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Farmers' Perceived Adoption Risks associated with Nicola Variety of Potato in Plateau State, Nigeria

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ABSTRACT
*This study was carried out to examine farmers' perceptions of characteristics of the Nicola improved potato variety as well as their perceived risks associated with adoption of the Variety. Five communities notable for potato production on the Jos Plateau were visited for the study. Fifty potato farmers were sampled and interviewed using structured questionnaire. Data collected were analysed with descriptive statistics. Also, the Logit regression model was conducted to determine effects of the perceived risks on adoption of the variety in the study area. Results of the study showed that 52% of the respondents perceived that the Nicola variety adapts and grows well in Jos Plateau, while 28% indicated that the variety does not grow well. Also, most respondents perceived that high initial cost of adoption (90%, high susceptibility to Diseases and potato Pests (72%) were major risk factors associated with adoption of the Nicola. Furthermore, the results indicated that farmers' perceptions of the variety as being prone to field thefts (-1.980**), low in yield (-2.333**) as well as highly susceptible to potato diseases (-1.911**) had significant negative effects on their level of adoption of the Nicola variety of Potato in the study area. As a result, farmers have not marched adoption of the variety with its widespread popularity. It is therefore recommended that relevant Research Institute concerned should endeavour to develop new variants of the Nicola which shall be high yielding and more resistant to potato diseases. Also, farmers should be encouraged to plant the variety early so as to escape the potato diseases which are more prevalent among late planted ones.*
Keywords: Perception, Adoption Risk, Nicola Variety, Potato

INTRODUCTION

Potato is cultivated in 140 countries and more than 100 of which are located in the tropical and sub-tropical zones. Annual world production currently totals 314.37 million tons and covers 19.55 million hectares (FAO, 2008). More than a billion people worldwide eat potato and the crop forms an important part of the diet of more than half a billion consumers in developing countries (FAO, 2008). In Africa, Nigeria occupies the seventh position in terms of total potato production, 840 000 tons in 2007. This implies that with the average market price of ₦70, 000/ton in 2007 over ₦5 billion circulated in the Nigerian economy through potato production. In terms of household, total expenditure on various food

items, Lenka, (2010) revealed in a study on potato consumption pattern of households, that households in Jos metropolis spend about 2% of their food budget on potato. Similarly, FAO (2008) reported that Nigeria has the lowest per capita potato consumption of 3.27kg in Africa. The households in Jos metropolis also identified potato being a staple food crop, a convenient fast food, easy to cook compared with other food crops as most important factors influencing potato consumption. These cardinal issues are paramount in solving food security problems. Nigerian's estimated cultivated area under potato in 2007 is 266,000 hectares with an average yield of 3.27 tonnes/ha (FAO, 2008).

Potato production on the Jos Plateau is both irrigated and rain fed. Rain fed potato is planted at the beginning of rains around the last week of April to 2nd week of May and rarely in July or August when the soil is frequently flooded. The irrigated production is carried out from the end of October to November to benefit from the cold night temperatures (below 15°C) of the harmattan months of January to February (Okonkwo et.al, 1995).

A survey of the major producing areas in Jos-Plateau showed that potato is grown as a sole crop during the dry season, but in crop mixture during the rainy season. Among the various advantages, intercropping aims at effectively utilizing the growing season, available land and takes advantage of the spatial arrangement of the component crops to increase yield (Okonkwo 1995). In rainy season, potato/maize intercrop constitutes 50% of the crop mixtures involving potato on the Jos-Plateau. Other potato-based systems are; potato sole, potato/maize, potato/maize/beans, potato/sorghum, and potato/millet (Okonkwo et al, 1995). In addition are potato/barley and potato/wheat. The potato farmer takes the first bold step by giving answers to some of the basic economic questions of production such as: what to produce, where to get inputs, how to produce, where to produce, where to distribute, is it profitable to produce? The farmer's answer to these questions gives the product and its first value in terms of quality and quantity. In terms of utility the farmer actually creates the form utility by converting raw materials into specific product and time utility, if the product is stored after production. The small-scale potato farmers in Nigeria have little power and political influence and unable to protect their interests in the market or the policy making area to enjoy a better share of profit in the chain.

