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Full length Research

Determinants of adoption of yam minisett technology in Ghana. A case study of yam farmers in the Kintampo North District of Ghana

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This study was conducted to explore the determinants of adoption of yam minisett technology among yam farmers in the Kintampo North District. It also explored the awareness, the adoption level, reasons for non-adoption by non-adopters and the problems limiting the usage of yam minisett technology by adopters. Multi-stage sampling technique was used to select 100 respondents from four (4) communities in the study area. Data was collected with the use of structured questionnaire and an interview guide. The study employed descriptive statistics to analyze socio-economic and demographic characteristics, awareness level, level of adoption, the reasons for non-adoption and problems limiting the usage of Yam Minisett Technology. The Probit regression model was used to ascertain the determinants of adoption of yam minisett technology. Results from the study revealed that, the awareness level of yam minisett technology was 28% whiles the percentage of adoption was 12% of the respondents. The major reasons for non-adoption of yam minisett technology were complexity of the technology, smaller tubers produced by the technology making them undesirable for the local market, non-compatibility of the technology with existing farming practices, and inadequate knowledge on the minisett technology. The major problems limiting the usage of the technology by adopters were lack of access to credit, inadequate extension contacts, high cost of labour, and lack of ready market for smaller tubers produced by the minisett technology. The study recommends among other things the need to upgrade the knowledge of farmers on improved techniques of agriculture through market-led extension with the view to improving output and incomes.

Keywords: Determinants of adoption, Yam Minisett Technology, Probit estimates, Market-led extension.

INTRODUCTION

Yam production is one of the main agricultural activities in the West African region which contributes between 90% and 95% of world yam production (FAO, 2009). Ghana is the second largest yam producer in the world and only 30,000 tons of its total production of 7 million tons are currently exported (MiDA, 2013). In Ghana, yam is one of the major staple food crops and occupies 11.6% of the total cropped area of Ghana. It is vital for both domestic and export markets. The crop is the most important food crop in terms of output value. It contributes about 17% of agricultural gross domestic product and also plays a key role in guaranteeing household food security (Kenyon and Fowler,2000).

The major constraints to yam production in Ghana are unavailability of planting materials, soil degradation, poor handling techniques, storability, high cost of staking and labour, pest and diseases attack. The most significant constraint is the unavailability of planting materials for the fact that, the cost of planting materials alone constitutes between 33% and 50% of the total production cost of yam in sub-Saharan Africa (Kambaska *et al*., 2009).

Despite the important role of yam in the economy of Ghana as a source of food and job creation, as much as 30% of the previous harvest that should have been sold or eaten is reserved for the next cropping season (Orkwor and Asadu, 1998; Kambaska *et al*., 2009). This clearly shows how farmers are constrained in terms of availability and cost of materials for planting.

The seed system of yam production in Ghana is mainly the traditional system where the yams are milked after first six months of planting and left in the soil to allow for the formation of setts which would be used for planting in the next season. The harvested ware yams are often physiologically immature and have short shelf life. The traditional method of seed yam involves the use of tubers (from whole tuber to mother seed yam ranging between 500 to 1000g).

The major challenges facing the traditional method of seed yam production include; relatively large amounts of planting material required, inadequate and inaccessibility of seed yam, production of small quantity of seed yam of poor quality, uneven sprouting of setts, low sprouting percentages of setts, tubers produced hardly meeting the standards required by export markets, disease transmission from mother yam heads to setts and many others. The traditional method of yam production using ware yam as planting materials when planted often sprouts unevenly since they are planted directly onto the field which prolongs the cropping season.

In attempt to addressing challenges facing the yam industry in Ghana, the Root and Tuber Improvement and Marketing Programme (RTIMP) under the International Fund for Agricultural Development (IFAD)/Ghana government initiative adopted the farmer field fora approach in disseminating yam minisett technology in 28 yam producing districts covering Volta, Northern, Ashanti and Brong-Ahafo regions of Ghana. The yam minisett technology is an improved technology for the production of healthy seed yam which was first developed by the National Root Crops Research Institute (NRCRI) in Umudike and International Institute of Tropical Agriculture (IITA) in Ibadan, Nigeria (RTIMP, 2012).

