A Research Article in AJRTC (2014) Vol. 11 No. 1: Pages 56-64

Women farmers in seed yam production: Implication for increased productivity and sustainable yam improvement in Southeastern Nigeria

A.G. Ironkwe [1] and R. Asiedu[2]
[1]National Root Crops Research Institute, Umudike, Nigeria
[2]International Institute of Tropical Agriculture, Ibadan, Nigeria

Corresponding Author: A. G. Ironkwe
E-mail: adanmaironkwe@gmail.com

Manuscript revised and received: 15/05/2014; accepted: 27/06/2014

Abstract

Empirical evidence revealed that rural women in Nigeria constitute majority of the farming population. These women are involved in yam production and marketing as means of livelihood. Yam is an important staple crop with nutritive, socio-cultural and economic values. However, the production of the crop is faced with the problems of scarcity and high cost of seed yam during its planting season. This necessitated the development of yam minisett technology which has been transferred to the farmers in the zone for adoption. This study was therefore conducted to analyse the effects of the technology and some socio-economic factors on the output of women farmers in seed yam production. Multi-stage sampling technique was used in selecting 240 respondents from five states in Southeastern Nigeria. Interview schedule was employed in eliciting data which were analysed with descriptive and inferential statistical tools. Results revealed that the technology enhanced the seed yam production of the women farmers in the zone. The results further showed that age, household size, educational status, as well as access to credits, income and involvement in technology development and transfer had positive influence on the output of female farmers in seed yam production. The important constraints they encountered in using the technology include scarcity and high cost of labour and fertilizer, unavailability of miniset dust as well as lack of market, transportation facilities, credits and loan. It was therefore recommended that efforts to increase the productivity of women farmers in seed yam production should be directed on educated and more experienced ones while more emphasis should be on involving women in technology development and transfer, improving their educational status, and increasing their access to productive resources, information, credits and market for sustainable yam improvement in Nigeria.

Key words: women farmers, seed yam, yam minisett technology, sustainable improvement, Nigeria.

Introduction

Yam (Dioscorea Spp.) is one of the important tuber crops produced both as food and cash crop in Nigeria (Asumugha, *et al*., 2009). This crop, being a staple crop, occupies a very prominent position in the daily food intake of Nigerians. Yam can be processed into various food forms and eaten in most traditional ceremonies. It is usually consumed boiled, fried or roasted (Spore, 2011). Yam production and marketing are major sources of employment and income for 70% of the farming population of over 140 million people (NBS, 2006) majority of which are women. The country has great potential for yam production both for local consumption and for export (Orkwor *et al.,* 1998). Nigeria is the largest world producer of the crop with annual production of about 36.72 million metric tones (FAO, 2008). The importance of yam in the country revolves on its caloric, economic and socio-cultural values. Though the crop is traditionally regarded as a "man's" crop, both men and women are engaged in its cultivation in most part of the country (Ezumah and Didomenica, 1995; Aiyedun and

Kormawa, 2001; Ironkwe, 2005) both for commercial and subsistence purposes.

The importance of yam to farm households in Nigeria cannot be over emphasized because the crop provides more income per unit weight (CBN, 2000; Idachaba, 2004) and also contributes more than 20 percent of daily caloric in-take of Nigerians (Ugwu,1999) than other arable crops. In recent times, many rural households have anchored their livelihoods on the frame of the combined enterprise of yam production and marketing because of strategic positioning of yam in the food systems of Nigerians. Again, with the high preference enjoyed by yam and its products, farm households suddenly observed rising market demand for their commodity. They further realized that with the minisett technology available, seed yam could be produced for household use and more so for cash income on sustainable manner. As a result, many women undertake production and marketing of seed yam as a combined enterprise and make substantial livelihoods from such.

These seed yams are usually produced in the rural areas and marketed at the farm gates through the middle men. Most at times, an informal seed yam distribution system emerged where seed yam purchased in rural areas easily and quickly get to consumers in the urban centers either through middlemen or the enterprising rural farmers, who prefer selling at urban market to get high income. Thus, the farmer could get good income from his effort in yam production to be able to take care of his or her family needs.

