1. examine the socio-economic characteristics of the farmers;
2. ascertain the extent of awareness of yellow flesh cassava by farmers in the study areas;

3. investigate the willingness of farmers to adopt yellow fleshed cassava in the study area; and
4. identify the relationship between the socio-economic status of the farmers to their willingness to adopt yellow fleshed cassava in the study area.

2. Materials and Method

The study was carried out in Ondo State, Nigeria, which Comprised of 18 Local Government Areas, the state has agriculture as the main stay of the economy. Majority of the populace are engaged in farming activities and mostly on a subsistence basis.

This study engaged a two-stage sampling technique with the first stage being the purposive selection of four towns in Ondo State which includes Ogbese, Uso, Ago-panu and Emure towns. These were selected based on their predominance in the cultivation of cassava. The second stage involved the random selection of forty-five (45) farmers in each of the selected towns, making a total of one hundred and eighty (180) farmers visited for data collection. Data for this study was collected through the use of reliable and validated interview schedule. The methods of data analysis used include descriptive statistics such as frequency and percentages which were used to summarize the socioeconomic characteristics of the respondents. Chi-Square analysis was used to identify the relationship between the socio-economic status of the farmers to their willingness to adopt yellow fleshed cassava in the study area;

Chi square Analysis:

$$X^2 = \frac{\sum(F_0 - F_e)^2}{F_e} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

is used

Where: F_0 = observed frequency

F_e = expected frequency

Degree of freedom (d.f) = (r-1) (c-1)

The expected frequency (fe) = (Σr X Σr)/n

Where r = numbers of rows

c = number of columns

Σc = column total

Σr = row total

n = number of observations

Decision Criteria: If the calculated X^2 is greater than the tabulated X^2 at the specified level of significance and degree of freedom, the null hypothesis (H_0) is rejected and concluded that there is no significant relationship between the socio economic status of the farmers and their willingness to adopt the yellow fleshed cassava variety.

3. Results and Discussion

Socio–Economic Characteristics of the Respondents

It is believed that awareness promotes demand, and force rapid adoption and spread of innovation. Adoption of improved cassava cultivars begins from the decision of farmers to replace old inferior varieties or to supplement their stock of planting materials with new improved varieties or simply by extending cultivated land areas. Many factors govern the adoption of new cassava varieties, under normal circumstances, the willingness of farmers to test and continue to grow the new varieties is closely tied to their socio-economic status, which have considerable influence on their adoption level. Therefore, knowledge of the socio-economic characteristics of farmers is very important in ensuring their willingness to adopt the yellow fleshed cassava variety in the study area.

Table 1 presents an overview of the socio-economic characteristics of Cassava farmers in the study area. The table showed that majority of the farmers (75.0%) were male while only, 25.0 percent were female. This confirms the assertion that cassava is traditionally a male crop in Nigeria.

Marriage among rural communities is most cherished as children born as a product of marriages are usually of great assistance in farming activities of households. The marital status of the respondents indicates that 68.3% of them were married and living together in the household while 18.3% were widowed, 6.7% of the respondents were single, 6.7% were separated.

Age is an important factor in farming business because it shows how active the farmers would be as the years go by. The result shows that18.3% were between 20 – 40 years of age, 61.7% were between 41 – 60 years of age and 20% were above 60 years of age. The average age of the respondent was found to be 51 years. The lower percentage of respondents that falls between the age range of 20-40 years of which one can say is the age range of the economically and productively active people, shows that

farming no longer piques the interest of these young ones.

In order to meet up with the modern and emerging technologies of farming, the educational status of the farmers play a very significant role. This is because the ability to read, write and understand would literally translate to better understanding and easy adoption of innovations as they are spread to them by extension agents. The result will be more yields and better output which will lead to higher income with relatively low cost. Most of the respondents had one form of education or the other. 48.3% of the respondents completed primary education, 21.7% attained secondary education, 1.7% attained tertiary education, and 8.3% had adult education while only20% had no formal education (Table 1). It could be deduced that a greater percentage (80%) of the farmers passed through basic and advanced education at different levels hence this is likely to influence the adoption behaviour of the farmers positively. This agrees with Awotide, *et al* (2016), who asserts that the educational level is highly significant in the extent, intensity and participation of farmers to adoption of technology.