The minisett method involves the use of smaller portions of the whole yam tuber as planting material which is a major advantage over the traditional methods of yam production. In the yam minisett technology, one yam tuber can be cut into approximately 40 pieces, setts of about 50 to 100 g each. The setts are dipped into fungicide and nematicide which kill any infections already present before planting and prevent disease from appearing once planted. The advantage of the minisett technology is that farmers do not need to use the whole of their second harvest as seed, thus increasing the availability of yam for food and income. This has relatively increased the income levels of farmers who have adopted the technology. Despite the fact that efforts have been made through concerted extension services to make farmers aware of the yam minisett technology and eventually practice it, not many farmers have been moved to adopt the minisett technology as a means to improving yam productivity, income and access to export markets. The reinforcement of any technology by farmers is usually based on positive outcome from the technology. Since adoption is not an end in itself, understanding the possible factors that affect the adoption process would facilitate the continuity of the adoption process. The adoption process as outlined by Rogers (1992) are; Knowledge, Persuasion, Decision, Implementation and Confirmation. Any factor that interrupts this process would defeat the ultimate aim of adoption of the innovation.

The success and eventual adoption of minisett technology will substantially reduce the volume of the root crop used as seed and in effect, increase the amount of yam available for sale or for consumption. Apart from its economic and food security benefits, the yam minisett technology will also substantially decrease or eliminate the transmission of disease especially nematodes, which is the main cause of low yields in yam production (IITA, 2009).

Research on yam minisett technology has been going on in Ghana since its introduction and this study sought to explore the determinants of adoption of yam minisett technology among yam farmers in the Kintampo North District in Brong-Ahafo region of Ghana. The adoption of a technology is dependent on numerous factors which influence the continuity and/or discontinuity of the adoption process. It is therefore important for policy makers, researchers and developmental partners to understand these factors and their effects on the adoption of yam minisett technology in Ghana. With this information, the promotion of yam minisett technology would properly be targeted to ensure effective adoption. This among other things would help identify potential beneficiaries and losers of the technology, and anticipate appropriate policy measures in improving rural livelihoods and reduce poverty among farmers (Agumago, 2001).

The main objective of the study therefore was to explore the determinants of adoption of yam minisett technology among yam farmers in the Kintampo North District in the Brong-Ahafo region of Ghana.

Specifically, the study was aimed at:

i. ascertaining the awareness and adoption levels of yam minisett technology among yam farmers;

ii. identifying reasons for non-adoption and problems limiting the usage of yam minisett technology among yam farmers and
iii. exploring factors which influence the adoption of yam minisett technology among yam farmers in the Kintampo North District.

Statistical hypothesis

H_0 : Farmer's age ,educational level , sex ,household size, Farming experience ,Farm size , income per annum , access to credit ,contact with extension agents ,Land tenure status ,Distance from farm to the nearest local market ,Membership with farmer based organization ,perception of the complexity of the technology and Source of planting materials have no influence on his/her decision to adopt the yam minisett technology.

MATERIALS AND METHODS

Brief description of the study area

This study was carried out in Kintampo North District. The District has a population of 111,122 comprising 49.1% male and 50.9% female with a growing rate of 2.6% per annum. It is located between latitude 8^0-45^0N and 7^0 - 45^0 S and a longitude $1^0 20'$W and $2^0 1'$E and shares boundaries with 5 districts in the country namely: central Gonja district to the North: Bole district to the west, East Gonja district to the North-East (all in the Northern region); Kintampo South to the South and Pru district to the South-East (all in the Brong-Ahafo region). The District capital, Kintampo is about 130km away by road and lies east of the Brong-Ahafo regional capital, Sunyani. The District has a surface area of about 12.9% of the total land area of Brong Ahafo Region (39,557km^2). In terms of location and size, the District is strategically located at the centre of Ghana and serves as a transit point between the Northern and Southern sectors of the country. There are ten settlements within the District namely; Babatokuma, Dawada Number 2, Gulumpe, Busuama, Kawampe, Kadelso, Kintampo, Kunsu, New longoro and Portor. The District is popularly called the District of "waterfalls". The main source of livelihood for the inhabitants of the District is farming, predominantly yam production and it was one of the districts in which the minisett technology was piloted.

