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Assessment of Farmers Utilization of Pro-Vitamin A Cassava (Yellow Roots) Varieties In Abia State, Nigeria.

Nwakor Flora Ngozi and Amadi Genevieve

National Root Crops Research Institute Umudike, Abia State, Nigeria
Email: ngonwakor @ gmail .com

Abstract
*This study assessed the level of utilization of pro vitamin A cassava in Abia state, Nigeria. A multistage sampling technique was used to select one hundred and twenty (120) farmers for the study. The farmers were interviewed by means of structured questionnaires to elicit information about pro vitamin a cassava utilization. Data collected were analyzed using descriptive and inferential statistics. The result shows a high level (100%) awareness of pro vitamin A cassava varieties and about 81.7% of the respondents have at least one of them in their farms. The most widely grown pro vitamin A cassava varieties were Umucass 36 (37.5%) and Umucass 38 (28.3%) while Umucass 45 (1.7%) was the least. There was also a high level of utilization of pro-vitamin A cassava stems (3.52), roots (4.10), fufu (3.95), gari (3.42), and abacha (3.48) as shown by the mean scores above threshold. The result also shows that the major determinants of pro vitamin A cassava utilization among respondents were Education (4.605***), fufu quality (1.892*), market value (1.932*), price of the product (2.080**), processing value (1.824*) and market distance (-3.592***). Lack of fertilizer, high cost of labour and unavailability of finance were the top three farmers' constraint to the use of pro vitamin A cassava among the respondents. It was recommended that more value addition to pro vitamin A cassava be promoted and farm inputs be made more available for increased utilization among farmers in Abia State.*
Keywords: Farmers, Utilization, Pro-vitamin A, Cassava,

Introduction

Many years of research and development has greatly impacted on the cassava varieties diversity on Nigerian farms. Research showed that 100 genotypes are grown on farmer's fields in South eastern states of Nigeria (Akoroda 2011). Among root and tuber crops cassava remains the key to food security and poverty reduction in Nigeria as most households are dependent on its production, processing and marketing (Amadi, 2018). Previous agricultural programmes in Nigeria have already emphasized high productivity and some efforts in preservation of produce, but little or no attention has been paid to improving the nutritional status of cassava as an energy giving food. Demand- driven research conducted by scientists at National Root Crops Research Institute (NRCRI) Umudike, Nigeria has led to the development of many improved technologies on cassava with the hope to give the farmers a stable new market along with new production technologies, Among the developed technologies are cassava stem multiplication technologies, improved cassava varieties and cassava value addition technologies(Nwakor,*etal*.,2016). Recently, cassava genotypes that have high amounts of pro-vitamin A, have been developed and transferred to farmers by NRCRI in collaboration with International Institute for Tropical Agriculture (IITA), for saving thousands of people particularly pregnant women and children from vitamin A deficiency related diseases, such as night blindness, stunting, predisposition to common infections and even death. The pro-vitamin A cassava varieties are Umucass 36,Umucass 37,Umucass 38 released in 2011 and Umucas 44, Umucas 45and 46 released in 2014. Egesi (2011) revealed that the next goal of the Bio cassava plus is to stack several genes conferring high level of vitamin A, iron and protein in a single variety of cassava.Nutrition is the key for sustainable economic development and government needs a paradigm shift to adopt new

technologies that will maximize the emerging opportunities for better nutrition.It was based on this philosophy, that NRCRI Umudike and IITA developed and transferred bio fortified cassava varieties to improve health and food security condition among the people.

The study seeks to analyze the utilization the of pro vitamin A cassava (Yellow root) varieties among farmers in Abia Statewith a view to identifying the various yellow roots cassavavarieties grown by farmers, assessing farmers' preference uses for pro vitamin A cassava, analyzing the level of utilization of pro vitamin A cassava, analyzing the determinants of utilization ofpro vitamin A cassava and identifying the constraints militating against utilization of pro vitamin A cassava in the study area

