THE INVOLVEMENT OF FARMERS INDIGENOUS KNOWLEDGE PRACTICES IN THE CONSERVATION OF CASSAVA IN SOUTH EAST OF NIGERIA.

Ezebuiro, N.C.[1], Ugboaja, C.I.[2], Ironkwe, A.G.[1], Uchechukwu, N.U.[1], and Nzeakor, F.C[2].
[1.] National Root Crops Research Institute, Umudike
[2.] Michael Okpara University of Agriculture, Umudike
E-mail: ezebuirochikason@yahoo.com,constancetalk@gmail.com, phone number: 08063885049

ABSTRACT
The study was carried out in South-East of Nigeria to find out the level of involvement of farmers and impact of indigenous knowledge practices in the conservation of cassava genetic materials. A sample size of 480 respondents were randomly selected from the study area and information obtained through the use of structured interview schedule. Results obtained were analyzed using descriptive and inferential statistics. The result showed that 61.5% of the respondents were males, with a mean age of 26.0 years. The mean farm size was 2.45ha. Local conservation traits practiced by the farmers showed that maintaining favored varieties constituted 56.2%. Other indigenous conservation practices by the farmers showed that storage of stakes under shade accounted for 44.8%. The ordered Probit Regression of the determinants of type of conservation practices used by the farmers showed non-zero censor points which were of positive correlation with the lower sensory threshold at 1.54 for ex situ type and the upper threshold at 2.07 for the in situ type of management practices. A participatory approach between research and the farmers is encouraged for more effective and sustained conservation practices.
Key words: Indigenous Practices, Cassava Conservation, Farmers Involvement.

INTRODUCTION

It is a well established fact that the food scarcity of the world is founded on an alarming narrow base, with only 30 crops "Feeding the World" and providing 95% of the world caloric intake. Out of those 30crops,wheat,rice and maize alone provide 50%(FAO, 1998),and further six crops- sorghum, millet, potatoes, sweetpotato, soybean andsugarcane (beet) add another 25% to the global plant derived energy intake. According to Pujol *et al.,* 2005,a deeper understanding of the natural and cultural ecology of crop populations is required for sound strategies of conservation of genetic resources in landrace populations.

Cassava is a staple food for most Nigerians and is known as the energy giving food *par excellence*,given that it could provide most of the body's daily energy requirement. Cassava (*Manihot esculenta* Crantz)is important not just as a subsistence or food security crop,but also as a main source of cash income for producing households(Bainbridge *et al.,* 1997). The crop has the ability to adapt to marginal soils,including drought stress and produce reasonable well comparatively to other crops in marginal environments with low rainfall(El-sharkawy,2005);climatic factors resulting to drought are high temperature, high wind and low relative humidity. Cassava is a perennial crop and has bulking duration which ranges from8weeks after planting – 24months after planting, which makes it a suitable crop for drought prone regions of the world.Cassava breeding is usually lengthy and involves several evaluations of new clones to determine their potentials before their actual release for commercial production. Plant breeders select genotypes/varieties with genetic potentials for high vigor, resistant to pests and diseases, good root size, number of roots, high dry matter content *et cetera*. In addition, cassava with high protein content, high beta carotene content, high starch, high dry matter content, delayed shelf life of roots are some traits farmers and end-users are looking for in Nigeria(Njoku *et al*,2015). Farmers have a lot of underutilized information as a result of long experience with cassava cultivation. These include characteristics of adaptation, resistance, morphology, quality or a number of traits that may not become apparent to a researcher, even after standardized evaluation.

Ghauzhdi, H.G. (2010) defined indigenous knowledge as the local knowledge, that is unique to a given culture or society". The basic component of any country's knowledge system is its indigenous knowledge. It encompasses the skills, experiences and insights of people, applied to maintain or improve their livelihood. Indigenous knowledge is developed and adapted continuously to gradually changing environments and passed down from generation to generation and closely interwoven with peoples cultural values.

Indigenous knowledge(Traditional Wisdom)is a key to sustainable rural development in Nigeria. In 1993,the United Nations declared that year as year of indigenous people to attest to the importance of traditional technology endowment in sustainable rural development.
Speaking about indigenous knowledge, practices and leadership do not assume that all is positive. As with other knowledge systems, indigenous knowledge of different cultural background does not have all the answers to the present day problems and certainly has its limitations. Its adaptability to present needs may be limited, while it is often not uniformly distributed in the communities. The access to specialized knowledge may be limited to certain persons who may not always use it to the benefit of the community.