Research design

A case study design was employed in the study. From literature, the common research type employed for adoption studies is survey. Since the determinants of yam minisett technology adoption are geographically specific, the survey approach was not likely to provide the information needed to understand the specific determinants of adoption peculiar to a given area. A case study focuses on a particular unit(s) of the population thereby allowing an in-depth probing or analysis of the study area. Both qualitative and quantitative approaches were used in the study.

Sampling and data collection methods

The target population for the study included all yam farmers in the Kintampo North District. Multi-stage sampling was applied in the study. Four communities were randomly selected from the ten major communities that constitute the study area. Five villages were randomly selected from each of the four communities. Five yam farmers were then selected purposively from each village to give a total of 100 respondents. Data was collected in May, 2014.

Data Analysis

Data was analyzed using descriptive statistics such as frequency, counts and percentages and likert scale with the aid of Statistical Package for Social Sciences (SPSS latest version). The **Maximum Likelihood Probit Estimate** was used to analyze the factors that determine the adoption of yam minisett technology and is expressed in its explicit form as follows:

$$Y = \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + \beta_8X_8 + \beta_9X_9 + \beta_{10}X_{10} + \beta_{11}X_{11} + \beta_{12}X_{12} + \beta_{13}X_{13} + \beta_{14}X_{14} + \varepsilon_{i.}$$

Where, Y= Adoption status (Dummy variable: Adopted = 1, Not-adopted = 0),X_1 = Farmer's age (years), X_2 = Farmer's educational level (years),X_3 = Farmer's sex (Dummy variable, male = 1, female = 0) ,X_4 = Farmer's household size (Number of persons),X_5 = Farming experience (years),X_6 = Farm size of farmer (hectares),X_7 = Farmer's income (¢GH),X_8 = Farmer's access to credit (Dummy variable; Yes = 1, No = 0),X_9 = Farmer's contact with extension agents (Number of extension visit),X_{10} = Land tenure status (Dummy variable; non-hired = 1, hired = 0),X_{11} =Distance from farm to the nearest local market (km),X_{12} = Membership to farmer based organization (Dummy variable; Yes = 1, No = 0),X_{13} = Farmer's perception of the complexity of the technology (Dummy variable; complex = 0, otherwise = 1),X_{14} = Source of planting materials (Dummy variable; self-produced = 0, other source(s) = 1) and $\varepsilon_{i.}$ = Error term. Chi-squre statistics specifically the P-test was used to test the hypotheses.

RESULTS AND DISCUSSION

Socio-economic and demographic characteristics of respondents

Majority of the farmers (yam farmers) were in their productive age: About 77% of the respondents fall within the age bracket of 21 – 50 years, with 13% being above 50 years (Table 1). The implication here is that, given the right resources and the needed support for production, the farmers have the required vigour or physique to produce large outputs of yams in the Kintampo North District. About 86% of the farmers were married, 12% were single and only 2% were widowed with the modal family size between 6 and 10. This indicates the presence of substantial intra – household demand for yam for food and income security as well as the availability of substantial family labour as input to the labour intensive yam production. High cost of labour was found to be a major problem constraining the adoption of minisett technology. Therefore, the availability of substantial family labour may reduce the cost of labour which in effect may increase the farmers' chances of adopting the yam minisett and other agricultural technologies.

About 48% of the farmers had no formal education while 26% had primary education; indicating a low literacy rate among the respondents which might hinder their chances of adopting agricultural technologies such as the yam minisett technology. Empirically, farmers with low level of education are associated with low adoption rates of agricultural technologies specifically from extension agents, conservatism and low technical efficiency in the farming sector (Chinaka *et al*., 1995).

