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Determinants of the Practice of CAY-Seed Technologies of Seed Yam Production by Women in the Federal Capital Territory, Nigeria

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Abstract

This study researched on the determinants of the practice of CAY-Seed Technologies of Seed Yam production by Women the Federal Capital Territory, Nigeria. The study aimed at examining the roles of gender in seed yam production, determining the factors influencing women's practice of seed yam production technologies and the perception of gender groups on the constraints encountered in seed yam

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production. The findings revealed that adult females take leading roles in fetching of water required for seed treatment and herbicide application (73.8%).About 19.4% of female youths engage in fetching water, while adult females led in carting of seed yams to the field for planting, placing them on ridges, harvesting and marketing with 52.2%, 79.4%, 59.7% and 53.1% respectively. A Probit regression model with an R^2 value of 0.4412 revealed that training(x_7) and extension visits(x_5) were statistically significant at 1% and 10% respectively, having a direct relationship to the practice of seed yam production technology. However, years of formal education of women was statistically significant at 10% but had an indirect relationship with the practice of seed yam production. The Likert scale showed that limited access to land, limited access to capital, difficulty involved in cutting yam tubers into minisetts, limited access to equipment for mechanization and poor road networks to seed yam farms were still perceived as severe constraints in order of severity by all gender groups. The study recommended that modern methods of growing crops in other media other than soil be encouraged by research institutes to address the constraint of limited access to land. Also, Women should organize themselves into self-help groups to easily access trainings from agricultural extension agents.

Keywords: CAY-Seed, technology, practice, women, seed yam

INTRODUCTION

Yam tuber is essentially a starchy or carbohydrate food which supplies calories to humans. Apart from its nutritional value, yam plays an important role in social and religious festivals in areas where it is grown. In many areas of West Africa, it is an integral part of the cultural heritage of the people (Izekor and Olumese, 2010). Traditional yam production is faced with many constraints, including high cost and/or unavailability of seed yams for planting. Up to 33% of yams that would have been available for food are reserved for planting a new crop (Oguntade *et al*., 2010). The minisett technique which involves the use of about 30g cut setts to produce small whole tubers to serve as "seed" was developed to address the problem of high cost of seed yam (Aighewi *et al*., 2015).

According to FAO (1997), women produce between 60 and 80 percent of the food in most developing countries and are responsible for half of the world's food production. However, they remain invisible partners in development. The contribution of women to agriculture is highly undermined and their specific needs ignored in most developing countries. Their roles in yam production has not been given much recognition as well because yam has been perceived traditionally as a man's crop. Mainstreaming gender in seed yam production would not only help men and youths appreciate the vital roles of women but will encourage men to give women more access to the control of the resources needed in seed yam production.

A number of barriers to women's participation in agricultural activities have been identified. Umunakwe *et al*. (2017) reported systematic gender biases, which exist in the form of customs, beliefs and attitudes which confine women mostly to domestic spheres. Also, women's economic and domestic workloads impose severe time burdens on them (Yemisi and Aisha, 2009). This results in their limited participation in the practice and adoption of agricultural technologies and they tend to practice only the ones that fit into their time schedules.

The 3-year Community Action for Improving Farmer-saved Seed Yam (CAY-Seed) Project was launched on 23 February 2015 in Kumasi, Ghana. It aims at establishing a sustainable seed yam

system that will improve food security and reduce the poverty of smallholder yam farmers in yam-growing areas of Ghana and Nigeria(Aighewi *et al*., 2017).CAY-Seed Project introduced yam farmers in the Federal Capital Territory (FCT), Nigeria to several technologies that were targeted at improving the quality of seed yams. The technologies include: sorting of clean tubers, cutting of yam tubers into minisetts of 30g size, treatment of cut setts with pesticide dip, planting minisetts on ridges at intra-row spacing of 30cm and inter-row spacing of 1m, neem leaf powder preparation and application, positive selection and sorting at harvest. It is against this backdrop that this research sought to determine what technologies were practiced by women in seed yam production in the FCT, Nigeria. The specific objectives of the study were to:

1. Examine the leading roles of gender in seed yam production
2. Determine the factors influencing women's practice of seed yam production technologies
3. Examine the perception of gender groups on constraints encountered in seed yam production

METHODOLOGY

Study Area

This study was conducted in the Federal Capital Territory (FCT), Nigeria, which is bordered by the states of Niger to the West and North, Kaduna to the northeast, Nasarawa to the east and south and Kogi to the southwest. FCT lies between latitude $8^{o}25^{1}$ and $9^{o}25^{1}$North and longitude $6^{o}45^{1}$ and $7^{o}45^{1}$East (Abuja master plan, 2000). It is geographically located in the center of the country and is within the yam producing zone. It has a landmass of 7, 315 square kilometers and a population of 1,406, 239 as at 2006 and a projected population of 4, 140, 920 at 9% population growth rate in 2018 (UNFPA, 2015).