Methodology

The study was conducted among farmers in Abia state, Nigeria. The state is made up of seventeen LGAs. Multistage sampling technique was used for the study. In the first stage six local government areas Arochukwu, Bende, Umuahia South, Isialangwa, Umunneochi and Umuahia North were randomly selected, followed by random selection of 2 communities in each LGA. Ten cassava farmers, who had used yellow root cassava were purposively selected in these communities. Making it a total number of 120 farmers selected for this study. A well-structured questionnaire with interview schedule was use to elicit information from the farmers. Data collected were analyzed by means of descriptive statistics such as frequency distribution tables, percentages means. A 5-point Likert rating scale with 3 points ({5+4+3+2+1}/5) as the threshold was used to analyze the level utilization of yellow root cassava among the respondents. The five point Likert scoring was used as follows: (5 HIU= highly in use, 4 FIU=fairly in use, 3 UN= Undecided, 2 HU=highly un-use, 1 NIU=Not in use). Mean of each value item was computed by multiplying the frequency of positive response with its appropriate Likert nominal value, and dividing the sum by the number of the respondent to the items. The model was specified as follows:

$\bar{X} = \sum fn/N$, where $\bar{X}$ = Mean utilization score, $\sum$ = Summation sign, F = Frequency or number of respondent who responded positively, n = Nominal likert score, N = number of respondents. $\bar{X}$ = 1+2+3+4+5/5 = 3.00. Responses with mean values of 3.00 and above indicated utilization of yellow root cassava, while values less than 3.00 indicated non-non-utilization. Also a three point likert type of scale 3 A= Agree, 2 UN= Undecided, 3 D=Disagree was used to analyzed the best use yellow root cassava was put to by the respondents (1 +2+3 = 6 /3 = 2.0) following the model specified above. The multiple regression analysis was used to analyze the determinant of yellow root utilization among the respondents. The multiple regression analysis is specified as follows:

The model is $Y = F(X_1, X_2, X_3, \ldots\ldots\ldots\ldots X_{13} + ei)$, where Y=Number of products utilized, X_1 = Age, X_2= Marital status, X_3= Gender, X_4 =Education (yrs), X_5 = Market distance (km), X_6 = Income (₦), X_7=input access, X_8=Food quality, X_9=Garri quality, X_{10}= Fufu quality, X_{11}=Market value, X_{12}= Price of product, X_{13}= Processing value, Ei =Error term

Results and Discussion

The result in table 1 showed the socioeconomic profile of the respondents. Majority (71.7%) of the respondents were females and majority (75.0%) were married, only but (18.3%) were single. Fifty (50%) of the respondents were below 40 years while the remaining 50% were above 40 years of age. The implication is that many young people were cassava farmers in Abia State and this will lead to increase production and utilization of yellow root in the study area sinceage is known to be a primary latent characteristic in adoption decisions and younger farmers are known

relatively better able to effectively withstand the rigours, strain and stress involved in agricultural production than older farmers (Onyenucheya and Ukoha, 2007). Majority (50%) of the farmers had secondary education while only 1.7% had no formal education at all. The fact that most farmers were educated shouldlead to increase in the utilization of yellow root cassava since education has the capacities to influence people to accept new technology and change their attitude to the desired technology (Okoye *et al.,* 2004). Moderate (70%) to large (28.3%) household size prevalent in the study area suggests the availability of family labour which may enhance pro vitamin A cassava utilization. Majority (72.5%) of the respondent live close to the market and also majority (80%) live very close to their farms, indicating that they have easy access to their farms and markets for yellow root utilization and commercialization. The highest source of information about yellow root cassava to the farmers was fellow farmers (45.0%), followed by NRCRI Umudike (39.2%). Similarly, the highest number of farmers (30.8%) obtained their yellow root cassava cuttings from their fellow farmers. Murphy (1993) observed that farmers communicate most frequently and effectively with those who are most similar to them and are more likely to obtain information from and be influenced in their farming practices and adoption decision by other farmers. Result presented in table 1 also indicated that most of the farmers have been farming for up to 10 years and above and majority (75.0%) belong to co-operative societies.

Table 1: Distribution of Respondents according to Socioeconomic Characteristics

Variable	***Frequency***	***Percentage***	***Mean***
Gender			
Female	86	71.7	
Male	34	28.3	
Total	**120**	**100**	
Marital status			
Married	90	75.0	
Single	22	18.3	
Divorced	8	6.7	
Total	**120**	**100**	
Age			
21 – 30	32	26.7	
31 – 40	28	23.3	
41 and above	60	50.0	
Total	**120**	**100**	**41.2**
Educational Qualification			
No formal education	2	1.7	
Primary	31	25.8	
Secondary	60	50.0	
Tertiary	18	15.0	
Others	9	7.5	
Total	**120**	**100**	
Household size			
1-5	84	70.0	
6-10	34	28.3	
10 and above	2	1.7	