The results in table 1 further indicate a very low farm income among farmers in the study area: 43% of the respondents earned between GH¢100 and GH¢ 500 per annum from farming. About 40% of the farmers earned between GH¢ 1100 and GH¢ 1500 and only 17% earned above 1500 Ghana cedis per annum. The income distribution of the respondents varied with their farm sizes with the minimum and maximum per annum income being GH¢ 100 and GH¢ 35,000 respectively. The low farm income in the study area has significant implications for resource-poverty, small scale production and low adoption of agricultural technologies. According to Gbegeh (2012), farmers with high farm income are in better position to meet the inherent cost associated with any agricultural technology and have the greatest chances of adopting modern agricultural practices (Risk-averse strategy is reduced).

The results also showed that 58% of the farmers cultivated more than 5.5 acres of yam farms. About 42% of the farmers cultivated between 0.6-5.5 acres. This relative greater farm size may be a boosting factor to adoption of agricultural technologies when sufficient technical and institutional support is provided. Udoh (2010) found that farmers with relative greater farm size more readily adopted agricultural innovations necessary to increasing farm productivity.

The sex distribution was 82% and 18% for male and female respectively reaffirming the general fact that, women remain virtually invisible in the farm sector especially in yam production. This could be as a result of it being labour intensive and requiring substantial energy and time. This result is in line with the findings of Orkwor and Asadu (1998), who described yam production as a token of masculinity. Sixty percent (60%) of the respondents were natives of Kintampo while 40% were non-natives who migrated mainly from the northern regions of Ghana to settle for more favourable climatic conditions.

Majority of the respondents were Muslims (55%) while 45% were Christians. This indicates a dominance of Muslims in the study area, noticeably for yam production. More importantly, 58% of the farmers had farming experience of between 6 and 20 years implying a medium to long term production experience. The land tenure status of the farmers was worthy of notice as 97% of the farmers obtained their land from communal land tenancy while only 2% hired their farm lands, implying that farmers were bonded together through their common source of farmland.

Table 1: Socio-economic and demographic characteristics of yam farmers

SOCIO-ECONOMIC CHARACTERISTICS	FREQUENCY	PERCENTAGES	MEAN/MODE
SEX			
Male	82	82%	Male
Female	18	18%	
AGE			
< 21	1	1%	
21 – 30	26	26%	
31 – 40	27	27%	31.25
41 – 50	24	24%	
> 50	22	22%	
RELIGION			
Christianity	45	45%	Islam
Islam	55	55%	
Others	0	-	
MARITAL STRATUS			
Married	86	86%	
Single	12	12%	Married
Divorced	2	2%	
Widowed	0	-	
EDUCATIONAL STATUS			
No formal education	48	48%	
Primary education	26	26%	No formal education
Secondary education	23	23%	
Tertiary education	3	3%	
HOUSEHOLD SIZE			
1 – 5	28	28%	
6 – 10	46	46%	
11 – 15	15	15%	6 – 10
16 – 20	5	5%	
> 20	6	6%	
ETHNICITY			
Natives	60	60%	Natives
Non – natives	40	40%	
FARM SIZE/ACRES			
0.6 – 1.5	4	4%	
1.6 – 2.5	10	10%	
2.6 – 3.5	14	14%	
3.6 – 4.5	8	8%	6.00
4.6 – 5.5	6	6%	
> 5.5	58	58%	
FARM INCOME PER ANNUM (GH¢)			
100 – 500	43	43%	
600 – 1000	8	8%	
1100 – 1500	6	6%	100 – 500
1600 – 2000	3	3%	
2100 – 2500	6	6%	
2600 – 3000	2	2%	
>2500	32	32%	
LAND TENANCY STATUS			
Hired	2	2%	
Communal	97	97%	Communal land tenancy
Purchased	1	1%	

Source: (Field survey results May, 2014)

Awareness level of yam minisett technology

The results in Table 2 showed a very low awareness level (28%) of yam minisett technology against the backdrop that, the study area is one of the major yam producing areas in Ghana. Awareness is the first step in the adoption process (Rogers, 1992). For a farmer to adopt the minisett technology, he/she must first be aware of the technology, develop interest in it, evaluate his decision to adopt, put the technology into trial, confirming the results of the trial and based on the confirmation he or she finally adopts or rejects the technology.

