Assessment of the extent of Participation and Awareness of Improved Technologies of Irish Potatoes by Women Farmers in Mambila Pleateau

Sabo Elizabeth, Adeniji, O.T, and Festus Napthali.

Department of Agricultural Extension and Management
School of Agriculture, National Open University of Nigeria
Department of Crop Science and Horticulture, Federal University, Oye Ekiti, Nigeria
E-Mail: *Elikwabe@yahoo.com*

Abstract

Irish potato is an important root and tuber crop in Mambila plateau. Women are largely involved in the production of Irish Potato in Mambila Plateau. The study was embarked upon to assess the extent of participation of women in Irish potato production in the Local Government area. A total of eighty-five respondents were selected from nine wards in the Local Government area, while a structured interview schedule was used to gather information from them. The data collected was analysed using frequency counts and percentages, as well as Likert-type scale. The study shows that the Women producing Irish potatoes in the study were predominately young and married, with moderate family sizes. Most of them were literate and were mainly small scale farmers. They relied mainly on inheritance for farm land. They derived most of their planting materials from the previous crops harvested. The major improved technologies on Irish potatoes they were aware of the Planting time and techniques and Bio-fortified potato. However a lot of them were not aware of the High yielding disease resistant varieties, Insect pests' management, and symptoms of diseases as well methods of storage and preservations of Irish potato. They participated to a great extent in the processing, weeding, harvesting and gathering of Irish potato. However they had low participation in land preparation and the control of pests and diseases. The study recommends the improvement of information dissemination on high yielding varieties and the techniques for insect and pest managements on Irish potato to the women farmers.

Key Words: *Awareness, improved technologies, Irish potato, participation, production, women-farmers,*

INTRODUCTION

The Nigerian economy is still predominantly agrarian and women are key players in the business of agriculture, especially within rural communities. Women contribute between 40% and 65% of all hours spent in agricultural production, processing and also undertake 60% to 90% of rural agricultural product marketing, thus constituting more than two-thirds of the workforce in Agriculture (FAO, 2007). Women are key suppliers of labour in agricultural production. Agricultural extension services in Nigeria have traditionally been focused on men, while neglecting the women. Most extension messages targeted at women emphasize their domestic roles with topics on child care and family nutrition. Irish potato (Solanum tuberosum) [L] originated in South America (Hawkes, 1990). It was first introduced into Nigeria in the later part of the 19th century and early 20th century by the Europeans in Jos plateau and the Germans in the Cameroon (Salau et al 2010). Irish potato is by far the most efficient tuber crop in Nigeria in terms of tuber early 20th century by the Europeans in Jos plateau and the Germans in the Cameroon (Salau et al 2010). Irish potato is by far the most efficient tuber crop in Nigeria in terms of tuber yield and period of maturity (Okonkwo et al 1988).

Abedullah and Khuda (2006) had reported that Irish potatoes were produced on a small scale basis on an average plot size of fewer than 0.5 hectares. Expansion in Irish potato production is accounted for by an increase in land area under cultivation, which is estimated to be around 55,000 hectares and adoption of improved management and storage techniques (Okonkwo et al. 1988). Potato is an important nutritive food, it contains higher crude protein than any other root and tuber crop, with low calories and high vitamin C contents (FAO, 2008).

In Nigeria, 80% of annual Irish potato production is under rain fed, while 20% is produced under irrigation (Okonkwo et al 1995). The Mambila plateau located in the Sardauna Local Government area in Taraba state is suitable for cultivation of Irish potato. The production and consumption of Irish potato is consistent with the norms and beliefs of the inhabitants of Mambila plateau. The soil and climatic conditions in the plateau are suitable for rainy and dry season production of Irish potatoes, where it is transported to markets located in urban and peri urban cities in Nigeria. In 2007, it was estimated that about 1,350,000 tonnes of potato were produced in Nigeria from an area of about 270,000 hectares (FAO, 2007).

Irish potato has been of great importance not only as a source of food, but also, as a source of income for the rural poor (FAO, 2007). In spite of the importance of this crop, there has been no significant increase in production, the average national yield is less than10 metric tonnes/hectare compared to a potential of 35 metric tons/hectare on research station (FAO, 2007).