Yam as a food crop in Nigeria is however, becoming expensive in urban areas as production has not kept pace with the population growth leading to demand exceeding supply (Kushwala and Polycarp, 2001). There is equally the need to step up the production of yam not only to satisfy domestic need but also export demand to increase our foreign exchange earnings. However, the general decline in yam production over the years, (Madukwe *et al*., 2000) is linked to laborious cultivation methods, the need for staking, and the high cost of scarce seed yam, which are also needed for consumption. This encourages the competition between edible tubers and tubers used as planting materials. Therefore the major, constraint to increased production of ware yam in Nigeria is the scarcity and high cost of seed yam during planting seasons.

Seed yams are most important input required for yam production in Nigeria. They are small whole tubers (about 100 – 500 grams) used as planting materials in production of ware yams. The seed yam constitute over 33% of the cost out–lay in yam production and limits the size of yam farms under traditional cropping method (Okwor *et al.,* 1998). To overcome the problem of unavailability of seed yam, the minisett technology involving the use of 25-50 grammes cut setts to produce whole tubers, which serve as "seed" of yam (Okoli and Akoroda, 1995), was developed by the National Root Crops Research Institute (NRCRI), Umudike in collaboration with International Institute for Tropical Agriculture (IITA), Ibadan. This technology has been disseminated to farmers in Southeastern Nigeria through the Agricultural Development Programmes of various states in the zone. The technology is relatively cheap with very high productivity ratio (Ironkwe *et al*., 2008). According to Otoo *et al*., (2001), one hectare of yam minisett can produce enough seed yams required to plant 3.7 hectares of ware yam whereas under traditional practice, one hectare may produce seed yams to plant only 1.3 hectares. It is therefore a quick cheap and easy way of multiplying healthy seed yam.

Despite these comparative advantages of the technology, the problem of unavailability of seeds during planting season and its attendant high cost persist, hence the absolute level of yam production has remained static for three decades (Scott *et al*., 2000). Since women are involved in yam production processes and majority of the farming population are women (NBS, 2006), this study was conducted to analyse the influence of some socio-economic factors on the outputs of the women farmers, and also to identify major constraints they encountered in using yam minisett technology in Southeastern Nigeria.

Methodology

The study was conducted in five states in Southeastern Nigeria noted for yam production. They included Abia, Anambra, Cross Rivers, Ebonyi and Enugu. The Agricultural Development Programme (ADPs) blocking system was used in selecting study locations. Multi-stage sampling technique was used in getting to the respondents for the study. In each state, two agricultural zones were selected by simple random sampling. By same random method, two blocks from each of the selected agricultural zone were selected. Similarly by random sampling, two circles were selected from each block. Finally, six yam women farmers were randomly selected from a list of yam farmers collected from extension agents in-charge of the selected circles. This gave a sample

size of 48 respondents per state and a total of 240 respondents for the entire study area.

With the aid of interview schedule, data regarding the respondents' socio-economic characteristics were elicited. Data on farm size, expenditure, output, income as well as level of involvement in technology development and transfer and constraints faced in using the technology were also collected. Descriptive as well as quantitative statistics were both employed in data analysis. Multiple regression model was used in determining the socio-economic variables that influenced the output of the women farmers in using the technology and four functional forms (Linear, exponential, semi-log and double-log) were fitted to the data. The functional form that provided the best fit on the basis of the F- statistics, R^2 and the sign and significance of the coefficient was chosen as lead equation for further analysis (Tanko and Jirgi, 2007). The model was specified implicitly as:

$$Y = f(X_1, X_2 \text{-------} Xn, U,) \text{----------} (1)$$

This was expressed as:

$$Y_1 = bo + b_1X_1 + b_2X_2 + b_3X_3 \text{----------} b_{12}X_{12} + U$$

Where:

Y_1 = Output of seed yam of the i^{th} farmer (kg) (dependent variable)

X_1 = Age in years

X_2 = Years of farming experience (Number of years spent in farming)

X_3 = House hold size (number of persons of working age in the household)

X_4 = Educational status (number of years spent in school)

X_5 = Membership of cooperative/farmers' association (a dummy variable that takes a Value of unity for members and zero otherwise).