Most potato production is carried out by peasant farmers who maintain small farms with operation done manually using traditional tools. During rainy season cropping, ridges or mounds are made with local hoes while in the dry season, stripes of flat land are prepared after soil tillage to enable farmers apply water manually or use flood irrigation. The traditional land preparation is slow and laborious. Where tractors are used, large areas of land are prepared. Currently, an array of exotic and few land races are among potato varieties grown in Jos Plateau, Nigeria. Among the potato farmers, varieties such as the Nicola, WC 785-2, Kondor, Diamant, Desire, 377865-35, WC 732-1 are popular. These varieties are relatively high yielding and to a great extent have boosted the annual national output of the crop in Nigeria (Lenka, *at.al*, 2010).

The Nicola variety for instance is an elite cultivar possessing high yielding attribute. It has large sized tubers that yield 25-35 tons/ha. It does well in both irrigated and rain fed cultivation. The Nicola variety is very prominent among potato farmers in the Plateau State as evidenced by the fact that most households are familiar with the variety as income generator due high market demand. Nevertheless, adoption of the variety has suffered

certain limitation as evidenced by the report that only 67% of sampled farmers in the study area cultivate the variety (Ekwe, *et al*, 2009). The paper therefore x rays the perceived risks associated with adoption of the Nicola variety among potato farmers in the Jos Plateau of Nigeria.

METHODOLOGY

A field survey of adoption of the Nicola variety of potato among farmers was undertaken in 2009 in Plateau State, Nigeria. In the State, eight Local Government Areas (LGAs) are known for potato production. Out of the eight, five were purposively sampled for the study because of their prominence in potato farm enterprise. The five LGAs included Jos South. Bokkos, Mangu, Riyom and Pankshin From each LGA a representative community notable for potato production was selected and visited by the research team for the study. From each community ten potato farmers were randomly sampled which summed up a sample size of fifty respondents. Well-structured questionnaires were used to interact and collect vital data from the respondents. The data were analyzed with simple descriptive statistics such as percentage and frequency. Also, the Logit model statistics was equally employed to determine the effects of certain perceived risk factors on the adoption of Nicola variety among potato farmers in the study area. The logit is defined as follows:

$$Z_i = ln\left(\frac{P_i}{1-P_i}\right) = \alpha + \beta_1 x_1 + .. + \beta_n x_n \quad (1)$$

where, P is the probability of a binary outcome of an event and always lies between 0 and 1.

Zi=Nicola Potato variety adoption outcome proxied as adopted=1 otherwise=0

α = the constant

β_i =the coefficient

X_1 = Low tolerance of drought (yes=1 otherwise=0)

X_2 = Highly susceptible to disease (yes= otherwise=0)

X_3 = Low yield (yes= otherwise=0)

X_4 = Susceptible to potato pest (yes= otherwise=0)

X_5 = Unstable policies (yes= otherwise=0)

X_6= Prone to theft (yes= otherwise=0)

X_7= Prone to wild fire attack (yes= otherwise=0)

X_8= High incidence of death (yes= otherwise=0)

X_9= High initial cost of adoption (yes= otherwise=0)

X_{10}= Does not tolerate farm land slope (yes= otherwise=0)

X_{11}= Prone to easy spoilage (yes= otherwise=0)

RESULTS AND DISCUSSION

Socio-economic Characteristics of the respondents

Age is critical in agricultural production activities, essentially due to the labour-intensive nature and the drudgery associated with agricultural production. The result presented in Table 1 shows that the mean age of farmers in the study area was 42 years. Similarly, majority of respondents (38%) were between age bracket of 31-40 years. This is followed by those aged 41 – 50 (22%). This implies that most of the respondents in the study area were still in their active stage in life which will enhance their farming activities as well as agricultural production efficiency for household food security. This result conformed with

findings of Nze and Azubuike (2016) that most farmers in Abia State were in their productive ages and were thus able to cope with the challenges of agriculture.