Irish potato is mainly cultivated by small holder rural women, who depend on obsolete farm tools in Sardauna Local Government area. The production is constrained by an array of agronomic, socioeconomic and institutional factors. These factors have negatively impacted on crop growth and yield, and subsequently, on the livelihood of the women growers. Research activities on the extent of participation of women farmers in production of Irish potatoes and awareness of Irish potato production technology information in the Mambila plateau is limited, when compared to tomato, pepper, maize, cassava, and cowpea. In recent times, a lot of technologies on Irish potato were disseminated by extension department of research institutes, which were expected to scale productivity. Women growers in the study area are not familiar with improved technologies on production and storage that could enhance the tuber yield and shelf life and also, boost the productivity. However, access to information on the production characteristics will improve the livelihood of growers. In the light of the above, this study seeks to describe the socio-economic and institutional characteristics of women Irish potato growers, evaluate the awareness of Irish potato production technologies, and determine the extent of participation of women farmers in production of Irish potato in Sardauna Local Government area.

Research Methods

The Study Area

The study was conducted in Sardauna Local Government area of Taraba State (Mambilla Plateau), Nigeria. Sardauna Local Government (longitude 10018/N to 11037 E. Latitude 50030E to 70018N) share boundary with the Republic of Cameroon in the East and South West, Kurmi Local Government area in the South East, and Gashaka Local Government area in the North. The study area is mountainous with an altitude of 1830 meters above sea level, and a population of 224,437 persons (Taraba State Diary, 2012). The total area of the plateau under crop production is about 2000 hectares. Sardauna local government area has a temperate climate with constant rainfall and waterfalls. The wet season starts in March and ends in October. Thus, the average rainfall ranges between 1866 mm – 3000 mm. while the dry season starts in November and ends in February. The temperature does not exceed 200C, the soil type predominant in the area is loamy or clay loamy. Hence, soil type is highly slightly acidic in most areas with pH ranging from 5.2 – 5.9.

The study made use of primary data, collected through structured questionnaire. A multi stage sampling procedure was adopted for the study. The first stage involves a purposive selection of ten villages from the local Government area. The villages were purposively selected due to high production of Irish potato production in the area. The second stage involves a random selection of two villages from each ward, Jabu and Gikau villages in Mayo Ndage ward, Leme and War in Gembu A, Barrup and Tep in Gembu 2, Wakill Babu and Wakill Goma in Nguroje ward, Furmi and Zongoagla in Magu ward, Kuma and Njeke in Bamaga ward, Yerimaru and Kusuku in Karara ward, Mayodule and Kabri in Warwar ward, Mbarkamanga and Kara in Titong village, Warkaka and Sarkaka in Ndunyaji village. The survey took place through July and December 2016, one hundred respondents were selected for the study, ten respondents from each ward (five respondents per village). Eighty five responses were retrieved and processed for data analysis.

Data collected from the respondents cover demographic, economic and institutional variables, these variables are age (years), sex, occupation and experience (years) in production, educational attainment, farm size, household size and marital status among others. Data collected were summarized and subjected to descriptive statistics as mean, frequency distribution, percentages and Chi-square 'goodness - of - fit' test, to determine if the frequency distribution of the categories observed for socioeconomic, institutional and production variables differ or are similar. Awareness of Irish potato production technologies was computed by awareness percentage. While the extent of participation by women growers in Irish potato production technologies was computed using a four point Likert scale as great extent = 4, some extent = 3, little extent = 2, no extent = 1. The mean score was computed as $4 + 3 + 2 + 1 = 10/4 = 2.50$. Using the interval score of 0.05, the upper limit cut-off was determined as 2.50 ± 0.05 and the lower

limit as 2.55 ± 0.05 = 2.45. On the basis of this, mean score (s) (MS) below 2.45 (that is, <2.45) were ranked 'low', those between 2.45 and 2.54 were considered 'medium' (that is, 2.45 ≥MS ≤ 2.54), while the mean score greater than or equal to 2.55 (that is, MS ≥2.55) was considered 'high'.

Results and Discussion

Majority (82.4%) of the respondents fell within the age range of 18 and 40 years, 11.8% were within the age range of 41 and 59 years, while a few (5.0%) was above 60 years of age (Table 1). This implies that Irish potato growers in Sardauna Local Government area are young and of the middle age group. The finding is in line with Vosanka et al (2016) report which indicated that young adult dominates Irish potato production in Sardauna Local Government. The preponderance of young women in Irish potato production implies high aspirations and possesses the physical strength required for crop production. The majority of the respondents (62.4%) were married, while 36.5% were single. It could be said that the married women dominate Irish potato production in the study area. The dominance of married women in Irish potato production is an indication that women growers may receive assistance from their children in the form of activities in seed sorting, land preparation, planting, weeding, spraying and harvesting. The household size in the study area ranged from 1 to 7 (Table 1). Women growers with a household size of between 1 and 4 had 48.2 % of the total respondents, while women growers with household size in excess of 5 constituted 51.8%. The two categories did not show any significant difference as indicated by Chi square goodness of fit test. In another study, Simonyan and Obiakor (2012) reported family size more than five among the rural residents in north central Nigeria. As the number of household size increases, agricultural activities of the households can also be accomplished in time due to sharing of farm activities among household members. In the same way, Okoye et al. (2008) and Udensi et al. (2011) had reported that a relatively large household size are more likely to provide more labour required for farm operations such as weed control, fertilizer application and harvesting (etc.).

