CONSTRAINTS TO THE ADOPTION OF YAM MINISETT TECHNOLOGY IN ANAMBRA STATE, NIGERIA.

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ABSTRACT
This study examined the constraints to the adoption of yam minisett technology. The study was conducted in Anambra State, Nigeria. A sample size of 160 respondents was used for the study. Data for the study were collected through the use of a validated interview schedule. A pilot test was conducted as part of instrument validation to test for reliability of the research instrument. Data generated for the study were analysed using descriptive and inferential statistics. Descriptive statistics such as frequency count, percentage and mean scores were used to summarize data, while explanatory factor analysis procedure using the principal factor model with iteration and varimax rotation was used to determine the constraints to the adoption of yam minisett technology. Results of the study revealed that respondents of the study had a low knowledge of yam minisett technology. Three main factors to the adoption of the technology include: Technology-related; Economic and farmer- related factors, specific constraints highlighting these factors were also identified. The study recommends that these constraints should be tackled through appropriate measures by relevant government agencies so as to enhance the utilization of the technology by farmers. Also, farmers' knowledge of yam minisett technology can be increased through workshops and seminars organized by the agency that is charged with the dissemination of information regarding the technology.
Keyword: Constraints, yam, minisett technology, adoption, Anambra State

INTRODUCTION

Yam is one of the important staple food crops second to cassava in terms of land area under cultivation in Nigeria (Chukwu and Ikwelle, 2000). According to Madukwe, et al; (2000), yam is a good source of energy and each 100 grams contain 118 calorie. Yam is mainly composed of carbohydrates and soluble sugar. It is an excellent source of vitamin B1, vitamin B6, riboflavin, folic acid, niacin and pantothenic acid. It also contains good amount of antioxidants and vitamin C. Yam provides about 20 percent of the required vitamin C in the body. Yam contains small amount of vitamin A and Beta carotene levels. It is a rich source of minerals like copper, potassium, iron, magnesium, calcium and phosphorus. Yam can be used in the preparation of cakes and bread.

Yam is also known to have numerous health benefits. For instance, in China, Korea and Japan, it is used as a traditional medicine to heal skin diseases and cure respiratory problems. Substances such as allantoin and decoction which are contained in yam have been found to have medicinal value. Allantoin, a cell proliferate expedites the healing process when applied topically on ulcers, boils and other skin diseases. Decoction stimulates and relieves bronchial irritation, cough, catarrh and other respiratory diseases. Yams contain steroid that stops the per oxidation of blood lipids (the principal cause of arteriosclerosis) and lowers the level of triglycerides, which are a type of fat in the blood. All of these, together with their fat content and their richness in potassium, makes yam very appropriate for cardiovascular disorders, particularly arteriosclerosis.

Nigeria cultivates about 69 percent of the world's total hectarage of yam, out of which the South eastern states comprising of Abia, Anambra, Enugu, Imo and Ebonyi provide 40 percent of the total land area (Onwueme, 1978). Unfortunately, in the Southern part of Nigeria, the average land mass ratio measured by hectares per man has been falling below the national average of 1.2 hectares (FOS, 1988). It fell from 1.02 hectares per man in 1960 to 0.7 by 1970 (Okigbo, 1983) and has continued to decline. The resultant effects have been the scarcity and increase in the prices of seed and ware yams. Efforts to tackle these problems resulted in the introduction of the yam minisett technology developed in 1983 by the National Root Crop Research Institute (NRCRI), Umudike in collaboration with the International Institute of Tropical Agriculture (IITA) Ibadan, Nigeria. The technology leads to increased yield, weed suppression due to reduced spacing and increased plant population (Ajieh, 2012).

Yam minisett technology involves a process of cutting healthy yam tubers to produce as many ministts as possible each weighing about 25g and about 2cm thick with some portion of the cutile (back) attached. The minisetts are then used to produce seed yams, which will be used produce ware yams for consumption and industrial use (Okoli and Akoroda, 1995). The technique is composed of several scientific steps which include:

- Selection of healthy yam tubers for cutting into recommended cylindrical pieces, each is cut longitudinally into 2, 3, 4 or more pieces such that each piece has a skin and weighs about 25-30g. Use yam tubers of 20-25cm length and 25cm girth (500-750kg). Avoid tubers with bigger girth.