The FCT is comprised of 6 Area Councils (Abaji, Bwari, Gwagwalada, Kuje, Kwali and Abuja Municipal Area Councils). It experiences three weather conditions annually. This includes a warm, humid rainy season and a blistering dry season. In between the two, there is a brief interlude of harmattan occasioned by the northeast trade wind, with the main feature of dust haze and dryness. It records a highest annual rainfall of about 1631.7 mm and a mean annual temperature ranging between 25.8 and 30.2^{o} C (Idoko&Bisong, 2010).

Sampling Procedure and Size

The study used primary data and secondary sources of information; the primary data were achieved using structured questionnaire while the secondary data were achieved through the use of journals obtained from the internet. Multi-stage sampling technique was employed in selecting the respondents for this study from the FCT, Nigeria. In the first stage, out of the six Area Councils in Abuja, two were purposively selected (Bwari and Kwali Area Councils) because CAY-Seed project was implemented in these areas. YIIFSWA is the seed yam project that gave birth to CAY-Seed Project farmers in the Area Councils. In the second stage, a total of eight villages were purposively selected; four villages from each Area Council. These villages were selected on the basis that they had more yam farmers who participated in the YIIFSWA Project. In the third stage, respondents were randomly selected from these villages so as to avoid bias. From a sample frame of 3,200 household heads of yam farmers drawn from Bwari and Kwali Area Councils, a sample size of 320 yam farmers was selected.

Method of Data Analysis

Descriptive statistics such as percentages and frequencies were used to analyze the first objective. The Probit regression model was used to analyze the second objective.

The dependent variable (Yi), which is practice of seed yam production technology by women is binary: $Y_i = 1$, if the women practice seed yam production technology and $Y_i = 0$, if the women do not practice seed yam production technology. Either choice yields a utility index, U_i, that the individual woman farmer, *I*, acts to maximize. If U_i^* is the critical or threshold level, at which decision is made to practice seed yam production technology, then:

$Y_i = 1$ if $U_i > U_i^*$

$Y_i = 0$ if $U_i \leq U_i^*$

The non-observable underlying utility function which ranks the preference of the *ith*woman farmer can be expressed thus:

$\sum_{n=1}^{N} Bn\ Xni\ ei$

Where;

Xni = the nth variable of the *ith* observation

X_i = Age(chronological years)

X_2 = Years of formal education(years spent in school)

X_3 = Membership of co-operative/farmer organizations(yes =1, otherwise = 0)

X_4 = Farm distance(kilometers)

X_5 = Extension visit(number of times in a month)

X_6 = Sources of information(family/friends =1, extension agents =2, electronic media =3, print media= 4)

X_7 = Trainings(number of times in a month)

βn = the nth parameter to be estimated

[i = I ------N]

e_i= error term

For K observations [i = I -----K]

Ui = βXi where

β = X x 1 vector of the parameters βn

Xi = N x K matrix of the repressor Xni

The probability Pi for woman farmer i to practice seed yam production technology is then:

$P_i = P [Y = 1] = P [U_i > = U_i^*] = P [U_i^* < = U_i]$

Since U_i^* is a discrete random variable, if F [*] is its cumulative distribution function, then,

$P [Y = 1] = P [U_i^* < = U_i] F [U_i]$

$P[Y-1] = 1 – F [U_i]$

The form of F [*] is determined by the probability density function of the random variable U_i.

The Likert scale was used to achieve the third objective by asking some perceptual statements and respondents were requested to respond to the statements along a three- point Likert - type scale of very severe constraint = 3; severe constraint = 2 and not severe constraint = 1. The mean value of 2.0 was taken as the cutoff point. Statements with mean score of 2.0 and above were therefore considered as severe constraints encountered in seed yam production, while statements with mean score below 2.0 were considered as not severe constraints encountered in seed yam production as perceived by all gender groups.

RESULTS AND DISCUSSIONS

Leading Gender Roles in Seed Yam Production

The study examined the leading gender roles in seed yam production among adult males, adult females, male youths and female youths. As shown in Table 1, adult males took the leading role in cutting of tubers into minisetts and treatment of cut setts, with 74.7% and 74.4 % respectively, while the female youths played the least roles in these practices with 2.2% and 1.3% respectively. A likely reason for this result could be that adult males are more energetic to carry out the laborious task of cutting yam tubers into minisetts. Also, treatment of cut setts requires technicality to measure the right quantities of pesticides and fungicides to use, for which men are more favorably disposed to because they have better formal education than the female gender. This agrees with the findings of Wakhungu (2010) which revealed that literacy level among females in Africa is low and this contributes to the vicious cycle of under-development of women.