On the other hand, endogenous knowledge is based on peoples criteria for development and takes into account their material, social and spiritual wellbeing. The importance of participatory approaches and of integrating local knowledge into development intervention has become broadly recognized.

Cassava genetic resources can be conserved either *in situ* or *ex situ* or a combination of the different methods used in a complementary way. Disadvantages in one method, example, risks of diseases and loss through other natural factors in the field gene bank are compensated for by the benefits of another, example, the relative security of *in vitro* conservation. The management or preservation of a genetic resource is important as all around the world; people use many different plants for food, fuel, clothing, shelter and medicine. This plant resource is a powerful weapon in our fight against hunger and poverty. By conserving and using it wisely, we will help ensure a brighter future for our children and grandchildren(IPGR, 1999). In Africa, genetic resources of cassava are considered to be in the humid and sub-humid regions of West and Central Africa.

Adoption of new improved varieties has increased rapidly since the turn of the 21st century. In some cases, this adoption of new varieties is creating a risk for loss of native landraces (Nwekeet *al.*, 1994). Landraces may be neglected and lost when adoption rates are high. In Nigeria, new varieties have been adopted due to increasing vulnerability and diseases and higher productivity of new varieties (Hershey, 2008).

Indigenous knowledge systems of cassava genetic resources conservation may meet the needs of the rural people from an ecological perspective but they may be in tune with their socio-cultural needs (Chukwu and Ifenkwe, 2001). Ignoring the knowledge of traditional customs and experience of local communities in the formulation of development policies is one of the major flaws in natural resource management. This may afford the scientists the opportunity to appreciate the traditional technological endowments of the rural people, to understand inherent problems in their conservation methods and to jointly formulate a solution to the problems to be identified. Farmers' choice of the best conservation options need to be guided to ensure they are scientifically and economically viable.

Quite a good number of improved conservation practices abound, example, *ex* situ, *in vitro* or tissue culture, biotechnology, cryopreservation or seed storage, but then, what are the farmers' perception and use level of these practices?

Cassava which is widespread in the area of study has a variety of uses which emphasizes the need for conservation of the crop. Genetic erosion is anticipated due to the replacement of landraces by improved cultivars produced by research (Allem and Hahn, 1991). This paper reports the involvement of farmers' indigenous practices in the conservation of cassava in S.E Nigeria.

METHODOLOGY

The area of study was South-East agro-ecological zone of Nigeria with a land area of about 109,524sq km, representing about 11.86% of the total area of Nigeria (Ekong, 2008). The zone lies between $4^0$20'N and $7^0$25'N and longitude $5^0$21' and $8^0$51'E. The zone has a human population of about 18.92 million or 21.48% of the total population of Nigeria (NPC, 2006). About 60% of the population resides in the rural areas, and with a population density of about 200 persons per square kilometer. Agriculture is the dominant occupation of the people, which to them is a way of life. The soils are underlain by a mixture of Coastal Plain Sands (FDALR, 1985). The zone is characterized by three major vegetation; the humid forest (made up of salt water, fresh water swamp), the rain forest, derived savanna and the Semi-Montana (Inyang, 1975).

The populations of the study were cassava farmers in the zone. For the purpose of this study, cluster sampling of the three major vegetative zones were delineated. A purposive sampling of a state each from the clusters was made. These were Abia, Akwa-Ibom and Ebonyi States. Two agricultural zones were randomly selected from each state in the first stage; Umuahia and Ohafia in Abia, Eket and Oron in Akwa-Ibom State and Afikpo and Abakaliki in Ebonyi State. Secondly, two blocks were randomlty selected in each zone. Thirdly, four circles in each of the blocks were randomly selected. Finally, ten cassava farmers were randomly selected from each circle. These gave sample size of 480 respondents from the three states. Extension Agents guided in the listing of the respondents, who were cassava farmers.A structured interview schedule was used to elicit information from the 480 respondents sampled. Data collected from the study were analysed using descriptive and inferential statistics. Probit regression was used to estimate model of ordered response for type of conservation model practiced. The conservation method practiced was modeled as follows.