- Treating with wood ash or benlate demosan or any fungicide (thiabendazole) to prevent rotting;
- Sun drying the minisetts in a cool dry place for about 30 minutes to allow the surface to dry up;
- Pre-sprouting in a basket or wooden container with sawdust which serves as the medium in which the minisetts will be pre-sprouted before transplanting in the nursery beds;
- Keeping of the container in a cool dry place for about 2-3 weeks and occasionally sprinkling it with water to encourage sprouting. This should be inspected periodically to ensure that the saw dust is neither too wet thus causing the yams to rot nor too dry to prevent sprouting;
- Transplanting the planting materials when the sprouts are not too fragile to prevent breakage. The material should be planted at least two months before the actual planting season to enable the setts to develop and to be ready for harvesting just before the soil dries

The technology has been incorporated since 1984 into the National Farming System Programme of the National Root Crop Research Institute. It was promoted through the annual zonal farming systems workshops; monthly technology review meetings; field shows and agricultural publications. Accordingly, this technology has been transferred for adoption by farmers in different parts of the country. Considering the advantages of the technology, its acceptance by farmers to boost yam production has remained questionable. Separate studies by Ajieh (2012); Ogbodu (1995); and Anuebunwa, et al; (1998) reported low adoption of the technology. It is possible that the low rate of adoption could be due to certain constraints associated with the utilization of the technology. This study was therefore conceived to examine these constraints. Specifically, the objectives of this study were to: i) describe the socio-economic characteristics of yam farmers; ii) ascertain respondents' knowledge of yam minisett technology and; iii) identify constraints to adoption of yam minisett technology.

METHODOLOGY

The Study Area

The study was carried out in Anambra State, Nigeria. The state is located on latitude $5^0 8^0$ and $6^0 10^0$ north and longitude $6^0 85^0$ $7^0 60^0$ east of the Greenwich meridian. The state shares boundary with Enugu State on the north, Delta State on the south, Kogi State on the West and Imo State on the East. Anambra state occupies an area of 4,416km^2 and has a population of 4,417,828 out of which 2,117,984 are males and 2,059,844 are females (NPC, 2006). The State has 21 Local Government Areas (LGAs) and is divided into four agricultural zones as follows:

- Aguata zone, comprising Aguata, Orumba North, Orumba South, Nnewi North and Nnewi South LGAs.
- Anambra Zone, comprising Anambra East, Anambra West, Aghamelum and Oyi LGAs
- Awka zone, comprising Awka North, Awka South, Njikoka, Dunukofia and Anaocha LGAs
- Onitsha zone, comprising Onitsha South, Onitsha North, Ogbaru, Ekwusigo, Idemili North, Idemili South and Ihiala LGAs

Population and sampling procedure

Yam farmers in Anambra state formed the population of the study. Sample for the study was drawn through a multistage sampling technique. In the first stage, two extension blocks (LGAs) were randomly selected from each of the four agricultural zones in the State. This gave a total of eight extension blocks. In the second stage, two extension circles were randomly selected from each of the selected extension blocks; this gave a total of 16 extension circles. The third stage involved a random selection of 10 yam farmers from each of the selected circles. This gave a total of 160 yam farmers who served as respondents in this study.

Data collection and analysis

Data for the study were collected through a validated interview schedule to elicit information from the respondents of the study. Socioeconomic characteristics of respondents were determined by requesting them indicate their age, sex, education status, farm size and farming experience. To obtain a quantitative measure of respondents' knowledge of yam minisett technology, ten questions relating to the activities involved in yam minisett technology were developed and respondents were requested to respond to the questions. A maximum of 1 point was awarded for a correct answer to each question and 0 point for a wrong answer. For the purpose of the study, respondents were categorized into three groups as follows: (a) Low knowledge (for those with 0-3 points), (b) Medium knowledge (for those with 4-7 points) and (c) High knowledge (for those with 8-10 points) Constraints to adoption of yam minisett technology was determined by making a list of possible constraints and respondents were asked to indicate the level of importance of these constraints. A four-point Likert type scale of not important =1, slightly important =2, important=3 and very important = 4 was used to ascertain their responses.