X_6 = Access to credit (a dummy variable that takes a value of unity for access and zero otherwise).

X_7 = Frequency of extension contact (number of times the farmer was visited by extension agent in a year and vice versa).

X_8 = Land ownership (a dummy variable that has a value of unity for land owners and zero otherwise)

X_9 = Farm size (in hectares).

X_{10} =Level of involvement in development and transfer of the technology (as computed).

X_{11} = Total annual farm income (total amount of money in Naira a farmer realized in a year from seed yam)

X_{12} = Type of farmer (a dummy variable that has a value of unity for full-time farmer and zero otherwise).

U_1 = Error term with zero means and constant variance (Aderinola and Akinrinola, 2005). All the variables were expected to have positive relationship with output from minisett technology expect age.

Results and Discussion

Table 1 shows the average statistics of female yam farmers in the zone. On average, a typical female farmer was 51 years of age with 24 years of farming experience, about 7 years of education, household size of about 7 persons, cultivated 0.17 hectare of land for yam minisett, had 16 times of extension contacts in a year, spent about N 29,594.71, realized about N96,777.04 from yam minisett yearly and produced about 7,706.24kg of seed yam per hectare annually.

Table 1: Average Statistics of female yam farmers in Southeastern Nigeria

Variable	Female
Age (years)	50.47
Farming experience (years)	24.22
Household Size	7.15
Educational Status (years)	7.33
Frequency of extension contact	16.17
Farm Size (hectare)	0.17
Expenditure (Naira)	29,594.71
Annual farm income (Naira)	96,773.04
Output (kg/ha)	7,706.24kg

Source: Field Survey, 2009

Analysis of influence of some socio-economic characteristics of women farmers on their output from yam minisett technology.

Multiple regression results of the influence of some-economic characteristics of the women farmers on their output from yam minisett were summarized and presented in Table 2. From the Table, the linear form of the regression results produced the lead equation. Based on the observed statistical and econometric reasons, this functional form was chosen for further analysis. The F-ratio was positive and significant at 1% level meaning that the estimated function was adequate for use in further analysis. The coefficient of multiple determination (R^2) was 0.49. This implies that 49% of variations in the production of seed yam from yam minisett by female farmers were determined by the variables included in the model.

The coefficient of age was positive and significant at 1% level. This implies that the older the respondent, the higher the output. Age as a proxy for experience was shown to enhance business initiative and efficient use of scarce resources (Okudu, 2006, and Ononuju, 2006). However, this result is contrary to *a priori*, expectations that productivity decreases with increase in age (Okoronkwo *et al*., 2009), but consistent with reports from Nwaru (2007) for arable crop production in Abia State, Nigeria. Espig (1992), however agreed that productivity decreases with advancement in age, but maintained that it is within the age range of 60 and above. Nevertheless he concluded that at that age range, farmers are greatly disposed in terms of experience and if properly harnessed could lead to higher levels of efficiency and translated into increased productivity. He therefore suggests that farmers at that age could make maximum use of hired labour. However, the variable was significant because majority of the respondents in the study area were within the highly productive age range of 30—59 years.

The coefficient of household size was positive and significant at 5% level in agreement with *a prior* expectation that higher household size eases labour constraints in farming operations, thereby leading to increased productivity (Onyenweaku and Nwaru, 2005) and income. This implies that an increase in the variable will result to increase in output of the women farmers and vice versa. However, the large household size might create a positive effect on output per hectare if household labour is devoted mostly to agricultural production. This result is in consonance with the findings of Okoye *et al*., (2009) for cocoyam farmers in Nsukka Agricultural Zone of Enugu State, Nigeria, and Nwaru (2007) for arable crop production in Abia State of Nigeria.

Similarly, the coefficient of education was positive and significant at 1% level in agreement with a *priori* expectations because acquisition of formal education is supposed to enhance skill and increase output. The result is consistent with the findings of Ironkwe *et al*., (2009) for cassava farmers in Ebonyi State and Onyeweaku and Ohajianga (2001) for swamp and upland rice farmers in South Eastern Nigeria. Education and training help to unlock the natural talents and inherent enterprising qualities of the farmers, enhance her ability to understand and evaluate new production techniques, leading to increased productivity and income (Nwaru, 2007). Therefore, attempts to enhance the productivity of women farmers should be targeted more at educated ones through adult education programmes, workshops and seminars, etc.