Total	**120**	**100**	**4.5**
Distance to market			
0-4km	87	72.5	
5-9km	8	6.7	
10-14km	9	7.5	
15km and above	16	13.3	
Total	**120**	**100**	**4.5**
Distance to farm			
0-4km	96	80.0	
5-9km	0	0.0	
10-14km	12	10.0	
15km and above	12	10.0	
Total	**120**	**100**	**5.0**
Source of information			
Extension agents	10	8.3	
NRCRI Umudike	47	39.2	
Fellow farmers	54	45.0	
Marketers	9	7.5	
Total	**120**	**100**	
Source of yellow root cassava			
NRCRI	17	14.2	
ADP	24	20.0	
Other farmers and friends	54	45.0	
Market	25	20.8	
Total	**120**	**100**	
Farming experience			
1-9 years	16	13.3	
10-19years	46	38.3	
20-29years	26	21.7	
30years and above	32	26.7	
Total	**120**	**100**	**8.9**
Cooperative membership			
Yes	90	75.0	
No	30	25.0	
Total	**120**	**100**	

Source: Field survey, 2019.

The result presented in table 2 shows 100% awareness of yellow root cassava and about 81.7% of the respondents have yellow root in their farms. This finding is in agreement (Esuma *et al,*2019*)* who reported a high level of awareness and production of pro-vitamin A cassava among farmers in eastern Uganda. Majority (81.7%) of the respondents started growing yellow root in the last 2years and many (78.3%) developed high interest on yellow root cassava. About 56 5% of the respondents like it because of its pro vitamin A content, while less than (50%)were using it because of several reasons like the attractiveness of the colour, the demand, the quality etc. The

table also showed that pro vitamin A cassava was being used for major food like gari and fufu. Farmers had added more value to pro vitamin A cassava for flour, chips and flakes

Table 2: Distribution of Respondents according to farmers' awareness and use of pro vitamin A cassava

Variable	Frequency	Percentage
Awareness of yellow cassava		
Yes	100	100
No	20	0.0
Total	**120**	**100**
Planting of yellow cassava		
Yes	98	81.7
No	22	18.3
Total	**120**	**100**
Number of years		
0-2 years	98	81.7
3-5 years	22	18.3
Total	**120**	**100**
Likeness		
Yes	94	78.3
No	26	21.7
Total	**120**	**100**
Reasons		
Contains vitamin A	71	59.2
High quality food	1	0.8
High market value	4	3.3
High demand	2	1.7
The colour	13	10.8
All of the above	29	24.2
Total	**120**	**100**
Value added to yellow cassava		
Gari	49	40.8
Fufu	55	45.8
Flour	6	5.0
Chips	8	6.7
Flakes	2	1.7
Starch	0	0.0
Total	**120**	**100**

Field survey, 2019

Result in table 3 shows the various varieties of yellow root grown by farmers in Abia State. The result shows that the most widely grown yellow root cassava were Umucass 36 (37.5%) and Umucass 38 (28.3%) while Umucass 45 (1.7%) was the least. This may be due to the fact these varieties were among the first pro vitamin A cassava to be released for commercial production in

2011 before the Umucass 44, 45 and 46 were released in 2014. Majority (47.7%) started to use it since 2014.

Table 3: Distribution of Respondents according to the varieties of pro vitamin A cassava used and period

	Frequency	Percentage
Yellow root cassava		
Umucass 36	45	37.5
Umucass 37	14	11.7
Umucass 38	34	28.3
Umucass 44	15	12.5
Umucass 45	2	1.7
Others	10	8.3
Total	**120**	**100**
Time of usage		
2014	50	47.7
2016	30	25.0
2018	40	33.3
Total	**120**	**100**

Source: Field Survey 2019

The result in table 4 showed high utilization of yellow cassava roots (mean score 4.10) for different purposes. Its usage for fufu (mean score 3.95), abacha/flakes (mean score 3.48) and gari (mean score 3.42) were high while there was low utilization of yellow root other purposes assessed. The grand mean of 2.55 showed a low level of utilization of yellow root cassava in the overall assessment of the utilization. The high utilization of Pro vitamin A cassava for gari, fufu and abacha may be due to the active promotion of such products by NRCRI and ADP in the State (Ezeh *et al*, 2014)

Table 4: Distribution of Respondents According to Level of Utilization of Pro vitamin A Cassava (yellow root cassava)