Data gathered for the study were analyzed using descriptive and inferential statistics. Descriptive statistics such as frequency count, percentage and mean scores were used to summarize data, while explanatory factor analysis procedure using the principal factor model with iteration and varimax rotation was used to determine constraints to the adoption of yam minisett technology. Variables with

coefficient of 0.40 or more were regarded to have high loading. All analysis were at 5% (α=0.05) level of significance.

Table 1: Sample composition

Agricultural Zones	Extension Block	Extension Circles	No. of farmers selected
Anambra	Oyi	Umunya	10
		Nteje	10
	Anambra West	Mmiata-Anam	10
		Nzam	10
Onitsha	Ekwusigo	Ozubulu	10
		Ichi	10
	Onitsha	Odekpe	10
		Atani	10
Awka	Awka North	Isuaniocha	10
		Ugbeni	10
	Awka South	Umuawulu	10
		Isheagu	10
Aguata	Orumba North	Ezira	10
		Eziagu	10
	Orumba South	Awa	10
		Enuguabor	10
Total			**160**

RESULTS AND DISCUSSION

Socio-economic characteristics of respondents

Data in table 2 reveal that respondents' age ranged between 20 and 79 years with a mean age of about 55years. This implies that yam farmers in the study area are in their productive age. According to Diederen, et al;(2003), these categories of farmers are more likely to adopt innovation earlier. Results on respondents' sex reveal that 84 percent of the respondents were males which imply that the male farmers dominate in yam production in the area of study.

Information in the table further shows that majority of the respondents representing 96 percent were married while 4 percent were single. One of the most important factors affecting the level of production and productivity of farmers is the composition and size of farm family. According to Igben (1988), married farmers are more likely to be under pressure to produce more, not for family consumption alone but also for sale. Thus, respondents who are married tend to be more productive because they are able to take joint decision in terms of better allocation and utilization of resources.

Information on household size reveal that respondents' household size ranged between 1- 25 persons, with a mean household size of 13 persons. Respondents' farming experience was found to range between 1-30 years with a mean farming experience of 21 years. This indicates that majority of the respondents have been cultivating yam for a long period of time.

Table 2: Distribution of respondents according to their socio-economic characteristics (n=160)

Socio-economic characteristics	Frequency	Percentage	Mean
Age			
20 -29	1	6	
30 - 39	15	10	
40 - 49	34	21	
50 -59	46	29	55
6 0- 69	47	29	
69 - 79	17	10	
Sex			
Male	135	84	
Female	25	16	
Marital status			
Married	153	96	
Single	3	4	
Household size			
1 – 5	4	3	
6 - 10	34	21	
11- 15	93	58	13
16 - 20	23	15	
21 - 25	6	3	
Educational attainment			
No formal education	9	6	
Primary school education	87	54	
Secondary school education	46	29	
Post secondary school education	18	11	
Farming experience			
1 – 5	7	4	
6 - 10	13	8	
11 -15	20	13	
16 -20	21	13	
21 -25	31	20	
25 -30	68	43	

Respondents' Knowledge of yam minisett technology

Entries in table 3 show that 110 or 68 percent of the respondents had low knowledge while 38 or 24 percent had medium knowledge. The remaining 12 or 8 percent of the respondents had high knowledge. This suggests that respondents of this study had a low knowledge regarding yam minisett technology. Knowledge is related to innovation adoption. Hunt (2003) emphasized that knowledge help people to conceptualize goals, anticipate and perceive events and respond in accordance with the changing needs.

Table 3: Distribution of respondents according to their knowledge of yam minisett technology (n = 160)

Knowledge level	Frequency	Percentage
High knowledge	12	8
Medium knowledge	38	24
Low knowledge	110	68
TOTAL	**160**	**100**

Constraints to adoption of yam minisett technology

Data in Table 4 show the result of the factor analysis of constraints to the adoption of yam minisett technology. Based on the item loadings, three factors were identified. These are: technology-related factor, economic factor, and farmer-related factor.

Specific constraints highlighting technology-related factor include: Cutting tubers into minisett consumes time (0.637), poor storage facilities for minisett seed yams (0.691), low patronage of minisett seed yams (0.796), minisett dust may be poisonous (0.702) and technology is complex with many steps (0.729).

A critical study of these technology-related constraints reveals that they could hamper the adoption of the technology. For instance, cutting tubers into minisett consumes time and is a very tedious activity. Most farmers will not want to engage in time consuming activities. Similarly, farmers are not likely to sacrifice the time needed to go through the steps involved in yam minisett technology. Furthermore, most farmers use poor storage facilities which may not store large quantities of seed yams produced from minisett technology. According to Chukwu and Chukwu (2004), these methods which include storing yams underground and in shades expose yams to vagaries of weather which favour physiological deterioration.

Specific constraints under the economic factor include: lack of credit facilities (0.676), high cost of fertilizers (0.690), unreliable price of minisett seed yams (0.602), high cost of labour (0.813), high cost of agro-chemicals (0.454), and poor economic returns from minisett seed yams (0.746). These constraints could limit the adoption of yam minisett technology. For instance lack of ready market for farmers to sell seed yams arising from the use of yam minisett technology is a major challenge to the use of the technology. This finding is in line with the views of Madukwe, et:al; (2000) who reported that unlike ware yam which is demanded throughout the year; seed yams are demanded for only about two months during the planting season in the year. The users of the technology will therefore have to wait for some time before turning their products into cash. This does not support the life pattern of the rural dwellers with poor financial status. The technology is therefore seen by farmers as a production activity providing revenue at only a specific period of the year and for specific purposes. Hence, the technology in this aspect may be considered as not being business-friendly.

The specific constraints highlighting farmer-related factor include: inadequate information on yam minisett (0.803), poor contact with extension service (0.745), unfavourable land tenure system (0.689) and lack of technical skills and know-how (0.592). Inadequate information on yam minisett technology may hamper its adoption by farmers. According to Aina (1995), information is one of the resources required for the improvement of agricultural production. Dervin (1976) also reported that every individual whether literate or non-literate needs information to guide him take decisions. Thus, information and communication are critical in the process of enhancing rural farmers' capacity to adopt agricultural technology.

Similarly, unfavourable land tenure system limits the capacity of farmers to adopt technologies. Among most of African farmers, farm land is not owned but held in trust by the present generation on behalf of their future descendants. It could be held by individual, families or the entire village but fragmented to individual, families or the entire village but fragmented to individual farmers, who only enjoy user rights (Nweke and Enete, 1999). This practice usually limits the level of farmers' investments in the development of farmland since the right could be withdrawn anytime even without notice.

Table 4: Analysis of constraints to adoption of yam minisett technology

Constraints	Technology Related factor	Economic factor	Farmer related factor
1. Lack of credit facilities	0.003	**0.676**	0.213
2. Lack of information on yam minisett	0.219	0.070	**0.803**
3. High cost of fertilizers	0.317	**0.690**	0.289
4. Poor contact with extension service	0.088	0.373	**0.745**
5. Cutting tubers into minisett consumes time	**0.637**	0.218	0.083
6. Unfavourable land tenure system	0.287	0.245	**0.689**
7, Unreliable price of minisett seed yams	0.250	**0.602**	0.167
8. Lack of technical skills and know- how	0.281	0.052	**0.592**
9. High cost of labour	0.202	**0.813**	0.279
10. High cost of agro- chemicals	0.289	0.454	0.267

11. Poor storage facilities for minisett seed yams	**0.691**	0.284	0.269
12. High cost of staking materials	0.322	**0.739**	0.308
13 Low patronage of minisett seed yams	**0.796**	0.165	0.135
14. Technology costly to implement	0.214	**0.727**	0.062
15. Poor economic returns	0.022	**0.746**	0.061
16. Minisett dust may be poisonous	**0.702**	0.299	0.102
17. Technology is too complex with many steps	**0.729**	0.377	0.008

CONCLUSION

Yam minisett technology was developed to tackle the problems of high cost and scarcity of seed yam experienced by yam farmers in Nigeria. The technology was incorporated into the National Farming System Programme (NFSP) of the National Root Crops Research Institute (NRCRI) and transferred for adoption by farmers since 1984. Different studies on the level of adoption of the technology have shown that there is low utilization of the technology by farmers. This low utilization has been attributed to technology - related, economic and farmer-related factors. In order to enhance the utilization of the technology by farmers, these factors and their specific constraints as identified by this study need to be tackled by increasing farmers' knowledge on the technology through workshops, seminar and other appropriate measures.

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