However, Simonyan and Obiakor (2011) justified that large household size may not guarantee for increased labour efficiency, since the family comprises mostly children of school age that are always in school during working period. This investigation showed that 14% of women growers had no formal education, this percentage is larger compared to those who had primary school certificate (2.4%) and tertiary education (2.4%). Educated Irish potato growers (the first school leaving certificate and secondary school certificate holder) accounted for 83.6% of the respondents. This is an indication that most farmers had a fairly good education to understand basic Irish potato production practices and techniques. In another study conducted among Irish potato growers in northern Malawi (Doss, 2015) and Ethiopia Gebru et al. (2017) opined that high literacy level among Irish potato farmers is considered as one variable that positively affects adoption of agricultural technologies. Due to high literacy level, improved potato production practices can be communicated to the women growers through reading materials such as pamphlets, leaflets, and other aids. Women growers with farming experience between 6 years and 11 years accounted for 82.4% of the Irish potato growers investigated. The results are similar to those reported by Kabungo (2008) in Tanzania. Most of the Irish potato farmers were small scale farmers, with 61.2% owing farmlands through inheritance while 36.5% rented farmlands for Irish potato production.

Table 1: Socioeconomic Characteristics of the respondents

Variables	Frequency	Percentage (%)
Age		
18 – 40	70	82.40
41- 59	10	11.80
60>	5	5.90
Marital status		
Married	53	62.4
Single	31	36.5
Divorced/Widowed	1	1.2
Family size		
1-4	41	48.2
5-7	47	51.8
Educational attainment		
No formal education	12	14.1
First School Leaving Certificate	2	2.4
Secondary School Certificate	69	81.2
Tertiary education (Diploma, Degree)	2	2.4
Farming experience		
1-5	15	17.6
6-10	36	42.4
11>	34	40.0
Farming size		
< 1ha	16	18.8
1-2ha	29	34.1
3-5ha	32	37.6
6>ha	8	9.4
Ownership of farmland		
Family	52	61.2
Lease	2	2.4
Rent	31	36.5

Data in Table 2 shows that 75.3% of women Irish potato growers prefer Irish potato seeds to small whole tubers or mini sets as planting materials. A majority (75.3%) of women growers' source for planting materials from the market while 14.1% of the women growers received planting materials from friends. The foregoing is an indication that there is no formal seed system for Irish potato in the study area. Consequently, access of women growers to high yielding, disease resistant, and bio fortified varieties is very low. The availability of improved varieties will improve tuber yield/hectare, increase household livelihood and nutrition. Women growers who cultivate white flesh Irish potatoes accounted for 95% of the respondents. On the other hand, women growers who are aware of orange flesh (bio fortified) Irish potatoes varieties accounted for 84.7% of the respondents. In the study area, women growers indicated that planting in the month of April/May was most preferred (54.1%), followed by August/September, and few growers plant during June/July. The preference for early planting (April/May) is to ensure two cycles of production between April and February. Further, preference for planting on ridges had 94.1%, while planting on bed or flat recorded 5%. The study revealed that few women growers (24.7%) showed a preference for medium to late maturing Irish potato. In contrast, a large proportion (76%) of the women farmer showed a high preference for early maturing Irish potatoes. Preference for early maturing Irish potato varieties is to have more cycles of production per year, early supply of Irish potatoes to the market, early profit, and to circumvent diseases and insect pests attack. A large proportion (76.4% and 88.23%) of the women growers indicated that they have no access to extension agents and credit facilities. In another study, Kabungo (2008) reported that Irish potato growers in Mbeya district, Tanzania had access to extension services and credit services. In contrast, poor access to extension agent and credit services had been reported in many parts of sub-Saharan Africa (Eze et al. 2006; Junge et al. 2009). The women growers acknowledged the preponderance of leaf yellowing followed by leaf browning and leaf spot as symptoms noticed on Irish potato production. Irish potato growers in the study areas used organic fertilizers (82.35%) compared to inorganic fertilizer (17.65%). This trend is associated with scarcity and the high cost of inorganic fertilizer. The cow dung, followed by

poultry droppings are frequently encountered. Processed organic fertilizers are least encountered, partly because they are expensive and scarce. The quantity of organic fertilizer applied by women growers is not standardized, each farmer uses her intuition in the application of organic fertilizer. The respondents indicated that if organic fertilizer was applied the Irish potato, the tubers have long shelf life compared to inorganic fertilizer.