The coefficient for membership of cooperatives was not significant but negative. This is contrary to *a priori* expectation that members of such association have more access to agricultural information, credit and other production input as well as more enhanced ability to adopt innovations which could lead to increased productivity (Onyenweaku and Nwaru, 2005). The coefficient for access to credit was positively signed according to *a priori* expectation but insignificant. This coefficient was positive showing that the variable is important in production.

Similarly, the coefficient for frequency of extension contact was positively signed according to *a priori* expectation but not significant. The positive sign means that the variable is very important in production therefore a unit increase of it would increase the output of the female farmers from the technology. This result agrees with Ironkwe *et al*., (2009) who reported that the number of extension contacts had a positive effect on the output because adoption of improved technologies increase with an increase in the number of extension contacts. By acquiring knowledge and skills from extension agents regarding improved yam production technology, the output of yam could thus be increased. The variable however, was not significant because the number of contact per year was relatively low.

The coefficient of land ownership was positively signed according to a *priori* expectation but not significant. The positive sign on the variable implies that the variable had positive relationship with output of the technology. Hence, a unit increase in the variable would result to an increase in the output of the

women farmer. The variable was not significant probably because the women were not allowed to own land in the study area. However the result is not consistent with the findings of Ironkwe *et al*., (2009) who reported a positive and significant relationship between land ownership and output of cassava in Ebonyi State, Nigeria.

Similarly the coefficient for farm size was positive according to *a priori* expectation but not significant. The positive sign implies that the variable is important in seed yam production; hence a unit increase of the variable would lead to an increase in the output of seed yam. The variable however was not significant because of the small size of land devoted for the cultivation of minisett by the majority of women farmers in the study area. This result is consistent with that of Bravo Ureta and Pinheiro (1997) and Okoronkwo *et al*., (2009) who found no significant relationship between farm size and output, but contracts from the reports of Onyemauwa *et al*., (2007), and Iheke and Nwaru (2009).

The coefficient of level of involvement in technology development and transfer was positively signed according to *a* priori expectation. This implies that the variable had positive relationship with output of the technology and as such it is important for increased production. This result agrees with the report of Ekop (2001). The variable however was not significant due to the low involvement of the female farmers in the technology development and transfer. The coefficient of total annual farm income was positive according to *a priori* expectation but not significant. The positive sign means that the variable had positive relationship with output of the technology. Hence a unit increase in the variable would lead to an increase in the output of female farmers from the technology and vice versa. Finally, the coefficient of type of farmer was negative and not significant contrary to *a priori* expectation that full time farmers are more committed to the business and as such achieve higher level of productivity than part time farmers.

Table 2: Multiple regression estimate of the influence of some socio economic characteristics of the female farmers on their output from yam minisett technology (n = 240)