Adult females assumed the leading role in fetching water for seed treatment and herbicide application with 73.8%, followed by female youths with 19.4%, while male youths had only 2.1%. This result shows that the traditional domestic role of fetching water was extended to agricultural field activity while the male is known to take lead in high energy demanding roles such as making of ridges and mounds. This finding is in agreement with Nahusenay and Tesfaye (2015) who reported that about 90% of water fetching in agricultural production is carried out by women.

The leading role of carting seed yams to the field for planting among the gender groups was performed by adult females, with 52.2% while the male youths played the least role with 8.4%. Carrying by head pottage is a practice closely related to the domestic roles played by the female gender and the report of Fu *et al*. (2011) supports this findings.

Adult males were more involved in planting of seed yams on ridges with 73.8% over the other gender groups and the adult females played the least role of planting seed yams on ridges with only 3.1%. Planting is not only limited to placing of seed yams in the soil and covering them. It also includes placing of seed yams on ridges; a role majorly played by the adult female with 79.4% over the male gender. A similar finding was reported by Fu *et al*. (2011), who found out that it is a very common practice for the females to assist in carrying seed yams to the farm and placing them on the ridges for men to plant. The likely reasons for this practice could be because females are more involved in head pottage and the task of placing seed yams on ridges demands less energy, compared to planting.

Adult females assumed the lead role in harvesting (59.7%) while adult male followed with 16.9%. Male youths were the least involved in harvesting (7.2%) compared with other gender groups. However, adult males led in sorting the seed yams at harvest with 75.9% engagement. This finding may be as a result of the cumulative complementary roles the female gender plays at harvest, such as preparation of food, packing and assembling of harvested tubers. These complementary roles by males and females is consistent with the findings of William *et al*. (2004), which revealed that in southeastern Nigeria, men and women are involved in harvesting of food crops.

Adult females took a leading role in seed yam marketing with 53.1% while male youths ranked least with only 4.1%. This result thus suggests that females take the leading role in marketing of seed yams in FCT as it is a traditional practice for men to produce food crops and for women to trade (Agwu *et al*., 2014).

Table 1: Leading Gender Roles in Seed Yam Production

Gender roles	Adult male		Adult female		Male youth		Female youth	
	Freq*	%	Freq*	%	Freq*	%	Freq*	%
Cutting of tuber into minisetts	239	74.7	20	6.3	54.0	16.9	7	2.2
Minisett treatment	238	74.4	13	4.1	65	20.3	4	1.3
Fetching water for seed treatment and herbicide application	13	4.1	236	73.8	9	2.8	62	19.4
Carting of seeds to the field for planting	71	22.2	167	52.2	27	8.4	55	17.2
Planting on ridges	236	73.8	10	3.1	63	19.7	11	3.4
Placing seeds on ridges	9	2.8	254	79.4	5	1.6	52	16.3
Harvesting of seeds	54	16.9	191	59.7	23	7.2	52	16.3
Sorting at harvest	243	75.9	19	5.9	52	16.3	6	1.9
Seed yam marketing	96	30.0	170	53.1	13	4.1	41	12.8

* Multiple responses recorded
Freq: Frequency count
%: Percentage
Source: Authors (2018)

Factors influencing women's practice of seed yam production technologies

Table 2 shows the probit regression model estimates of factors that influence women's practice of seed yam production technologies. The model has an R^2 of 0.4412, implying that about 44% variation in the practice of seed yam production technologies is explained by the independent variables in the model. Training $X_7$was significant at 1% level of probability while extension visits and years of formal education X_2 were significant at 10% levels of probability. Training was directly related to the dependent variable, implying that as more training is given to women, there is increased probability of higher practice of seed yam production technologies. Extension visits (X_5) was directly related to the dependent variable. This means that the higher the frequency of extension visit to women practicing seed yam production technologies, there will be an increased probability for more seed yam production technologies to be practiced by women. This result agrees with the findings of Lawal *et al.* (2014), in their study which revealed that extension visits influenced farmers' likelihood of adopting yam minisett technology. Years of formal education was indirectly related to the dependent variable, implying that the more years of formal education acquired by women, there is reduced probability of practicing seed yam production technologies. This finding corroborates with that of Hiroki and Ashok (2010), that formal education can be a barrier to technology adoption, especially for small scale farmers who have higher tendencies to work off farm. Age (X_1), membership of co-operatives/organizations (X_3), farm distance (X_4) and sources of information (X_6) were not significant.