Table 2: Level of awareness of yam minisett technology among respondents

	FREQUENCY	PERCENTAGE
AWARE	28	28%
NOT AWARE	72	72%

Source: (Field survey results, May 2014)

Low level of awareness of yam minisett technology in the study area is surprising for the fact that, Kintampo North District was among the 28 districts or Districts in which the technology was first introduced by Root and Tuber Improvement and Marketing Programme. This low level of awareness may be attributed to the weakness of the communication channels through which the yam minisett technology was disseminated and lack of reinforcement of the technology adoption in the study area.

Percentage of adoption of yam minisett technology

The low adoption percentage (12%) in this case (Table 3) is not coincidental for the fact that, low awareness levels presumed low percentage of adoption. It is practically impossible for adoption to take place without being well informed of the attributes of the technology (awareness of the technology).

Table 3: Adopters and non-adopters of yam minisett technology among respondents

	FREQUENCY	PERCENTAGE
ADOPTERS	12	12%
NON – ADOPTERS	88	88%

Source: (Field survey results, May 2014)

Most of the respondents including adopters had little or no knowledge on the yam minisett technology. It was therefore difficult to solicit basic information on yam minisett technology from the respondents. Respondents who were designated as adopters were those who adopted about 80% of the components in the yam minisett technology since majority of the farmers adopted components that were convenient to them. Thus this study did not find any farmers who have adopted all the components of the yam minisett technology.

Problems limiting the usage of yam minisett technology and reasons for non-adoption.

Adopters were asked to rank the problems constraining their usage of yam minisett technology on a 4-point likert scale and the results obtained (Table 4) indicate that lack of credit to buy chemicals to treat minisetts, high cost of labour at nursery, inadequate extension visits or contacts and no ready market for the produce from minisetts were the most important in that order. Non-adopters were also asked to rank their reasons for non-adoption of yam minisett technology on a 4-point likert scale and the results obtained (Table 5) indicate that the complexity of the minisett technology, lack of knowledge on minisett technology, lack of credit facilities and , inadequate extension visits or contacts were the most important in that order. The entries in Table 4 and Table 5 further revealed that, reasons for non adoption provided by non adopters and problems limiting the usage of minisett technology provided by adopters were almost the same. This may be due to lack of extension visits in a sustained promotion of the technology. This may have affected the behaviour of the majority of farmers in not adopting the yam minisett technology. The fact that the adopters and non-adopters of yam minisett technology shared the same concern or problems calls for urgent intervention by the technology promoters (RTIMP), and other concerned stakeholders.

Table 4: Problems limiting the usage of yam minisett technology by adopters

PROBLEM	Mean score	Rank
Lack of credit to buy pesticide or fungicide	3.44	1
Inadequate extension visits or contacts	3.33	2
High cost of labour at nursery (weed control, staking, mound making, pests and diseases control etc.)	3.32	3
No ready market for small tubers	3.30	4
Pests and diseases problems at nursery	3.27	5
Thievery/ other farmers steal minisetts at nursery	2.52	6
Insufficient information on yam minisett technology	2.20	7
Consumers complain of tubers having short shelf life	2.11	8
Unfavourable weather conditions at nursery	2.08	9
Unavailability of medium for pre-sprouting minisett at nursery	2.06	10
Inadequate nursery facilities	1.86	11
Delay or late planting due to the nursery of minisetts	1.79	12
Unavailability of ware yams close to planting season	1.70	13
High cost of land preparation at nursery	1.71	14
Lack of knowledge on minisett technology especially in nursery	1.67	15

(4=Very Important, 3=Important, 2=Not Important and 1=Not Important at all)

Source: (Field survey results, May 2014)

Table 5: Reasons for non - adoption of yam minisett technology

REASONS	Mean score	Rank
Minisett technology is too complex	3.26	1
Don’t understand the rationale behind the minisett technology	3.08	2
Lack of credit facilities	3.04	3
Inadequate extension contacts or visits	2.99	4
Not compatible with the farming system	2.94	5
Minisett produce smaller tubers	2.82	6
Need more information on minisett technology	2.64	7
Minisett technology waste times or delay the cropping season	2.62	8
Not consistent with the variety	2.59	9
Minisett have low sprouting rate	2.53	10
Other farmers don’t like it	2.48	11
Ridging is required in minisett technology	2.46	12
Familiar with traditional method	2.39	13
Tubers produced by minisetts have shorter shelf life	2.34	14
Minisetts are not resistant to harsh weather conditions	2.19	15
No ready market for yam produce	2.09	16
Nursing of minisett is tedious	2.02	17
Transplanting o f minisett is complex	1.69	18