Ordered probit (*in situ*, in-root-from, *ex situ*)
=b0+b1x1+b2x2+b3x3+b4x4+b5x5+b6x6+b7x7+b8x8+b9x9+b10x10+ui

where.

- X_1=Age in years
- X_2=Educational attainment (years)
- X_3= Sex(dummy variables,1=male,0=female)
- X_4= Farm size(ha)
- X_5=Contact with extension (Dummy Variables, 1=Yes, 0 = No)
- X_6= Household size (Numbers)

- X_7= Membership of coopreative (Dummy Variable,1=Yes,0= No)
- X_8= Farming experience (Years)
- X_9= Marital status (Dummy Variable 1= Married,0= Otherwise)
- X_{10}= Farming location (km)

RESULTS AND DISCUSSION

Socio-economic characteristics of the respondents. Results in table1 show some socio-econnomic characteristics of the farmers. The result shows that 61.5% of the respondents were males. The low percentage of females may be attributed to their limited access to land, information and other production resources, hence their low participation in conservation practices.

Age:The table shows that 38.5% of the respondents were in the age range of 41-50 years, while 28.8% were in the age range of 51-60 years which indicates that majority of the respondents were middle aged farmers, since age of the farmers is important in determining participation in innovation Nwaru, 2004). However, the age bracket of 31-50 years contains innovative, motivated and objective individuals (Yunusa, 1999).

Marital status: The result in Table 1shows that 81.9% of the respondents were married. This implies that married people dominated in agriculture as opined by Edeoghon*et al.*, (2008), aimed at making ends meet and carter for their children.

Household size: Household size of 3-7 people constituted 60.0%, while 8-12 people were 22.0%. The mean household size was 10. Effiong (2005) and Idiong(2005) reported that a relatively large household size enhances the availability and cheap labor in the farm.

Farm size: Farm sizes of 1-2ha were 39.2%, while respondents with farm size less than 1.0hawas 17.5%. The means farm size was 2.5ha. Small land holding in the study area are a major constraint to technology adoption as the holders tend to be passed by such innovation as in conservation e.t.c. According to Azih (2004), small farm holdings predominate in Nigeria and account for up to 81.0% of the total area and produce 95% of agricultural output.

Farming experience: The farming experience was 20.6% for 26-30 years and 20.0% for ≤10 years. The result shows that new people are embracing agriculture. A farmer's experience can generate or erode confidence, as with more or less averse to the risk implied by adopting a new technology.

Educational attainment: Result from the table showed that about 13% of the respondents had no formal education. Those with primary and secondary education accounted for 32.0% and 24.8% respectively. The differences in their education level may affect perception and this is expected to have influence on their efficiency in technology use. Education makes communication easy as educated farmers are known to be less conservative and are willing to explore their environment to boost their knowledge about innovation.

Membership of cooperative: About 53.1% of the respondents belong to the co-operative society, while 46.9% did not. Most societies and other social groups may be heterogeneous in nature but serve a common purpose of being a platform for articulation of interest in the community (ECA, 1990).

Contact with extension: The table showed that about 84.8% of the respondents had contact with extension. An effective extension service is more than simply making knowledge available. Equally important is providing an opportunity to interpret the information together with its implications.

Farm location **(Km):** Farm locations vary based on distance from homes. About 59.4% of the respondents had their farms around their homes. Nearby farms constituted 27.3%, while distant farms were 13.3%.

Table1: Some Socio-economic characteristics of the respondents.

VARIABLE	FREQUENCY	PERCENTAGE
Sex		
Male	295	61.5
Female	185	38.5
Total	**480**	**100.0**
Age (years)		
< 30	18	3.8
31-40	69	14.3
41-50	185	38.5
51-60	138	28.8
< 60	70	14.6
Total	480	100.0
Mean	**26.0**	