Variables	Linear	Exponential	Semi – log	Double – log
Constant	- 2.9062	1.8558	- 38.4068	00.6208
	(- 0.67)	(8.52)***	(-1.94)	(- 0.06)
Age X_2	0.5916	0.0275	18.2828	0.9707
	(9.31)***	(8.68)***	(4.22)***	(4.10)***
Farming experience	- 0.0391	- 0.0019	- 0.8206	- 0.0661
X_3	(- 0.92)	(-1.17)	(-1.00)	(- 1.48)
Household size X_4	0.3828	0.0159	6.6115	0.2262
	(2.37)**	(1.98)*	(3.32)***	(2.07)**
Educational status X_5	0.7115	0.00320	5.1318	0.2466
	(5.35)***	(4.81)***	(2.99)***	(2.62)**
Membership of	- 0.0895	0.0328	1.0425	0.0894
farmers/cooperative	(-0.08)	(0.62)	(0.70)	(1.10)
society X_6				
Access to credit X_7	0.3687	- 0.0121	- 0.6802	- 0.1026
	(0.30)	(- 0.20)	(-0.39)	(- 1.07)
Frequency of contact	0.0501	0.0007	-0.1778	- 0.0521
with extension X_8	(0.90)	(0.20)	(-0.09)	(- 0.46)
Land ownership X_9	0.5465	0.0324	1.1369	0.1129
	(0.52)	(0.62)	(0.79)	(1.33)
Farm size X_{10}	2.4709	0.1967	1.1486	0.0880
	(0.77)	(1.22)	(1.11)	(1.55)
Level of involvement	0.0110	0.0012	- 1.7303	- 0.0358
in technology	(0.32)	(0.70)	(- 1.47)	(-0.56)
development X_{11}				
Total annual farm	0.0215	0.0013	- 0.7290	- 0.0266
income X_{12}	(1.15)	(1.40)	(- 0.70)	(-0.47)
Type of farmer X_{13}	- 2.0655	- 0.1268	- 0.7739	- 0.0164
	(-1.41)	(-1.73)*	(-0.37)	(-0.14)
R^2	0.4936	0.4622	0.4473	0.3930
Adjusted R^2	0.4667	0.4337	0.3803	0.3194
F-ratio	18.36***	16.19***	6.68***	5.34***