The result of the primary occupation of the respondents as presented in Table 1 revealed that 98.3% were engaged in farming, while 1.7% were traders. While only 1.7% of the respondents were engaged in farming as a secondary occupation. Majority of the farmers are business owners (30.0%) and artisans (26.7%) respectively. Household size is the number of persons that contribute and draw on the incomes of the household. (Table 1) showed that 51.7% had a family size of 1 – 5 members, 40.0% had a family size of 6 – 10 members and 8.3% had above 10 family members. Large household sizes have been noted to have correlation with food security, and especially, poverty when the household is engaged in agriculture as the main source of livelihood and income (Ike and Uzokwe, 2011). The implication is that the relatively large household size may likely enhance family labour supply on the farms, hence supporting the favorably, productive capacities of the farmers already enhanced by their ages.

The result revealed that 25% of the respondent have 1 hectare of farm, 23.3% have 2 hectares, 20% of the respondents have 3 hectares, and 20% have 4 hectares while 11.7% have 5 hectares of farmland for cultivation. The average farm size among the respondent was found to be 2.7 hectares. The study shows that 30% of the respondents had less than 10 years' experience, 33.3% had between 11 – 20 years farming experience, 20% of the farmers had between 21 – 30 years' experience in farming while 16.7% had over thirty years' experience This implies that the number of years of farming may not likely influence their willingness to adopt yellow fleshed cassava. (Table 1)

Table 1: Socio-Economic Characteristics of the Consumers

Characteristics	Variables	Frequency	%
Sex	Male	135	75
Marital status	Married	123	68.3
Age	41-60	111	61.7(50.78)
Level of Education	Primary school	87	48.3
Primary occupation	Farming	177	98.3
Secondary occup.	Business owner	54	30.0
Household size	1-5	93	51.7(5.87)
Farm size (Ha)	1	45	25.0(2.7)
Experience in farming	11-20	60	33.3
TOTAL		180	100.0

Source: Field Survey, 2019

Figures in parenthesis are mean

Membership of Association, Awareness and Willingness to Adopt Yellow Fleshed Cassava

Table 2 showed that 47.5% of the respondents belong to a farmers' association while 52.5% of the respondent do not belong to any association. It can be speculated that since fewer number of the farmers belongs to an association, their level of awareness of yellow fleshed cassava will be

low. 23.3% of the respondents indicated that they are aware of the yellow fleshed cassava while 76.7% of the respondents indicated they are not aware. It can be deduced from this result that the level of awareness of the yellow fleshed cassava is still very low. Majority (81.7%) of the respondents indicated that they are willing to adopt the yellow fleshed cassava while 18.3% of the respondents indicated they are not willing to adopt yellow fleshed cassava due to one reason or another.

Table 2: Distribution of respondents by membership of association, awareness and Willingness to adopt yellow fleshed cassava (YFC).

Factors	Variables	Freq.	%
Membership of association	No	96	52.5
Awareness of yellow fleshed cassava	No	138	76.7
Willingness to adopt YFC	Yes	147	81.7

Source: Field Survey, 2019

Reasons for Willing To Adopt Yellow Fleshed Cassava

Table 3 reveals that farmers are willing to adopt yellow flesh cassava because they think it will improve their income with a mean of 3.00, the yellow fleshed cassava grows faster with a mean value of 3.00. Farmers are also willing to adopt because others are adopting and because of the nutritional value with mean values of 2.38 and 2.96 respectively.

Table 3: Distribution of Respondents by Reasons for Willing to Adopt Yellow Fleshed Cassava

Variable	Agree		Undecided		Disagree		Mean
	Freq.	%	Freq.	%	Freq.	%	
Increase Income	165	91.7	0	0.0	0	0.0	3.00
Grows faster	165	91.7	0	0.0	0	0.0	3.00
I like the color and flavor	165	91.7	0	0.0	0	0.0	3.00
Others are adopting	114	63.3	0	0.0	17	30.9	2.38
Health reasons	162	90.0	0	0.0	1	1.8	2.96

Source: Field Survey, 2019

Factors Militating Against the Adoption of Yellow Fleshed Cassava

Table 4 shows the result of factors militating against the adoption of yellow fleshed cassava among the respondents. Lack of knowledge and non-availability of the variety with mean values of 2.77 and 2.70 respectively are the major factors militating against farmers' adoption. Difficulty in cultivating the yellow fleshed variety has a mean value of 1.70, and this could be as a result of lack of knowledge. Farm size with a mean of 1.63 is another factor militating against adoption, although the farmers disagree with the statement "not liking the yellow variety" with a mean value of 1.23 as a reason for not wanting to adopt the yellow fleshed variety.