Marital status		
Married	393	81.9
Single	25	5.2
Widowed	53	11.0
Divorced	9	1.9
Total	**480**	**100.0**
Household size		
<3	15	3.0
3-7	313	65.0
8-12	106	22.0
13-17	28	6.0
>17	18	4.0
Total	**480**	**100.0**
Mean	**10**	
Farm size(ha)		
<1.0	84	17.5
1-2	188	39.2
3-4	88	18.3
5-6	68	14.2
7-8	23	4.8
9-10	15	3.0
>10	14	3.0
Total	**480**	**100.0**
Mean	**2.45**	
Farming experience(years)		
<10	96	20.0
11-15	77	16.0
16-20	75	15.6
21-25	40	8.4
26-30	99	20.6
>31	93	19.4
Total	**480**	**100.0**
Mean	**13.6**	
Educational attainment		
No formal education	61	12.7
Primary school education	154	32.0
Secondary school education	119	24.8
OND	35	7.3
NCE	41	8.5
HND	31	6.5
B.SC	31	6.5
M.SC	8	1.7
TOTAL	**480**	**100.0**
Membership of Cooperative		
Yes	255	53.1
No	225	46.9
Total	**480**	**100.0**
Contact with Extension		
Yes	407	84.8
No	73	15.2
Total	**480**	100.0

Farm Location (km)		
Homestead	285	59.4
Nearby (1-2km away)	131	27.3
Distant (≥ 3km)	**64**	13.3
Total	**480**	100.0

Source: field survey data, 2014

Table 2: Distribution of respondents according to local conservation traits.

Variable	Frequency	Percentage
How cassava traits are maintained		
Myths	5	1.0
Songs	3	0.6
Names	59	12.3
Indigenous production	70	14.6
Collection	35	7.3
Trading	1	o.2
Stealing	3	0.6
Maintaining favored varieties	270	56.2
Purging the less desirable	33	7.0
Others	1	0.2
Total	**480**	**100.0**

Source: field survey data, 2014

The result from Table 2 shows that 56.2% of the respondents conserved cassava varieties by maintaining favored varieties, while 14.6% and 12.3% are by indigenous production and names respectively. Until recently, the only means of conserving thesespecies was in the field gene bank where the material is maintained in the vegetative state. Farmers' preferred method(s) of conservation should be improved upon and encouraged upon viz-a viz the improved conservation methods. Stroud and Kirkby (2000); Oyewole (2009) stressed the need to have adequate understanding of the knowledge behind his technology and the decision he took, prompting a re-direction of policy formulation from top-down, to bottom-to-top technology approach. To say that farmers' indigenous practices are perfect is to leave no room for improvement as many of the practices they engage in may lack scientific basis and may have no long term prospect of meeting the food need of exploding population in the face of limited resources.

Table 3: Distribution of respondents based on other indigenous practices for cassava conservation and other key players in protecting cassava

Variable	Frequency	Percentage
Allow the plants grow in the field	154	32.1
Planting in hydromorphic areas during dry period.	60	12.5
Storage of stakes under shade	215	44.8
Others	51	10.6
Total	**480**	**100.0**

Key players in protecting Cassava genetic resources		
Men	6	1.3
Women	123	25.6
Youths	19	4.0
All	109	22.1
No Idea	226	47.0
Total	**480**	**100.0**

Source: field survey data, 2014

Indigenous practices for cassava conservation. Result of the analysis showed that 44.8% of the respondents store stakes under shade, while 32.1% allow the plants to grow in field until when needed.

About 12.5% of the respondents plant in hydromorphic areas during the dry season. The scarcity or high cost of planting materials necessities the need to preserve them for future use as they are constraints to farmers. Often major reasons why farmers do not cultivate species or varieties is limited access to appropriate germplasm and to information they need or how to plant, manage and use the materials.

Key Players in protecting cassava genetic resources. Result from the table revealed that 47.06% of the respondents had no idea of who was responsible for protecting cassava genetic resources. However, 25.6% were of the opinion that women were more into it than men who constituted 1.3%. Verna (2001) observed that women sustainably manage land that they do not own, either because their tenure is threatened or as a symbolic gesture to their husbands and community that they are 'good wives' and farmers.Howard (2003) shows how gender relations inform management and conservation, and why in several cases, women predominate particularly in the management of genetic resources, cassava inclusive. The low rate of youth's participation in this activity may be due to the fact that women and youths are not given enough opportunity to participate in household's production decision- making or that the youths may not be much interested in agriculture as a career (Ajah, 2010 and Ezebuiro*et al.*,2014)

Table 4: Determinants of types of conservation practices used by the farmers in the study area