Table 2 Factors influencing women's practice of seed yam production technologies

Variables	Coefficient	Standard Error	Z	P>|z|	
Age X_1	0.0086	0.0485	0.18		0.858
Years of formal education X_2	-0.2582*	0.1423	-1.81	0.07	
Member of organization X_3	0.1856	1.3920	0.13		0.894
Farm distance km X_4	0.0622	0.0671	0.93		0.354
Extension visits X_5	0.2858*	0.2610	1.71		0.076
Sources of information X_6	-0.9249	1.5849	-0.58	0.56	
Training X_7	4.7252***	1.6097	2.94		0.003
_cons	-0.0118	2.4180	0		0.996
Log likelihood	14.6906				
R^2	0.4412				

*** implies significant at 1%; * Implies significant at 10%
Source: Author (2018)

Perception of gender groups on constraints encountered in seed yam production

The constraints encountered in seed yam production by all gender groups and their corresponding Likert scores were shown in Table 3. The result showed that all gender groups perceived in order of severity: Limited access to land (2.47), limited access to capital (2.38),cutting yam tubers into minisetts is difficult (2.38), limited access to equipment for mechanization (2.34) and poor road network to seed yam farms (2.01) to be the severe constraints associated with the production of seed yam using the yam minisett technology. Lack of seed yam market (1.97), lack of technical know-how (1.89), inadequate access to extension services (1.84), intensive nature of labor for ridge making (1.78) and gender discrimination in seed yam production (1.57) were perceived by all gender groups as not severe constraints they encounter in seed yam production. The rapid rate of urbanization of the Federal Capital Territory could be responsible for limited access to land and it implies agricultural production could be adversely affected in the coming years. The findings of William *et al.* (2004), revealed that access to agricultural credit is low, especially for female farmers in southern Nigeria and that credit delivery has been politicized in some states. This agrees with the finding of this work, as all gender groups perceived limited access to capital as a constraint encountered in seed yam production.

Table 3 Perception of gender groups on constraints encountered in seed yam production

	Statements	Mean Score	Rank	Perception Comment
1	Limited access to land	2.47	1st	SC
2	Limited access to capital	2.38	2nd	SC
3	Cutting yam tubers into minisetts is difficult Limited access	2.38	2nd	SC
4	to equipment for mechanization	2.34	4th	SC
5	Poor road network to seed yam farms	2.01	5th	SC
6	Poorly developed seed yam market	1.97	6th	NSC
7	Inadequate technical know-how	1.89	7th	NSC
8	Inadequate access to extension services	1.84	8th	NSC
9	Intensive nature of labor for ridge making	1.78	9th	NSC
10	Gender discrimination in seed yam production	1.57	10th	NSC

Key: SC=Severe Constraint, NSC= Not Severe Constraint
Source: Author (2018)

CONCLUSIONS AND RECOMMENDATIONS

The female farmers play critical roles in seed yam production which go unrecognized and underappreciated. This study has revealed that women play leading roles in fetching of water for seed treatment and herbicide application, carting of seed yams to the farm for planting and placing of seed yams on ridges while the males do the actual planting. In addition, they complement the roles of men at harvest by cooking food, packing and assembling harvested tubers. Seed yam marketing is also a practice that the female farmers takea leading role. Going by these immense contribution of women, it is recommended that the efforts of women in seed yam production be recognized by all development partners in agriculture and the federal government of Nigeria, especially in coming up with agricultural policies to attain gender equity.

Training programmes should be organized for women periodically by programme implementers because it has the potential of increasing knowledge and technical skills of women practicing technologies of seed yam production; thus boosting yam productivity, income and household food security status.

CAY-Seed project has greatly contributed to reducing the constraints all gender groups encounter in seed yam production by stationing research assistants in project intervention communities who train farmers on seed yam production technologies. Therefore, it is recommended that possibilities for scaling out the key messages of the project be looked into by donors and other development partners. However, limited access to land, limited access to capital, difficulty involved in cutting yam tubers into minisetts, limited access to equipment for mechanization and poor road networks to seed yam farms were perceived as severe constraints by all gender groups. It is therefore recommended that modern farming methods that employ raising of crops in other media other than soil be encouraged by research institutes to address the constraint of limited access to land. Also, Women should organize themselves into self-help groups to easily access trainings from agricultural extension agents.

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