Table 4: Distribution of Respondents by Factors Militating Against the Adoption of Yellow Fleshed Cassava

Variable	Agree		Undecided		Disagree		Mean
	Freq.	%	Freq.	%	Freq.	%	
Lack of Knowledge	159	88.3	0	0.0	7	11.7	2.77
Farm size	57	31.7	0	0.0	41	68.3	1.63
Difficult to cultivate	63	35.0	0	0.0	39	65.0	1.70
Non availability of the variety	27	85.0	0	0.0	51	15.0	2.70
I don't like the yellow variety	21	11.7	0	0.0	53	88.3	1.23
High cost of cultivation	51	28.3	1	1.7	42	70.0	1.58
Taboo	30	16.7	0	0.0	50	83.3	1.33
No access to cutting	57	31.7	2	3.3	39	65.0	1.67
No market for yellow cassava	3	1.7	0	0.0	59	98.3	1.03

Source: Field Survey, 2019

Test of Hypotheses

Hypothesis H_0

Ho: There is no significant relationship between the socio economic status of the farmers and their willingness to adopt the yellow fleshed cassava variety.

The result of the chi square analysis revealed that education and household size significantly influence the willingness of farmers to adopt yellow fleshed cassava. It implies that the level of education of the respondents influence their willingness to adopt. This could be because they are more knowledgeable and realize the benefit of adopting the yellow flesh cassava. Also there is a significant relationship between household size and willingness to adopt. The implication is that, as family size increases, the probability of adopting the yellow flesh cassava also increases. The result supports Awortwi's (2013) assertion that educational status and family size influences participation among rural people. The result also, reveals that, age is not significant, and this is an indication that, age of respondents is not influential in determining their willingness to adopt the yellow fleshed cassava variety. Marital status of the respondent and the number of years of farming are not significant and thus do not influence the willingness of farmers to adopt yellow fleshed cassava.

Table 5: Chi square analysis between the socio – economic characteristics of farmers and willingness to adopt yellow fleshed cassava

Variables	Willingness to Adopt			
	Will adopt	Will not adopt	Df	p-value
Age				
41-60	87	24	2	0.632
Sex				
Male	108	27	1	0.563
Educational level				
No formal	72	15	4	0.003
Farming years				
0-10	48	6	3	0.738
Marital status				
Married	102	21	3	0.964
Family size				
1-5	78	15	3	0.036

Source: Field Survey, 2019

Conclusion and Recommendations

The study examined the awareness and willingness to adopt yellow cassava variety by farmers in Ondo State, Nigeria. Findings from the study showed that 18.3% were less than 40 years of age, while 20% were above 60 years of age. The average age of the farmers was 51years. The respondents showed a commendable level

of literacy as majority of the farmers have one form of education or the other. A greater percentage (80%) of the farmers passed through basic and advanced education at different levels.

The study also revealed that a large percentage of the farmers were males. Out of 180 respondents, 135of them, representing 75%, were males and 45, representing 25%, were females. It could be deduced that that cassava is traditionally a male crop in Nigeria. The awareness of the respondents to yellow fleshed cassava is very low as indicated by the 76.7% who indicated that they are not aware. However, the farmers are willing to adopt the yellow fleshed cassava as indicated by 81.7% of the respondents. Findings from the study as revealed by the chi square analysis showed that education and household size significantly influence the willingness of farmers to adopt yellow fleshed cassava and this corroborates Awortwi's (2013) assertion that educational status and family size influences participation among rural people. Age, marital status and the number of years of farming have no significant relationship to the willingness of farmers to adopt the yellow fleshed cassava.

The study concludes that the yellow fleshed cassava variety is not well known among rural farmers; however, farmers are willing to adopt the variety. Therefore, in order to improve the level of awareness and the adoption of yellow fleshed cassava, more awareness have to be done especially in the rural areas as the bulk of the food produce of the nation are cultivated and produced by farmers living in the rural areas. Also education is a key factor that has a significant effect on the willingness of the farmers to adopt yellow fleshed cassava. Consequently, if education is improved in the rural areas, it will assist the rapid transformation of the rural sectors in Nigeria and improve the understanding of farmers to new technology and boost the adoption of new innovation with a view to contributing to the overall national development of the country. Standard of living increases as the level of education increases. Also, rural farmers should be encouraged to adopt new innovations and improved varieties of plants in order to improve standard of living and farmers should be well trained in order to improve their farming practices. Government should create more awareness about the yellow fleshed cassava and other improved variety of agricultural input. Agricultural operations are time bound, thus there should be timely and adequate provisions of agricultural inputs at a subsidized cost by the Government. State government should ensure and mandate all extension agents in all the 18 local government to pay more farm visit in order to enhance more interaction with farmers and through that farmers' can get access to more information about new innovations in agriculture. The government must ensure the provision of improved processing facilities and adequate market for agriculture in order to increase productivity. Trainings should be organized for farmers so that they can have the right knowledge of the latest agricultural practices and the importance of adopting new and improved varieties of agricultural inputs.

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