(4=Very Important, 3=Important, 2=Not Important and 1=Not Important at all)

Source: (Field survey results, May 2014)

Determinants of Adoption

The estimation of Probit Regression Model was undertaken to ascertain the determinants of adoption of yam minisett technology. The test of model coefficients and the likelihood ratio statistics indicated by chi – square (X^2) statistic (*P < 0.0002*), suggested that the model has a strong explanatory power. The pseudo R-squared which represents the multiple determinations has a value of *0.8312 (83.12%)* implying that, the explanatory variables jointly explain 83.12% of the variation in the adoption of yam minisett (dependent variable). Consequently, the interpretation of Probit results (Table 6) indicates the following:

Extension contacts: Extension contacts had a positive *(coefficient=0.240)* and significant *(p value<0.05)* influence on farmer’s decision to adopt the yam minisett technology. Farmers who had exposure to extension

Table 6: Probit estimates on Adoption determinants

Variables	Coefficients	Z -values	P -Values
Sex	- 0.272930	- 0.56	0.577
Household	- 0.031457	- 0.83	0.405
Education Level	**0.055538****	**2.00**	**0.046**
Farm income	0.000014	0.83	0.404
Farm size	0.015769	0.40	0.692
Access to Credit	**1.460648****	**2.97**	**0.003**
Extension contact	**0.239794***	**1.83**	**0.067**
Distance from farm to market	-0.059133	-1.27	0.203
Farming Experience	- 0.022987	- 1.00	0.315
Membership of farmer-based organisation	**2.908232*****	**3.63**	**0.000**
Sources of planting material	**0.973279***	**1.96**	**0.050**
Complexity of the technology	- 0.20932	- 0.38	0.705
Land tenancy	**- 1.302833****	**- 2.25**	**0.024**
Age	0.000381	0.73	0.464
Constant	**-22.74804****	**-2.10**	**0.035**

(*p<0.10, **<0.05 and ***p<0.01)

Source: (Field survey results, May 2014)

visits had more likelihood to adopt the minisett technology. Extension contacts represent access to information and knowledge about the new agricultural innovation. This observation was in line with the findings of Kebede *et al.* (1990) who reported positive relationship between access to information and extension services and adoption of agricultural technologies. Increasing extension contacts will cause marginal increase in adoption.

Access to credit: There was a positive (*coefficient=1.461)* and significant (*p value<0.05)* relationship between farmer's access to credit and adoption of yam minisett technology. One of the major causes of different rates of adoption is a differential access to credit among farmers. Access to credit is one way to improve farmer's access to new production technology and increase farmer's ability to purchase inputs. Farmers who have access to credit can relax their financial constraints and therefore buy inputs.

Education level: The results indicated that, the coefficient of educational level was positive *(coefficient=0.056)* and significant (p<0.05) at 5% confidence interval. The positive coefficient of education implies that, increase in education (number of years spent in school) could lead to an increase in the adoption of yam minisett technology.

Membership of Farmer-Based Organisations: This variable had a positive *(coefficient=2.908)* and significant (p value<0.05**)** influence on farmer's decision to adopt. Farmers who belonged to farmer- based organisations were more likely to be influenced by their decision to adopt the minisett technology especially if the organisation is used as a channel for technology dissemination. This result is also in line with that of Gbegeh, (2012) who found a significant relationship between adoption of yam minisett technology and membership with farmer-based organisation. This is so in the case of Farmer Field fora approach employed by RTIMP as its major extension service delivery method.