The results for the sex distribution of the respondents indicate that a large proportion of the respondents were males (66%). This indicates that there is more male involvement in potato production in the area. The result is in tandem with the findings of Otitoju and Arene (2010) that Nigerian Agriculture is dominated by men.

Education is key to development of any economy. Technologies developed and disseminated usually suffer setbacks in places where the level of literacy is low. Results in Table 1 reveal that majority of the respondents (46%) attended secondary school while 22% of them obtained post-secondary education. The results indicate that most of the respondents were educated. In a related study Apu and Nwachukwu (2008) had reported that farmers educational level positively influenced their adoption of improved technologies.

Table 1: Distribution of the Respondents according to their Socio-economic Characteristics

Variable	Frequency	Percentage
Age		
≤ 30	9	18.0
31-40	19	38.0
41-50	11	22.0
51-60	6	12.0
61 and above	5	10.0
Mean	42.22	
Sex		
Female	17	34.0
Male	33	66.0
Educational status		
No school	5	10.0
Primary	11	22.0
Secondary	23	46.0
Post-secondary	11	22.0
Household size		
1-3	4	8.0
4-6	10	20.0
7-10	19	38.0
11-13	9	18.0
14 and Above	8	16.0
Mean	9.6	
Extension contact/year		
None	33	66.0
1-2 times	12	24.0
3-4 times	3	6.0
5-6 times	1	2.0
Above 6 times	1	2.0
Farming experience		
≤10	13	26.0
11-20	14	28.0
Above 20 years	23	46.0
Mean	21.4	

Source: Field survey, 2017

The level of extension contact has been described as essential in driving adoption of improved agricultural innovations (Ekwe and Nwachukwu, 2011). The results show that majority of respondents (66%) had no contact with extension agents within a year, while only 24% of them had 1-2 times of contact with extension agents. The results generally suggest that the level of farmers' contact with extension agents in the study area was very low. The results were similar to findings by Osahon (2018) which indicated that 78.1% of the respondents from Enugu State said they have had no contact with extension.

In a typical African community, the size of a household has great implication for labour availability and dissemination of information relevant to the household (Ekong, 2010). The study, therefore, looked at the household size distribution of the farmers. The results reveal that the mean household of the respondents was 9 persons/household. Similarly, majority 38%) of respondents had 7 – 10 persons/household while 18% of them had 11-13 persons/household. The implication of the result is that there will be easy availability of family labour for potato production among the respondents since they have large household sizes.

The results also show that respondents' mean years of farming experience was 21 years. Furthermore, majority of the respondents (46%) had over 20 years of experience in potato production, followed 28% of them with 11-20 years of experience in potato farming. The results imply that most of the respondents have acquired long years of farming experience in potato production. In a related study Arimi (2014) opined that higher number of years of experience in farming helps a farmer to understand and tackle the complications of the enterprise. Similarly, Kabir and Ranais (2012) reported that farming experience increases the likelihood of adoption of best practices by experienced farmers since they have both knowledge and adequate information.

Respondents' perceptions of the Nicola Variety of Potato

The respondents expressed their perceptions of the attributes of the Nicola Variety. Results described in Table 2 shows that majority of farmers (52%) indicated that Nicola adapts and grows well in the Jos Plateau ecology. However, 28% opined that it does not perform well in their environment. Only 6% of the farmers agreed perceive Nicola is the best variety grown in the locations while another 6% did not perceive any special attribute about the variety. About 4% of the farmers did not hesitate to declare that the variety was the worst ever grown in the Jos Plateau. According to Ekwe and Osuagwu (2016) considering farmers' perceptions of technologies provides better understanding of their technology adoption patterns since they are the ones that use them and probably perceive the technologies differently from researchers and extension agents.