Variable	Parameter	Coefficient	Standard error	T-value
Age(years)	0.0625224	0.153507***	4.07	0.000
Education	-.0656854	.0635993	-1.03	0.302
Sex	.1950828	.2543707	0.77	0.443
Farm size(Ha)	-1010931	.0387445**	-2.61	0.009
Extension Contact	1.247943	4.555143**	2.74	0.006
Household size	-.0418898	.06578	0.90	0.368
Membership of Cooperative	-.0337766	.294799	-0.11	0.909
Farming experience	-.0405621	0.14677**	-2.76	0.006
Farm location	-.129401	.1800049	-0.72	0.472
Ancillary parameters				
C^1	1.5452		1.1141	
C^2	2.07806		1.1165	
Log likelihood	-94.8305			
Pseudo R^2	0.1670			
Chi^2	38.03			

Source: field survey data, 2014

Results in Table 4 shows the Ordered ProbitRegression estimates of the determinants of type of conservation practices used by the farmers in the study area. The non- zero censor points were of positive correlation with the lower sensory threshold at 1.54 for *ex situ* type and the upper threshold at 2.07 for *in situ* type of management practices. These are not significant. The goodness of fit measured by the Chi^2 showed that the choice of explanatory variables included in the ordered probit model explained the variation in type of conservation practices used by the farmers in the study area.

The coefficients of age and extension contact were positively correlated and significant at 1%and 5% levels of probability respectively. Farmers who are older and with more number of extension contacts are more likely to use *ex situ* conservation practices than in-root form. The coefficient for farm size and farming experience were negatively correlated and significant at 5% level of probability. This implies that farmers with large farm sizes and with longer years of farming experience are more likely to use *ex situ* than *in situ* and in-root types of conservation practices in the study area.The coefficient for education and household size were negatively correlated but not significant as well as gender which was positively correlated.

CONCLUSION

Farmers adopt varying methods suitable to them to conserve cassava materials, both seeds and roots. Research too adopts various scientific methods, which have been proven to be effective for conservation but unknown to farmers. Exploring the Indigenous Knowledge practices of the people will help key into what the farmers are already doing and improving on them, *viz-a-viz* the improved conservation practices. Efforts should be geared towards developing more sustainable and cost effective methods for conservation at the grassroots level. Adopting researcher – farmer participatory approach may ensure better and sustainable conservation practices involving men, women and youths.

REFERENCES

Ajah, J. (2010). Participation of women in Household: Farm Production Decision Making in S.E. Nigeria. Proceeding of 44th Annual Conference of Agricultural Society of Nigeria, LAUTECH, 18 – 22. Oct. 2012. Pp. 367 – 372.

Azih, Innocent (2004). "Policy for small Farms Productivity and Competitiveness in Nigeria" The Nigerian Economic summit Group Economic Indicator. 10(3) 40 – 46.

Bambridge, Z. Wellings, K and Westby, A. (1997). Village Level Cassava Processing: Distance Learning Package (Field Guide) Chanman, UK: National Resources Institute.

Chukwu, G.O. and Ifenkwe, G.E. (2001).Traditional System of Yam Storage in Nigeria.Rural Resources Development and Sustainability 1:117 – 120.

Economic Commission for African (ECA) (1990). Manual on Topologies and Activities of Rural Organization in Agriculture and Rural Development in selected African Countries, Addis Ababa, Ethiopia, Pp 1 – 83.

Edeoghon, C.O., Ajayi, M.T. and Ugboya, T.O. (2008).Awareness and use of Sustainable Agricultural Practices by Arable Crop Farmers in Ikpoba-Okha Local Government Area of Edo State.*Journal of Sustainable Development in agriculture and Environment. Vol. 3(2):55 – 63. Practical Publishers.*

Effiong, E.O. (2005). Efficiency of production of selected livestock enterprise in AkwaIbom State of Nigeria.Unpublished Ph.DDissertation Development of Agricultural Economics, Michael Okpara University of Agriculture, Umudike.

Ekong, F. (2008). Contribution of Women to National Development: Examples from AkwaIbom State. www.info.rdg.ac.uk/publication/searches.asp. Accessed Nov. 2009.

El-Sharkawy, M.A. (2005). How can calibrated reseach model be improved for use as a tool in identifying genes controlling crop tolerance to environmental stresses in the era of genomics from an experimentalist's perspective, photosynthetic. 43:161 – 176.