Table 3 shows that the awareness of planting time and planting techniques, and bio fortified varieties recorded 94.12% and 88.24% respectively. However, the absence of bio fortified Irish potatoes varieties in the study area suggests the need to improve access through a sustainable seed system. A few of the women growers (23.52% and 35.29%) were knowledgeable of insect pests' management methods, and the symptoms of Irish potato diseases. The foregoing is associated with a preponderance of insects and insects' transmitted diseases during cropping season. It could be affirmed that the absence of extension agents, inadequate knowledge on application rate and time of application account for poor yields on farmers' fields. Women growers of Irish potatoes (23.53%) in the study were not aware of high yielding and disease resistant varieties released by research Institutes in the study area. A good proportions (47.06% & 48.23%) were aware of the processing and value addition methods, and storage and preservation methods respectively.

Table 2: Production characteristics of Irish Potato growers in Sardauna Local Government Area, Taraba state

Variables	Frequency	Percentage	Chi square	Probability
Source of planting materials				***
Market	23	27.05	44.49	
Agricultural Development Project	3	3.52		
Friends	16	18.82		
Previous saving from harvesting	43	50.58		
Type of planting material				***
Seeds	64	75.3	21.75	
Mini set/small whole tubers	21	24.7		
Preference for white flesh Irish potatoes				***
Yes	81	95.3		
No	4	4.7	69.75	
Awareness of bio fortified Irish potato				***
Yes	72	85.88	40.93	
No	13	15.29		
Women growers who planted orange flesh Irish potato				***
Yes	12	14.1		
No	73	85.88	41.34	
Planting time (rain fed)				**
April-May	46	54.1	17.38	
June/July	16	18.8		
August/September	23	27.1		
Planting				***
Ridges	80	94.11	42.32	
Beds	5	5.88		
Preference for maturity types				***
Early maturing	65	76.4	21.75	
Medium maturing	20	23.5		
Access to Extension Agent				**
Yes	20	23.5	21.75	
No	65	76.4		
Access to credit				***
Yes	75	88.23	39.20	
No	10	11.77		
Fertilizer use				***
Organic	70	82.35	41.66	
Inorganic	15	17.65		
Occurrence of diseases				***
High	62	72.94	21.11	
Moderate	17	20.0		
Low	6	7.05		
Knowledge of disease symptoms				
Leaf yellowing	45	52.94	16.04	**
Leaf spot	15	17.64		
Leaf browning	25	29.41		
Disease control methods				***
Chemical method	50	58.82	40.02	
Cultural method	5	5.88		
No control	30	35.30		

Table 3: Awareness of Irish potato production technology information

Variables	Yes	No
Planting time and planting techniques	80 (94.12%)	5 (5.82%)
Insect pests management	20 (23.52%)	65 (76.47%)
Insecticides and spraying methods	40 (47.06%)	45 (52.94%)
High yielding disease resistant varieties	20 (23.53%)	65 (76.47%)
Bio fortified Irish potatoes	75 (88.24%)	10(11.76%)
Symptoms of diseases	30 (35.29%)	55 (64.71%)
Signs of harvesting, harvesting techniques, and tools	45(52.94%)	40(47.06%)
Processing and value addition	40(47.06%)	45(52.94%)
Markets	60 (70.59%)	25(29.41%)
Storage and preservation methods	41(48.23%)	44 (51.77%)

Women growers are largely involved in gathering and processing of Irish potato seeds for next season planting, planting, weeding, harvesting, processing, storage and marketing. These variables recorded scores ranging from 3.82 to 3.99 (Table 4). On the other hand, the extent of participation of women Irish potato farmers in spraying of agrochemicals (insecticides, herbicides, and fungicides) and land preparation recorded scores of 2.76 and 2.62 respectively. The women growers seek support from the men to secure land for farming, hire labour for land preparation, spraying of herbicides, fungicides, and insecticides.