Source of planting materials: source of planting materials had a positive *(coefficient=0.973)* and significant *(p value=0.05)* influence on farmer's decision to adopt the minisett technology. Farmers who obtained their planting material from other farmers, commercial producers and agricultural agents were more likely to be influenced by their decision to adopt yam minisett technology especially if the external sources had adopted the technology. A study conducted by Asante *et al.* (2011) also reported a significant influence of source of planting materials on yam minisett adoption.

Land tenure status: Land tenure status had a negative *(coefficient=-1.303)* but significant *(p value<0.05)* effect on yam minisett adoption, which implied that farmers who hired land were more likely to adopt the minisett technology. This contradicts the findings by Chikwendu *et al.* (1995) that some farmers in hired land tenancy agreement did no adopt the production of yam minisett.

Native farmers who obtained their farmlands from communal, inheritance and other non-hired status may be reluctant to adopt the yam minisett technology. Because they were already were established yam farmers with little or no problems with planting materials as compared to non-native farmers who migrated from other ecological zones to settle for favourable climatic conditions. This observation is true in the sense that indigenous farmers who form part of the already established social system and culture of practice in the study area were more in tune with the traditional method of seed yam production. Non-native immigrants were more likely to be in need of seed yam to establish large commercial farms and therefore were likely to adopt the yam minisett technology.

Commercial farming is characterized with modern agricultural practices; hence farmers who are more conserved in traditional farming practices have lesser tendency to adopt modern agricultural technologies. Farmers' age, sex, household size, farm income, farm size, distance from farm to market, farming experience and complexity of yam minisett technology had no significant influence on farmers' decision to adopt yam minisett technology.

Probit Regression Summary

Number of observations = 100
Wald chi^2 (14) = 42.26
Prob > chi^2 = 0.0002
Pseudo R^2 = 0.8312
Log pseudo likelihood = -22.46

CONCLUSION

In conclusion, the awareness level (28%) and adoption level (12%) regarding yam minisett technology was very low in the study area. The major reasons for non-adoption were complexity of the technology, non-compatible with the farming system, inadequate information on yam minisett technology, ignorance of the rationale behind the technology, inadequate extension contact and many others.

The major problems limiting the usage of yam minisett technology by adopters included lack of credit to purchase chemicals for the treatments of minisetts, inadequate extension contacts, high cost of labour associated with the nursery of minisetts, unavailability of nursery facilities including the medium for pre-sprouting minisetts, consumer preference for bigger tubers instead of the smaller tubers produced from minisetts.

Age ,household size, extension contact, income, access to credit, land tenancy, membership of farmer-based organization and farming experience all had positive influence on farmer's decision to adopt yam minisett technology. Farmers' age, sex, household size, farm income, farm size, distance from farm to market, farming experience and complexity of yam minisett technology had no significant influence on farmers' decision to adopt yam minisett technology

Based on the findings of this study, the study recommends the following:

The Root and Tuber Improvement and Marketing Programme (RTIMP), the main promoter of yam minisett technology in the study area should create more awareness about yam minisett technology among farmers. This can be done in collaboration with the district extension agents using effective extension communication methods such as extension campaigns, farm demonstrations and small plot adoption trials.

The essence of extension is to upgrade the knowledge of farmers on improved techniques of agriculture with the view to improving income and output. This study revealed that, about 95% of the respondents had no contact with extension agents. Farmers contact with extension agents had significant positive influence on their decision to adopt the minisett technology. More extension agents should therefore be engaged to fill up the gap or those available should be highly motivated with adequate logistics and incentives to reach out to more farmers especially in the hinterlands.

Farmers' access to credit was found to have positive and significant influence on their decision to adopt the minisett technology. Efforts should therefore be made to grant credit facilities on soft terms to farmers through rural banks and micro-credit programmes, so that farmers can meet the cost component associated with the adoption of the yam minisett technology.

Membership of farmer-based organization had a positive and significant influence on farmers' decision to adopt the minisett technology. This study therefore recommends the encouragement and formation of farmer based organizations, agricultural cooperatives and non-formal education fora. These organizations could be used as channels for diffusing agricultural technologies and improve the literacy rate among the farmers. Finally, market-led extension, in linking yam producers to exporters could directly trigger the adoption of minisett technology in a win-win scenario for both producers and exporters.

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