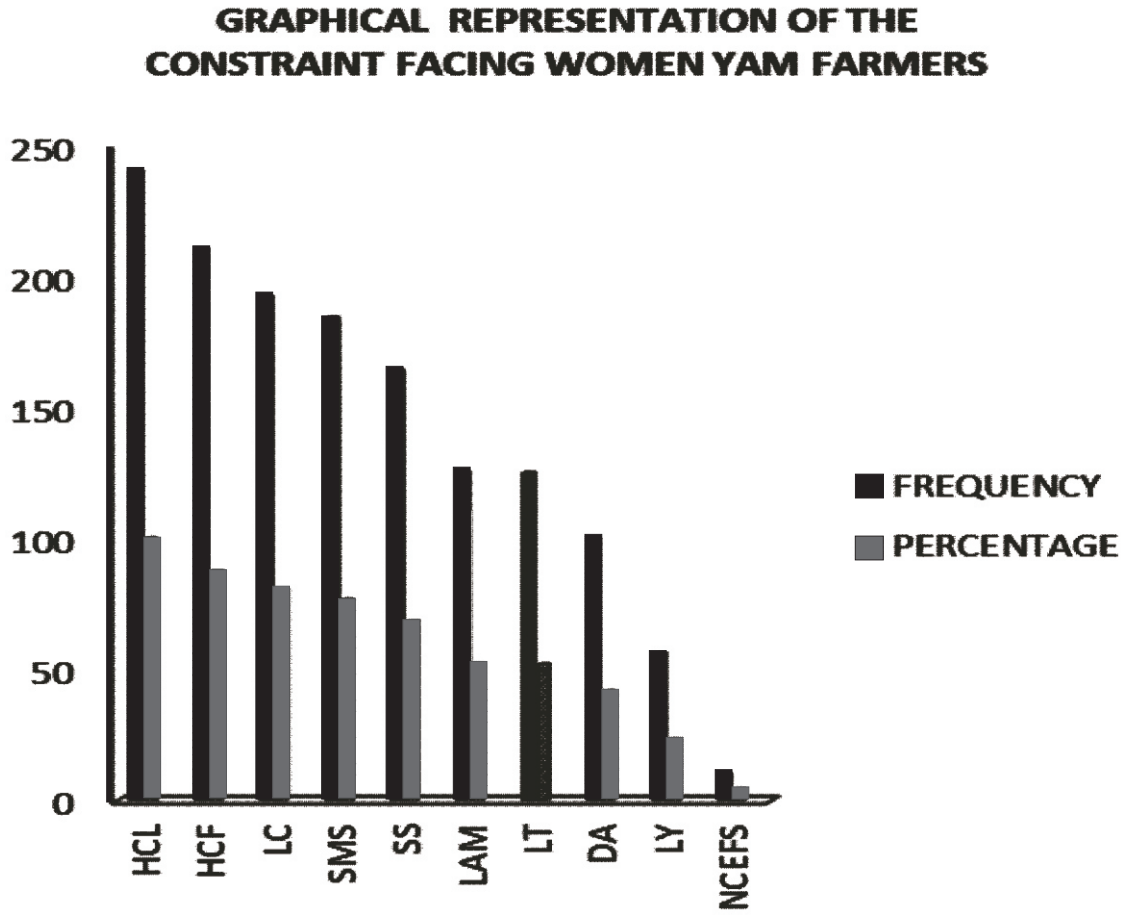
Source: Field Survey, 2009

Note: Figures in parentheses are t – value

*, **, *** represent levels of significance at 10%, 5%, 1% respectively.

Constraints faced by women farmers in using yam minisett technology.

The results in Table 3 revealed that 100% of the respondents identified high cost of labour as a problem while 87.50% agreed on scarcity/high cost of fertilizer as a problem. Majority (80.00%) of female farmers identified lack of loan/credit as a problem while about 76.67% of them perceived scarcity of minisett dust as a problem. The issue of scarcity of stakes was seen as a problem by about 68.33% of the women farmers; 52.08% identified lack of access to market and transportation as problems, while 41.67% of the women farmers considered insect/disease attack as problems. On the low yield of the technology, about 23.33% of them perceived it as a problem. Also, small sizes of seed yam produced were seen as problem to increased usage of yam minisett technology by about 12.92% of the women yam farmers.



Multiple responses recorded

Key:

HCL = High cost of labour
HCF = Scarcity/High cost of fertilizer
LC = Lack of loan/Credit
SMS = Scarcity of minisett dust
SS = Scarcity of stakes
LAM = Lack of access to market
LT = Lack of transportation
DA = Insect/Disease attack
LY = Low yield
NCEFS = Not compatible with existing farming system

Conclusion and Recommendations

The finding from the study revealed that young women farmers with more farming experience were into seed yam production in the study area. The ages of the respondents were equally within the economically active range which also favors agricultural production. They had low level of education, large household size, high number of extension contact as well as high output and increased income from the use of the technology.

Such factors such as age, household size and educational level had positive and significant relationship with the output of the women farmers. The important constraints encountered by the women farmers in using the technology include scarcity and high cost of labour, scarcity and high cost of fertilizer,

unavailability of minisett dust and lack of loan and credit. In order to ensure increased production of seed yam from the use of the technology among the women farmers, efforts should be made in removing the identified production constraints and in improving the relevant variables found to have significant effect on the output of the women farmers. These women farmers, who constitute the majority of the farming population, should be encouraged and motivated to compete favourably with the men by removing the constraints that hinder them from realizing their full potential in the seed yam production business. This could be done by formulating desirable policy objectives and providing suitable institutional environment that will encourage adequate use of the technology by the women farmers for increased seed yam production in the study area. There is also need for policies targeted at encouraging the older and more experienced women farmers to remain in seed yam production, improve their educational levels and increase their access to land and production resources. This could be done through formation of cooperatives, organization of training courses, workshops and seminars for women farmers in the area. All these will help the women farmers to improve their scale of operations, increase output levels and income from seed yam production in the study area.

Acknowledgement

I sincerely appreciate National Root Crop Research Institute (NRCRI), Umudike, for funding the project and Dr. Robert Asiedu from International Institute of Tropical Agriculture (IITA), Ibadan, for sponsoring me in The First Global Yam Conference for presentation of this work.

References

Aderinola, E.A. and Akinrinola, O.O. 2005. Profitability, input elasticities and return to scale or yam production in Ondo State, Nigeria. Agricultural Rebirth for improved production in Nigeria. Proceedings of the 39th Annual Conference of Agricultural Society of Nigeria, held at the University of Benin, Benin City Nigeria. Pp 300 -303.

Aiyedum, E. and Kormawa, P. 2001. Sustainability of yam production by indigenous women in Abuja. Program of event and book of Abstracts of the 35th Annual Conference of the Agricultural Society of Nigeria (ASN) held at the University of Abeokuta, Nigeria, 16th to 20th September, 2001. Pp 68.