Table 2: Distribution of respondents according to perceived varietal attributes of Nicola potato variety in Jos Plateau

Perceived Varietal Attribute	**Frequency**	**%**
Nicola is best variety ever grown by farmers in the Jos plateau	3	6
Nicola adapts and grows well in Jos Plateau	26	52
Nicola has no observable special attribute	3	6
Nicola does not grow well in Jos Plateau	14	28
Nicola is the worst variety grown in Jos Plateau	2	4
Total	**50**	**100**

Source: Field survey, 2017

Furthermore, the farmers also indicated their perceptions on certain risk factors associated with adoption of the variety. Results in Table 3 indicated that majority of the farmers (90%) perceived Nicola has high initial cost of adoption while 74% consider the variety as being highly susceptible to diseases. Seventy two percent (72%) of farmers perceive the variety as the mostly attacked variety by potato pests. Furthermore, majority of the respondents were prone to quick spoilage (62%) and highly susceptible to unstable government policy changes (62%) the variety's tendency. Half of the respondents perceived the variety as being most prone to theft in the field (52%) and could yield low (50%) if planted late. Report by Ekwe *at.al* (2015) indicated that farmers grapple with risk and make decisions that affect their farming operations and the factors that affect their decisions cannot be predicted with 100 percent accuracy. The report opined that factors such as climate change, prices fall at the time of harvest, hired labour scarcity at peak times of demand; machinery and equipment break down when most needed, as well as sudden change in government policy. All of these risks affect their farm profitability.

Table 3: Percentage Distribution of Perceived risk factors associated with Nicola potato variety in Jos Plateau, Nigeria

Perceived risk factors	**Agree (%)**	**Disagree (%)**
Low tolerance to Drought	68	32
Highly susceptible to Diseases	74	26
Mostly attacked by potato Pests	72	28
Low yield	50	50
Theft of produce in the field	52	48
High Initial Cost of Adoption	90	10
Insecure farm land	36	64
Does not tolerate farm land slope	54	46
Prone to easy spoilage	62	38
Unstable policies	62	38
High incidence of crop death	40	60
Prone to wild fire attack	28	72

Source: Field survey, 2017

The Probit model analysis of effect of perceived risk factors on adoption of the Nicola variety revealed that farmers perceptions of certain risk factors such as the Nicola variety being prone to theft in the farm (-1.980**) and susceptible to disease (-1.911**) as well as producing low yield (-2.333**) had negative significant effect on the adoption of the variety. The results imply that unit increases in those risk factors would amount to corresponding decrease in the adoption level of the variety in the area. Farming face wide variety of risks which include climate and weather, pests and diseases, and natural catastrophes such as earthquakes or landslides. These risks can cause fluctuations in production, which damage livelihoods and contribute to consumer price volatility (Ekwe, *et.al*, 2015).

Table 4: Probit Model analysis of effects of perceived risk factors on adoption of Nicola potato variety in Jos Plateau, Nigeria

Parameter	Estimate	Std. Error	Z
Low tolerance of drought	0.062	0.293	0.213
Highly susceptible to disease	-0.591	0.309	-1.911**
Low yield	-0.542	0.232	-2.333**
Susceptible to potato pest	0.020	0.263	0.074
Unstable policies	0.380	0.209	1.816*
Prone to theft	-0.467	0.236	-1.980**
Prone to wild fire attack	0.551	0.357	1.543
High incidence of death	-0.355	0.262	-1.356
High initial cost of adoption	0.251	0.346	0.726
Does not tolerate farm land slope	-0.350	0.262	-1.335
Prone to easy spoilage	-0.487	0.302	-1.614
Intercept	-0.873	0.442	-1.975**
Chi square (goodness of fit)	54.543**		
Degree of freedom	32		

Source: Field survey, 2017

CONCLUSION

The Nicola variety of potato despite its promising attributes of high yielding, large sized tuber and suitable for both irrigated and rain fed cultivation has limited adoption level. Its use among farmers is still being compromised by certain perceived risk factors. Specifically, farmers' perceptions of the variety as being prone to field thefts, low in yield as well as highly susceptible to potato diseases grossly discourage adoption of the variety. As a result, farmers have not marched adoption of the variety with its widespread popularity. There is therefore the need for further research to develop new variants of the Nicola which shall be high yielding and more resistant to potato diseases. Farmers should also be encouraged to plant the variety early so as to escape the potato diseases which are more prevalent among late planted ones.