Table 4. Extent of participation of women growers in production of Irish potatoes

Irish Potato Production activities	Great extent	Some extent	Little extent	No extent	Score
Gathering of Irish potato seeds	70 (3.29)	15 (0.59)	0	0	3.88
Land preparation (making ridges and beds)	10 (0.47)	65 (2.29)	0	0	2.76
Planting	60 (2.82)	15 (0.53)	0	0	3.34
Weeding	80 (3.76)	5 (0.23)	0	0	3.99
Harvesting	70 (3.29)	15 (0.53)	0	0	3.82
Processing	80 (3.76)	5 (0.17)	0	0	3.93
Marketing	80 (3.76)	5 (0.23)	0	0	3.99
Spraying of herbicides, fungicides, and insecticides	12(0.56)	30 (1.05)	43(1.01)	0	2.62
Processing and storage of Irish potato seeds	70 (3.29)	15 (0.53)	0	0	3.82

Conclusion Women farmers are involved in the production of Irish potato in Sardauna Local Government area, Taraba state. This investigation showed that women growers are moderately educated up to secondary school. With this literacy level, technology information communicated to the growers will improve production. Women Irish potato have little access to extension agent, credit facilities, bio fortified Irish potato seeds and modern storage techniques. Women growers are conversant with disease symptoms on the field. Also, the use of fungicides in the control of diseases is widely accepted. Organic fertilizers are frequently used compared to inorganic fertilizer. The latter is expensive and encourage rotting of tubers during storage. The study recommends a sustainable system for supply of Irish potato seeds, dissemination of technology information, provision of inputs and facilities to scale production, affordable processing and storage methods, and marketing.

References

Abedullah, D.A and V.E Khuda (2006).Technical Efficiency and its Determinants in Potato Production, Evidence from Punjab, Pakistan. The Lahore Journal of Economics 11: 2 (Winter 2006) pp. 1-22

Doss C. R. (2003). Understanding farm level technology adoption: lessons learned from CIMMYT's micro surveys in Eastern Africa. CIMMYT Economics Working Paper. Mexico, DF: CIMMYT. Vol 20: 4-20

Eze C.C, Ibekwe, U.C, Onoh, P.O and Nwajiuba C.U (2006). Determinants of adoption of improved cassava production technologies among farmers in the Enugu State of Nigeria. Global Approaches to Extension Practice. 2 (1): 37-44.

FAO (2007). Food and Agricultural Organization of the United Nations. Crop prospects and food situation, http://www.potato2007.org/en/potato/utilization.html.

FAO (2008). Food and Agriculture Organization of the United Nations. International Year of the Potato, 2008. www.potato2008.org.

Gebru, H., Mohammed, A., Dechassa, N., and B. Derbew (2017). Assessment of production practices of smallholder potato (Solanum tuberosum L.) farmers in Wolaita zone, southern Ethiopia. Agric and Food Security. 2-11 6:31 DOI 10.1186/s40066-017-0106-8

Hawkes, J.G (1990). The potato: evolution, biodiversity and genetic resources. London: Belhaven 21 – 43.

Junge B, Deji O, Abaidoo R, Chikoye D. and Stahr K (2009). Farmers' Adoption of Soil Conservation Technologies: A Case Study from Osun State, Nigeria. The Journal of Agricultural education and extension.15 (3): 257- 274.

Kabungo C.V.D. (2008). Evaluation of Irish Potato production and marketing performance: A case study of Mbeya Rural District, Mbeya Region, Tanzania. Msc. Dissertation, Sokoine University of Agriculture, Morogoro, Tanzania. 89pp.

Okonkwo, J.C, Nwokocha, H.N, Ifenkwe, O.P (1988). Effect of storage environment on post-harvest losses and subsequent field performance of some potato (Solanum tuberosum) cultivars. Nigeria. Agriculture. Journal. 23: 41-56.

Okonkwo, J.C., L.S.O. Ene and O.O. Okoli, (1995). Potato production in Nigeria. National Root Crops Research Institute, Umudike Umuahia, Abia State, Nigeria, pp: 109.

Okoye B.C, Onyenweaku C.E, Agwu A.E. (2008). Technical efficiency of small holder cocoyam farmers in Anambra State, Nigeria: implications for agricultural extension policy. J Agric Ext. 12(1):107

Simonyan J.B, Obiakor C.T (2012). Analysis of household labour use in yam production in Anambra West Local Government Area of Anambra State, Nigeria. Prod Agric Technol. 8:1–16. 26. `

Taraba State Diary (2012). A publication of Ministry of information Jalingo Taraba State, Nigeria.

Udensi E, Gbassey T, Ebere, U.F.G, Asumugha, C.E, Okoye, B.C, Okarter, C, Paul, I, Richardson, O, Alfred, D. (2011). Adoption of selected improved cassava varieties among small holder farmers in South-Eastern Nigeria. Int J Food Agric Environ. 9(1):329–35.

Vosanka I.P, Alam, M. K, Simon, B.P, Rikwentishe, R (2015). Analysis of Saving Pattern of Co-Operative Farmers in Sardauna Local Government Area of Taraba State, Nigeria ARPN Journal of Science and Technology Vol. 5: 10-16.