Asumugha, G.N., Njoku, M.E., Aniedu, O.C., Okoye, B.C., Ogbonna, M.C., and Nwosu, K.I. 2009. Demand Functional Elasticities for seed yam in Northern Nigeria. *The Nigeria Agricultural Journal* 40 (1): 1 – 8.

Bravo-Ureta, B.E. and Pinheiro, A.E. 1997. Technical, economical and efficiency in peasant farming evidence from the Dominican Republic. *The Development Economics*, 35(1): 48 – 67.

CBN. 2000. Central Bank of Nigeria. The Agrarian System In changing Economy and Implication for Development, Research Department CBN, realm Communications. Pp 31-60.

Ekop, M.O. 2001. Gender Implication for Sustainable Technology Adoption. In: Akoroda, M.O. and Ngeve, J.M. (eds). Root Crop in the 21st Century. Proceedings of the 7th Triennial Symposium of International Society for Tropical Root Crops – *Africa Branch (ISTRC-AB)* 11-17 October, 1998. Pp. 110-120.

Espig, A.F. 1992. Economics of Yam Production in Haryan. *Indian Journal of Agricultural Economics, 92(7): 28 – 34.*

Ezumah, N.N. and Didomenica, C.M. 1995. Enhancing the Role of Women in Crop Production. A case study of Igbo women in Nigeria. *World Development*. 2(10): 1731 – 1744.

Food and Agricultural Organization (FAD) 2008. FAO STAT. Statistical Division of the Food and Agricultural Organization of the United Nations. Rome, Italy. www. faostat org. June 8, 2008.

Kushwaha, S. and Polycarp, I.M. 2001. Economics of small scale yam production in Oua'an Pan L.G.A of Plateau. In: Abubakar, M.M., Adegbola, T.A.and Butswat, I.S.R. (eds). The Role of Agriculture in Poverty Alleviation. Proceedings of 34th Annual Conference of Agricultural Society of Nigeria, held at Abubakar Tafawa Balewa University (ATBU), Bauchi, October, 15 – 19, 2001. Pp. 69 – 74.

Idachaba, F.S. 2004. Policy Requirements for Root Crops Market Economy in Africa. Proceedings of 8th Triennial Symposium ISTRC-AB, IITA, Ibadan. 1-4.

Iheke, O.R. and Nwaru, J.C. 2009. Gender, farm size and relative productivity of cassava farmers in Ohafia Agricultural zone of Abia State, Nigeria. *Nigerian Journal of Rural Sociology*. 9(1): 69 – 75.

Ironkwe, A.G. 2005. Adoption of yam minisett technology by women farmers in Abia state, Nigeria. An unpublished MSc. Thesis in the Department of Rural Sociology and Extension, Michael Okpara University of Agriculture, Umudike, Abia State. Pp. 75-81.

Ironkwe, A.G., Asiadu R., Chinaka, E.C. and Ezebuiro, C.N. 2008. Comparative analysis of women's involvement in crop production in Ohafia and Umuahia agricultural zone of Abia State, Nigeria. Policy Advocacy Role in Agricultural and rural transformation in Nigeria. Proceedings of the 17th Annual Congress of the Nigerian Rural Sociological Association held at National Root Crops Research Institute, Umudike, Abia State, Nigeria. 19th – 22nd August, 2008: 69 – 74.

Ironkwe, A.G., Ekwe, K.C., Okoye, B.C. and Chukwu, L.I. 2009. Socio-economic determinants of cassava production among women farmers in Ebonyi State, Nigeria. *Nigerian Journal of Rural Sociology*. Vol. 9(1): 63 – 68.

Madukwe, M.C., Ayichi, D and Okoli, E.C. 2000. Issues in yam minisett technology transfer to farmers in Southeastern Nigeria. ATPS working paper No.21. African Technology Policy Studies Network, Nairobi. March, 2000, Pp 3-23.

NBS. 2006. Statistical Year Book, 2006. Nigeria Bureau of Statistics (NBS), Abuja, Nigeria.

Nwaru, J.C. 2007. Gender and Relative Technical Efficiency in Small Holder Arable Crop Production in Abia State of Nigeria. *International Journal of Agriculture and Rural Development (ISARD),* 10(2): 25 – 34.