REFERENCES

Apu, U and Nwachukwu, I (2008) Effect of the adoption of improved cassava varieties on farmers' income in Abia State, Nigeria. *Journal of Agriculture and Social Sciences*. Vol 11, No 2. 155-160

Arimi, K. 2014. Determinants of climate change adaptation strategies used by rice farmers in Southwestern, Nigeria. *Journal of Agriculture and Rural Development in the Tropics and Subtropics* Vol. 115(2): 91–99

Ekwe K.C and Ike Nwachukwu (2011) Sustaining rural livelihoods through cassava gari enterprises- A mix of farmers' use of local and improved innovations in Nigeria. In Amadi, C.O., Ekwe, K.C., Chukwu, G.O., Olojede, A.O and Egesi., C.N(Eds.). Root and Tuber Crops Research for Food Security and Empowerment in Nigeria. SNAAP Press Nig. Ltd. Enugu. P493

Ekong E. Ekong (2010) Rural Sociology.An introduction and analysis of rural Nigeria, Third Edition. Doc Educational Publishers, Uyo, Nigeria

Ekwe K.C; Ironkwe A.G and Nwakor F.N (2015) Strategizing Extension and Advisory Services for Farm Risk Management. In I. Nwachukwu, Ifenkwe, G.E., Onumadu, F.N., Agbaraevo, M.N.B., Apu, U., Odoemenam L.E. and Nwaobiala C.O. (eds) Contemporary Issues in Agricultural Extension and Rural Development. Dept of Agricultural Extension and Rural Development Publication, MOUAU P183

Ekwe K.C and Osuagwu J.C., (2016) Farmers' Perception of Agrochemicals' Use in seed yam production in Umuahia South Local Government Area of Abia State. *Nigerian Journal of Agriculture, Food and Environment*. 12(4)224-229

Ekwe K.C., Anyaegbunam H.N., Amadi C.O., Dung E.A., Dalyop T.Y., Lenka D. (2009) Adoption Risks associated with Nicola Variety of Potato in Jos Plateau. NRCRI Annual Report.

FAO (2008). Food and Agriculture Organization. Potato Atlas

Kabir, M. H., and Rainis, R. (2012). Farmers' perception of the adverse effects of pesticides on environment: The case of Bangladesh. *International Journal of Sustainable Agriculture* 4 (2): 25-32.

Lenka D M, Okonkwo J.C, C.O. Amadi, G.N. Asumugha and K.I. Nwosu (2010) Potato Production, Storage and Marketing in Nigeria. Farmers' Perspective and Practices. DFAS Press, Jos, Nigeria

Nze, E.O. and Azubuike O. (2016). economic performance of subsistence poultry farm in Abia State, Nigeria. *Journal of community and communication Research; Vol.1, No.1, pp. 6-12*

Okonkwo, J.C., Amadi, C.O and Nwosu, K. I. (2009). Potato Production, Storage, Processing and Utilization. National Root Crops Research Institute Umudike, 185pp

Okonkwo, J.C., Ene, L.S.O. and Okoli, O.O. (1995); Potato Production in Nigeria, National Root Crops Research Institute, Umudike, Abia State, Nigeria.

Otitoju, M.A., & Arene, C. J. (2010). Constraints and determinants of technical efficiency in medium-scale soybean production in Benue state, Nigeria. *African Journal of Agricultural Research,* 5, 2276–2280.

Osahon, E.O. (2018) Utilization of cocoyam production and value-addition technologies among rural households in South-east, Nigeria. A Ph.D. Dissertation submitted to Department of Rural Sociology and Extension, MOUA, Umudike,

NRCRI (2006). Training Workshop on Potato Production, Storage and Processing. NRCRI Annual Report.