Ezeburio, Nathaniel Chika, Kenneth ChikwadoEkwe, EkwuruchiOgbonnaMbanaso, LilianEkwi Franca Amamgbo, Godwin NdubuisiAsumugha and Justin EnyinnayaEwuziem (2014). Perception of Agricultural Science/Home Economics as a career among Senior Secondary Students in Abia State, Nigeria.*Journal of Life Science, ISSN 1934 – 7391, USA.June 2014, Vol. 8. N0 6, Pp 532 – 542.*

FAO (1998).Food and Agricultural Organization Yearbook, 1998.

FDALR (1995).Federal Department of Agriculture and Land Resources Reconnaissance Survey of Imo State, Nigeria, soil report, FDALR, Kaduna.

Flavier, J.M. (1995). The Regional Programme for the Promotion of Indigenous Knowledge in Asia, Pp. 479 – 487; In Warren, D.M., L.J. Slikkerveer and D.Brokensha (eds.). The Cultural Dimension of Development: Indigenous Knowledge System, London: Intermediate Technology Publications.

Ghauzhdi, H.G. (2010). Indigenous knowledge in agriculture with particular reference to black cumin (Nigella Sativa) production in Iran. Scientific Research Essays Vol. 5(25). Pp 4107 – 4109, 24 December, 2010 Special Review.Available online at http://www.academicjournals.org/SRE.ISSN 1992 – 2248, 2010 Academic Journals.

Howard, P. (2003). Women and Plants: Gender Relations in Biodiversity Management and Conversation London: Zed Books.

Hershey, C. (2008). A global conservation strategy for cassava (*Manihotesculenta*) and Wild manihot species. Summary of stakeholder deliberation and recommendations prepared for the Global Crop Diversity Trust. Available: http://isa.ciat.cgiar.org/urg/urgwebfolder/files/unit/A%20global%20conservation%20strategyfor%20%August%202008-2.pdf. Data accessed 13 Nov. 2012.

Idiong, I.C. (2005). Evaluation of Technical Allocation, and Economic Analysis.Unpublished Ph.D. Dissertation, Department of Agricultural Economics, MicahelOkpara University of Agriculture, Umudike.

Inyang, P.E.B. (1975). Climatic Regions of Eastern Nigeria.Ethiope Publishing House, Benin City, Nigeria.

International Plant Genetic Resources Institute (IPGRI) (1999).Diversity for Development.Via dell SetteChiese, Rome, Italy.

Njoku, D.N., Egesi, C.N., Amanze, J.N., Okoro, M., Agu, P. and Olojede, A.O. (2015). Selection of high Pro-vitamin A Cassava Genotype for Agronomic and Industrial uses in Nigeria.

National Population Commission (NPC) (2006). The 2006 National Population Census. www.nigeriamuse.com/nigeria_2006_population_census. Accessed October, 2009.

Nwaru, J.C. (2004) Rural Credit Markets and Arable Crop Production in Imo State of Nigeria.An unpublished Ph.D Dissertation, MicahelOkpara University of Agriculture, Umudike, AbiaState, Nigeria, 123 pages.

Oyewole, C.I. (2009). Understanding Indigenous Cropping Technology in Kogi State, *Nigeria.Nigerian Journal of Indigenous Knowledge and Development.Vol. 1:118 – 191.*

Pujol, M., David, P., Mckey, D. (2005). Microevolution in agricultural environments: How traditional Amerindian farming practices favourheterozygosity in cassava *Manihotesculenta*Crantz, Euphorbiaceae, Ecology letters 8: 138 – 147.

Stroud, A. and R. Kirkby (2000).FSR in Technology Chioce and Development. In: *History of Farming System Research* (Collison, M. edited). Published by Food and Agricultural Organization of United Nations and CABI publishing, pp 95 – 129.

Verma, R. (2001). Gender, Land and Livelihood in East Africa. Ottawa, Canada, International Development Research Centre (IDRC). Available sat www.idrc.ca/books/focus/944/PREP_ACK.HTML.

Yunusa, M.B. (1996). Not for alone. A study of Rural Livelihood in Middle Belt of Nigeria.DARE/ASC working paper, Pp 38 – 39.