Onyenweaku, C.E. and Olajianya, D.O. (2005). Technical efficiency of Swamp and Upland rice farms in Southeastern Nigeria. Journal of Sustainable *Technical Agricultural Research,* 14: 64 – 70.

Okoli, O.O. and Akoroda, M.O. 1995. Proving seed tubers for the production of food yam. A review article in African. *Journal of Root and Tuber Crops*. 1 (1): 1 – 6.

Okoronkwo, M.O., Okelola, O.E. and Nwangwu, A. 2009. Estimation of Socio-economic factors of cassava production of rural farmers in Ikwo L.G.A of Ebonyi State. Global food crisis and Nigerian Agriculture Proceedings of the 43rd Annual Conference of the Agricultural Society of Nigeria, held at National Universities Commissions and Raw Materials Research and Development Council, FCT, Abuja. 20 – 23 October, Pp. 384 – 386.

Okoye, B.C., Okoye, A.C., Dimehu, M.U., Asumugha, G.N., Agwu, A.E. and Agbaeze, C . C . 2009. Determinants of gender productivity among small holders cocoyam farmers in Nsukka Agricultural Zone of Enugu State, Nigeria. *Nigerian Journal of Rural Sociology*, 9(1): 101 – 106.

Okudu, P. 2006. An appraisal of Abia State Agricultural Development Project (ADP) on Livestock Production in Umuahia Agricultural Zone, An unpublished M.Sc Thesis in Department of Agriculture, Abia State University, Uturu, Abia State, Nigeria.

Okwor, G.C., Asiedu, R. and Ekanayale, I.J. 1998. (ed). *Food yams: Advances in Research*. IITA, Ibadan and NRCRI, Umudike, Nigeria.

Ononoju, A.A. 2006. Economic Implication of Non-Timber Forest Product (NTFP) in Umuahia South L.G.A. of Abia State, Nigeria. B(Agric). Thesis Department of Agriculture, Abia State University, Uturu.

Onyemauwa, C.S., Eze, C.C., Oguoma, N.N.O., Ehirim, N.C. and Osugiri, I.I. 2007. Allocative Efficiency and Output Elasticity of Crop mixture Farmers by Gender in Nwangele, Imo State, Nigeria. *International Journal of Agriculture and Rural Development (IJARD),* 10(2): 50 – 55.

Onyenweaku, C.E. and Nwanu, J.C. 2005. Application of a Stochastic frontier production function to the measurement of technical efficiency in food crop production in Imo State, Nigeria. *The Nigerian Agricultural Journal*, 36: 1 – 12.

Onyenweaku, C.E. and Olajianya, D.O. 2005. Technical efficiency of Swamp and Upland rice farms in Southeastern Nigeria. Journal of Sustainable *Technical Agricultural Research,* 14: 64 – 70.

Otoo, J.A., Okoli, O.O. and IIona, P. 2001. Improved production of seed yam . IITA Research Guide 63. printed by IITA, Ibadan, Nigeria. Pp 1 – 4.

Scott, G.J., Best, R., Rosegrant, M. and Bonkanga, M. 2000. Roots and Tubers in the Global Food System. Vision Statement of Year 2020. International Potato Centre, Lima Peru Pp67 – 70.

Spore. 2011. Commodity Associations: More Competitive supply chain. In: Yam A Triumph for Town No. 152, p20.

Tanko, L. and Jirgi, A.J. 2007. Agricultural credit and relative production efficiency in sorghum based cropping enterprise in Kebbi State, Nigeria. *Journal of Research in Agriculture*. 4 (4): 47 – 54.

Ugwu, B.O. 1999. Policy Imperatives for Sustainable Production of Root and Tuber Crops in Nigeria. In: Nwosu, A.C., C.U. Najiuba and J.A. Mbanasor (eds). Agricultural Transformation in Nigeria. Proceedings of a national Conference in Honour of Prof. M.O. Ijere, held at Federal university of Agricultre, Umudike, Abia state, Nigeria, 24th-26th August, 1999: