Asian Journal of Agricultural Extension, Economics & Sociology
3(6): 562-568, 2014; Article no. AJAEES.2014.6.008

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The State of Adoption of Yam Minisett Technique in Imo State, Nigeria

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Authors' contributions

This work was carried out in collaboration between authors. Author ROA designed the study and wrote the protocol. Author SNA managed the literature searches. Author UJU performed the statistical analysis. Author OEO wrote the first draft of the manuscript. All authors read and approved the final manuscript.

Original Research Article

Received 15th September 2013
Accepted 14th January 2014
Published 25th June 2014

ABSTRACT

The study was carried out to determine the state of adoption of yam minisett technique by farmers in Imo State. Multi-stage random sampling technique was employed to select 90 respondents (yam farmers) from the area. Structured questionnaire was used to obtain useful information from the respondents. Results showed that 72% of the respondents were between 41 – 60 years of age, 56.7% were married, all attended formal education, 88% had above 5 years farming experience and 45.6% had below ₦100,000 net annual income from yam production. Findings also indicated that only 36.7% of respondents adopted the yam minisett technique. Age of the farmer, level of education, farming experience, educational level of farmers were factors found to have significant effect on adoption of the yam minisett technique. The farmers were also constrained by scarcity of inputs, low capital outlay, difficulty in obtaining loans, poor market for products and poor extension visit.

Keywords: Ferulago angulata; essential oil; microwave-assisted hydrodistillation (MAHD).

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1. INTRODUCTION

Yam is one of the major food crops grown by man. Yams, *discorea spp,* belong to the family *Dioscoreacea* and the genius *Dioacorea*. The global production of yam is 30.1million metric tons annually [1]. About 90 – 95% of this amount is produced in West Africa. Nigeria produces 36.72 million tons of yams annually [2]. Nigeria is the largest world producer of yam accounting for about 65 – 71% of the world total production [3,1], with Cote d'Ivore, Benin Republic, Ghana and Togo following in that order.

Various species of yams in the genius *Dioscorea* are cultivated in the tropics and sub-tropics. The six most economically important species grown as staple foods in Africa are *D. rotundata* (white yam), *D. cayenensis lam* (yellow yam (water yam), *D. esculenta* (cour), *Burk* (Chinese yam), *D. dumentorum* (kuntil), *Pax* (bitter yam) and *D. bulbitera L* (aerial yam) [4]. These six species constitute over 90% of the food yams produced in the tropics [5,6].

The tuber is the economically important part of the yam plant which is grown as a stable food. It is prized for its excellent eating qualities and has potential as an export crop to Europe and North America. Yam is an excellent source of carbohydrate, energy and some minerals [7]. A tuber of yam is composed of 65 – 75% water, 15 – 23% starch, 1 – 2.5% protein, 0.05 – 0.2% fibre, 0.7 – 2% ash and 0.05 – 0.2% fat [7].

The tuber is the major means of crop propagation. Small-sized tubers of 200g to 1000g either specially produced for use as seed yam or selected from harvest as planting materials for the subsequent cropping season. Up to 30% of the previous years harvest may be used to plant a new crop [8]. Thus, only 70% of the years harvest is available for other uses.

National Root Crops Research Institute, Umudike in 1981 developed the yam minisett technique for mass production of seed yams [9,10]. A minisett is a set of about 25 – 50gm (one quarter of the normal planting sett for seed yam production). The components of the yam minisett for seed yam production technology are: seed dressing chemicals (minisett dust/pesticides); planting time (when the rains become regular and steady or by irrigation); seed bed (planting on ridges or beds); spacing (25cm x 100cm) and fertilizer application (compound fertilizer). A farmer could use one tonne of 25g yam minisetts to achieve what 2.5tonnes/ha of seed yams would not achieve [11]

Despite numerous advantages of the yam minisett technique, this method of yam production has not been widely adopted by yam farmers in the study area.

The objectives of this study are to:

(i) determine the socio-economic characteristics of yam farmers,
(ii) investigate the extent of yam minisett technique adoption by farmers.
(iii) identify problems that hinder adoption of yam minisett technique by farmers,
(iv) estimate the effects of socio-economic factors of the rural farmers on the adoption of yam minisett technique.

2. METHODOLOGY

Imo State is one of the south eastern states of Nigeria, located in the rainforest zone between latitude 4º5` and 7º15′ North of Equator and longitude 6º5º′ and 7º25′ East of

Greenwich. The state occupies a land area of 5,100sq kilometers lying between the River Niger and upper and middle Imo River. Imo State is bounded on the east, west, north and south by Abia, Anambra, Enugu and Rivers State respectively. The area has a humid climate with a rainfall range of between 1990mm to 2200mm and mean temperature of above 20º [12].

Imo State is divided into three zones which are Owerri, Okigwe and Orlu zones. The study adopted a multi-stage sampling. First, two local government areas were randomly selected from each of the zones. Fifteen yam farmers were later randomly selected from each of the six LGAs, giving a sample size of 90. Data was generated using a well structured questionnaire. Respondents were asked to indicate the stages they were in the adopters category viz non-adoption, awareness, interest, evaluation, trials and adoption. Only those that were at the adoption stage were considered to have adopted the technology [13,14].

Data generated were analyzed using descriptive statistics (frequencies and percentages) and multiple regression analysis.

The regression model is specified thus:

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, e)$$

Where Y = Stage of adoption of minisett technique (non-adoption=1, Adoption = 2)

X_1 = Age in years
X_2 = Sex (dummy, female = 1, male = 2)
X_3 = Level of education (years spent in formal education; primary = 6, Secondary = 12, Tertiary = 17)
X_4 = Farming experience in years
X_5 = Level of income (Naira)
X_6 = Farm size (Hectare)
X_7 = Household size (Number of persons in a household)
e = Error term.

3. RESULTS AND DISCUSSION

Yam farmers in the study area were mostly within the age ranges of 41 – 50 years and 51 - 60 years. These two age ranges constituted 72.2% of the respondents. Only 6.7% were below 30 years while 7.8% were 61 years and above. Majority (56.7%) were married, while 57.8% had only primary education. Those with secondary and tertiary education were 27.8% and 14.4% respectively. All the respondents have at least primary education (Table 1).

Farming experience vary among the respondents. Eleven percent had 3-5 years, 21.1% had 6 – 10 years of experience, 38.9% had 11- 15 years experience while 22.2% and 6.7% had 16 -20 years and above 21 years experiences respectively. Thus, respondents have acquired enough experience in yam farming. Majority (63.3%) had 1 -2 hectares of farm land, 34.5% had 3 – 4 hectares whereas 2.2% had 5 – 6 hectares. Farmers having about 5.0 or less hectares of farm land have been classified as small farmers who produce at subsistence level [15]. Many (45.6%) had bellow ₦100,000 annual income from yam business, while 32.2% had ₦100,000 – ₦199,000 income only 22.2% had income of ₦200,000 and above income.

Table 1. Distribution of respondents according to their socio-economic characteristics

Socio-economic variable	Frequency	Percentage
Age range (Yrs)		
Less than 30	6	6.7
30 – 40	12	13.3
41 – 50	37	41.1
51 – 60	28	31.1
61 and above	7	7.8
Marital status		
Single	29	32.2
Married	51	56.7
Widowed	10	11.1
Household size		
1 – 5	39	43.3
6 – 10	51	56.7
Farming experience (yrs)		
3 – 5	10	11.1
6 – 10	19	21.1
11 – 15	35	38.9
16 – 20	20	22.2
21 and above	6	6.7
Farm size (Hectare)		
1 – 2	57	63.3
3 – 4	31	34.5
5 – 6	2	2.2
Income level (N)		
Below 100,000	41	45.6
100,000 – 199,000	29	32.2
200,000 – 299,000	17	18.9
300,000 – 399,000	3	3.3