YELLOW ROOT PRODUCTS	HIU (5)	FIU (4)	UN (3)	HU (2)	NIU (1)	TOTAL	MEAN
Yellow cassava stem	54(270)	26(104)	2(6)	4(8)	34(34)	422	3.52
Yellow cassava root	72(360)	20(80)	0(0)	24(48)	4(4)	492	4.10
Yellow cassava fufu	74(370)	14(56)	6(18)	4(8)	22(22)	474	3.95
Yellow cassava garri	60(300)	10(40)	4(12)	12(24)	34(34)	410	3.42
Yellow root slice	24(120)	28(112)	24(72)	6(12)	38(38)	354	2.95
Yellow root abacha	32(160)	36(144)	28(84)	6(12)	18(18)	418	3.48
Yellow root flour	2(10)	22(88)	4(12)	12(24)	80(80)	214	1.78

Yellow root chips	6(12)	6(24)	16(48)	4(8)	88(88)	174	1.45
Yellow root leaves	0(0)	14(56)	44(132)	6(12)	56(56)	256	2.13
Yellow root leaves	0(0)	14(56)	44(132)	6(12)	56(56)	256	2.13
Cassava bread	0(0)	0(0)	2(6)	5(10)	113(113)	129	1.08
Yellow root cassava ball	4(20)	4(16)	44(132)	2(4)	66(66)	238	1.98
Yellow root cassava doughnut	0(0)	0(0)	44(132)	6(12)	70(70)	214	1.78
Yellow root cassava chinchin	0(0)	0(0)	48(144)	12(24)	60(60)	228	1.90
Grand mean							**2.55**

Field survey, 2019, HIU= highly in use, FIU=fairly in use, UN= Undecided, HU=highly un-use, NIU=Not in use, Sample size: 120, Decision rule: ≥ 3.0 = High, < 3.0 = Low

The result in Table 5 showed that most of the respondents preferred processing their pro vitamin A cassava roots into fufu (mean = 2.27) and this was in agreement with (Omodamiro *et al* 2014) who recommended the use of traditional method for production of fufu when using yellow root cassava varieties for maximum utilization of the nutrient in the newly released yellow cassava varieties. Many preferred using it for making abacha (mean = 2.23) and gari (mean = 2.20.). Farmers' preferences for using pro vitamin A cassava to make other processed products were below the threshold.

Table 5: Distribution of Respondents according to preferred use of pro vitamin A cassava

Preferred products	**A (3)**	**UN (2)**	**D (1)**	**TOTAL**	**MEAN**
Preferred for fufu	60(180)	32(64)	28(28)	272	**2.27**
Preferred for garri	52(156)	40(80)	28(28)	264	**2.20**
Preferred for abacha	50(150)	48(96)	22(22)	268	**2.23**
Preferred for flour	20(60)	58(116)	42(42)	218	**1.82**
Preferred for starch	0(0)	12(24)	108(108)	132	**1.1**
Preferred for slices	30(90)	46(92)	44(44)	226	**1.88**
All purpose	18(54)	58(116)	44(44)	214	**1.78**

Field survey, 2019, A= Agree, UN= Undecided, D=Disagree, Decision rule: ≥ 2.0 = High
< 2.0 = Low. Sample size 120

Linear functional form which was chosen as the lead equation showed that 89.9% of the total variations in the utilization of pro vitamin A cassava roots was explained by changes in the independent variables included in the model. The independent variables with significant and positive coefficients at different levels of probability include education (4.605^{***}), fufu quality

(1.892*), market value (1.932*), price of the product (2.080**) and processing value(1.824*). This implies that a unit increase in these variables among the respondents will lead to a corresponding increase in the utilization of yellow root cassava. The positive relationship between education and utilization of yellow root cassava in the study agrees with *a priori* expectation since education has the capacities to influence people to accept new technology and change their attitude to the desired technology (Okoye *et al.,* 2004). The coefficient of market distance was statistically significant and negatively related to the utilization of yellow root cassava in the study area at 1percent level of probability (-3.592***). This implies that a unit increase market distance leads to a corresponding decrease in the utilization of yellow root cassava. Amadi (2018) found that increasing distance from farm to market decreased the level of participation of male farmers in cassava production as it increases the cost and hassles of conveying produce from farm-gate to market. Nwaogu *et al*, (2016) reported that the distance farmers travelled to their farms from their homes had a negative toll on cassava productivity at 10% significance and implicated that drudgery and fatigue associated with trekking long distances as being responsible.

Table 6: Regression analysis of determinants of utilization of yellow root cassava

Variables	+Linear	Exponential	Semi log	Double log
Constant	-1.150	0.137	-25.167	-3.141
	(-2.653)***	(1.111)	(-5.047)***	(-4.054)***
Age (X_1)	-0.022	-0.010	4.389	0.467
	(-0.990)	(-1.947)*	(1.564)	(1.070)
Marital Status (X_2)	0.246	0.217	2.990	0.100
	(0.534)	(6.859) ***	(1.408)	(0.258)
Gender (X_3)	-0.040	-0.004	0.112	0.124
	(-0.078)	(-0.114)	(0.240)	(0.130)
Education (X_4)	0.179	0.003	-4.489	0.085
	(4.605)***	(0.388)	(-2.643)***	(0.320)
Market distance (X_5)	-0.489	0.017	4.373	0.256
	(-3.592)***	(1.635)	(0.209)	(1.583)
Income (X_6)	0.000	0.029	-0.460	0.025
	(0.386)	(1.365)	(-0.663)	(0.231)
Input Access (X_7)	0.664	6.629	2.249	0.032
	(1.275)	(0.347)	(3.272)***	(0.304)
Food Quality (X_8)	0.069	-0.058	-4.943	-0.834
	(0.573)	(-1.122)	(-1.150)	(-8.199)***
Garri Quality (X_9)	0.290	5.006	2.050	-0.525
	(0.630)	(7.227)***	(4.485)***	(1.116)
Fufu Quality (X_{10})	0.363	1.542	-1.855	-0.085
	(1.892)*	(0.916)	(-1.101)	(-0.694)
Market Value (X_{11})	6.134	1.087	3.922	0.282
	(1.932)*	(0.556)	(6.885)***	(3.181)***
Price of the Product (X_{12})	0.000	1.332	-1.715	-0.085
	(2.080)**	(0.916)	(-0.362)	(-0.694)
Processing Value (X_{13})	1.986	1.117	3.882	0.282
	(1.824)*	(0.556)	(0.885)	(3.181)***
R^2	0.899	0.817	0.892	0.882
R^{-2}	0.886	0.798	0.883	0.872
F- ratio	73.331***	43.815***	100.720***	91.096***

Source: Field Survey, 2019*10% ** 5% ,***1%level of significance

Note: +Lead equation, Values in parenthesis are the t-value

Table 7 presents the constraints militating against the use of pro vitamn A cassava in the study area.Lack of fertilizer was ranked 1st, indicating that 81.7 % of the respondents did not use yellow root cassava due to lack of fertilizer. High labour cost and unavailability of finance came 2nd and 3rdwhile poor marketing of the stem came last in the ranking.

Table 7: Distribution of Respondents According to Constraints to the Utilization of Yellow root Cassava

Challenges/Constraints	Frequency	Percentage	Rank
Lack of land	68	56.7	6th
Lack of fertilizer	98	81.7	1st
Unavailability of finance	79	65.8	3rd
Lack of herbicide	63	52.5	7th
Poor yield	25	20.8	12th
Inaccessibility of modern processing equipments	72	60.0	5th
High labour cost	86	71.7	2nd
High cost of processing equipment	68	56.7	6th
Pest and diseases	51	42.5	9th
Climate change	38	31.7	10th
Storage problems	28	23.3	11th
Poor marketing of root	19	15.8	13th
Poor marketing of stem	18	15.0	14th
Theft	58	48.3	8th
low processing value	78	65.0	4th
Fragmentation of land	16	13.3	15th
Inaccessibility of credit facilities	38	31.7	10th

Source: Field survey, 2019 (Multiple response)

Conclusion

The study that farmers in Abia state were planting different varieties of pro vitamin A cassava. All the farmers were aware of them and majority had grown or are growing them in their farms. Many have been using them for the past 3 years. Some farmers have started processing harvested roots of pro vitamin A varieties into mostly fufu, garri and abacha. The level of utilization of these varieties was still low among the respondents because many farmers complained of lack of fertilizer, high cost of labour and unavailability of finance amongst others etc. Determinants of utilization of pro vitamin A varieties include education (4.605^{***}), fufu quality (1.892^{*}), market value (1.932^{*}), price of the product (2.080^{**}), processing value (1.824^{*}) and market distance (-3.592^{***}).

Recommendations

There should be more promotion of pro vitamin A cassava and its value addition technologies in order toincreased utilization. Fertilizer, other farm inputs and finance should be made more available and affordable to encourage production and concomitant utilization of pro vitamin A cassava varieties.

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