Source: Field Data 2011

Table 2. Distribution of respondents according to stage of adoption of minisett technique

Variables	Frequency	Percentage
Awareness	8	8.9
Interest	26	28.9
Evaluation	10	11.1
Trial	13	14.4
Adoption	33	36.7

Source: Field Data 2012

From the result, all the respondents were aware of the minisett technique. Eight (8) farmers reported not making any move towards adopting the technique. Twenty six (26) farmers had indicated interest in the technique. Ten farmers were at the evaluation stage, while 13 farmers were at the trial stage. Only 33 farmers representing 36.7% of respondents adopted the technique (Table 2). Generations of agricultural research technologies are meaningful only when they are adopted at the farm level [16].

Table 3. Distribution of respondents by problems militating against adoption of minisett technique

Problems	Frequency	Percentage	Ranking
Scarcity of inputs	46	51.1	1
Low capital outlay	38	42.2	2
Difficulty in obtaining loans	35	38.9	3
Poor market for products	21	23.3	4
Poor extension visit	13	14.4	5

(Multiple responses recorded) *Source: Field data 2012*

Farmers are constrained by the following factors, scarcity of inputs (51.1%), low capital outlay (42.2%), difficulty in obtaining loans (38.9%), poor market for products 23.3% and poor extension visit (Table 3). Scarcity of inputs (seed yams, minisett dust/pesticides, compound fertilizer) ranked highest seconded by inadequate working capital. There was no institutional funding since many of them did not belong to any co-operative society. Most of the farmers depended on social funding.

Table 4. Regression estimates for socio-economic factors that influence adoption of yam minisett technique

Explanatory variable	Coefficient	t-ratio
Constant	73.2413	3.8891
Age (X_1)	-9.0218	-2.0115^{xx}
Sex (X_2)	6.7321	1.1167
Education Level (X_3)	5.0073	2.0172^{xxx}
Farming experience (X_4)	6.1724	0.1132^{xxx}
Income level (X_5)	4.2331	0.7811^{xxx}
Farm size (X_6)	3.0114	1.8321^{xx}
Household size (X_7)	2.1011	1.0223
R^2	0.7122	
F – Value	13.507	

xxx and xx = Significant at 1% and 5% respectively.
Source: Computed from field data 2011

Regression result in Table 4 shows that the coefficient of multiple determination (R^2) was 0.7122. This means that variables in the model explained 71% of the variation in adoption of the minisett technique. Thus, other factors not included in the model explained 29% of variation in the minisett adoption by farmers. The result indicates that age of the farmer (X_1 = 9.0218) and farm size (X_6 = 3.0114) were significant at 5%. Result on the age of the farmers conforms to economic theory. This implies that adoption of yam minisett decreases as farmers gets older. Farm size has a positive relationship with adoption of yam minisett, 1% increase in farm size will enhance adoption by 3.0114. Positive and significant (at 1%) relationships were also found between adoption of minisett technique and educational level of farmers (X_3 = 2.0172), their farming experience (X_4 = 6.1724) and income level (X_5 = 4.2331).

4. CONCLUSION

The study revealed that all the respondents were aware of the yam minisett technology but only 36.7% adopted the technology in their farming activities. Farmers level of education,

farming experience, income level and farm size were found to be positively and significantly influence their adoption of the minisett technique. The major problems identified by the respondents which hinder adoption of the technique were scarcity of inputs, low capital outlay, difficulty in obtaining loans, poor market for products and poor extension visit.

To enhance adoption of yam minisett technique by farmers, the study calls for policies aimed at assisting farmers improve their educational attainment. Availability of credit could encourage farmers with low capital base to adopt new technologies. It is also required that the extension activities in the area be improved.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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