WFL Publisher
Science and Technology

Journal of Food, Agriculture & Environment Vol.3 (2) : 134-137 . 2005

www.world-food.net

Agriculture

Survey on the adoption of yam minisett technology in South-Western Nigeria

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Received 11 January 2005, accepted 11 March 2005.

Abstract

The production of yam and the high demand of yam tubers for food created an imbalance and scarcity of tuber that could be used as planting materials. The development of alternative method of seed production using minisett instead of the traditional method of milking was believed to be able to provide enough seeds while ware tubers are only used for consumption. The study focused on the adoption of yam minisett technology in southwestern Nigeria. Three yam producing states were randomly selected in South-Western Nigeria; and yam farmers were purposively selected from farmers in each of the states for interview. A validated interview guide was used to source information from farmers. The result indicated that most respondents are men and fifty percent are within the ages of 41-50 years. Majority (76%) of the respondents cultivated less than one hectare of yam plot, and 60% of the farmers had received information on the technology from the agricultural development programme (ADPs) in their state. Thirty-three percent of the farmers have adopted yam minisett technology while those that did not adopt mentioned high input cost, low success rate, labour intensive and marketing problems as the reasons for their non-adoption.

Key words: Adoption, *Dioscorea* spp., minisett technology, planting material, yam.

Introduction

The major food component in yam is carbohydrate, which constitutes the main dry matter part of the tuber. Yam tubers are processed into various food forms which include pounded yam, boiled yam, roasted or grilled yam, fried yam, yam balls, mashed yam, yam chips and flakes. Fresh yam tubers are also peeled, chipped, dried and milled into flour. Yam (*Dioscorea* spp.), an important staple food is considered as a man's crop and has socio-cultural significance [3]. Yam is the food of choice at many ceremonies and festivals and an indispensable part of bride price. Studies conducted in Eastern Nigeria showed that yams contributed about 32% of farmers' gross income derived from arable crops [7].

In spite of the importance of yams as major staple food and its socio-cultural value in the lives of people of the West and Central African subregion, information on the constraints in the adoption of new technologies and its commercialization is limited. One of the novel technologies that can enhance availability of planting materials in yam production is the yam minisett technology. Planting materials are a major constraint in yam production, they are difficult to obtain, expensive and often of low quality. The cost of planting materials is estimated to be about one-third of the total cost of yam production [1, 2].

Yam minisett technology was developed to ameliorate the inadequate supply and dearth of high quality and disease free seeds in yam production. It has been estimated that a hectare of minisett field will produce seed that can plant 3.7 hectares of land while the seeds from the same hectarage with the traditional "milking" can produce seeds to plant 1.3 hectare of land. The traditional method has the advantage of producing ware tubers and seed yam on the same vine, a "double harvest" whereas yam minisett technique is meant to produce seed yam only. However, the transfer of diseases and pest from mother plant to the seeds is a major problem in the traditional method. Nematode pest, mealy bugs and scale insects that previously infest the ware tubers are transferred to seed tubers from the milked yam vines [6, 8].

In minisett technology, healthy yam tubers are used to produce seeds within a gestation period of 6-7 months unlike 2-3 months in milked traditional method. Minisett technology has been proved to generate large quantities of high quality planting materials at an economically viable rate [4].

Despite the new minisett technology, price of yam seeds are still high and over one thousand dollar ($1,000) is required to procure yam seeds as planting materials for a hectare of land. This study, therefore, seeks for farmers' awareness of minisett technology, whether they have been trained on the technology and whether they have adopted the technology. The study also tried to find out the constraints of adopting minisett technology and made suggestions on ways of improving the seed yam system in southwestern Nigeria.

The national agricultural policy of the Federal Republic of Nigeria of 1988 and 2001 aims at enlarged private sector investment in agriculture, strengthening of the research and delivery systems, rapid development of the seed/seedlings industry, enhanced investment in local manufacturing of agricultural inputs, increased mechanization of farm operations, improved storage/processing of agricultural produce to reduce postharvest losses and market expansion to increase demand for agricultural commodities and encourage export. Thus this study is in consonance with the Federal Government of Nigeria policy on strengthening of the research and delivery systems and rapid development of the seed

industry. The adoption of yam minisett technology by farmers will go a long way in increasing yam production, economic status as well as improve their standard of living.

Methodology

Study area: The study was conducted between March and June, 2003 in the three yam producing states (Oyo, Ondo and Edo) in southwestern Nigeria. Yam farmers were purposively selected across each state and invited for group meetings with the assistance of agricultural extension personnel from ADPs in each state. Farmers from Ondo state were invited from Owo, Obasooto, Oda, Emure-ile, Akure, Isuada and Ogbese, Akungba, Ikare, Ondo, Okitipupa, Idanre etc. These areas cover the humid rainforest belt and the fringes of derived savannah areas. They are located between latitude 7°14'–7°39'N and longitude 5°8'–5°51'E, their rainfall pattern is bimodal with annual rainfall above 1,400 mm. These areas support tree crops like cocoa, oil palm, citrus and kola. Other food crops grown in this diverse ecology include banana, plantain, cocoyam, cassava, maize, yam, melon and okro.

In Oyo state, farmers were invited from Saki, Tede, Iseyin, Kisi, Ago-are, Ago-amodu, Owo, Ogbooro and Ighoho. These are derived savanna ecology areas situated in the northern part of southwestern Nigeria. These areas lie between latitude 8°53'N and longitude 3°50'E. The annual rainfall of this area is 1,000-1,400 mm and is bimodal. Most of the forests in this ecology have been cleared and their economy is purely agrarian. Oil palm is found along the fringes of the rainforest but arable crops like yam, cowpea, maize, cassava, okro, melon and sorghum are grown towards the Guinea savanna ecology. Yam farmers in Edo area were invited from the northern derived savanna areas (Auchi, Afeshie, Aviele) and the southern rain forest areas. The northern parts are located within latitude 7°10'N and longitude 6°16'E.

Data collection: Data was collected with the aid of well structured questionnaire which was administered through personal interview during a group meeting in each of the four states of study. Group discussion led by one of the farmers followed the administration of questionnaires. The aim of the discussion was to gather more information from the farmers and understand the basis for some of their practices. The meetings and questionnaire administration was facilitated through the state ADPs (Agricultural Development Programmes) and coordinated by the zonal officers in the study areas. Yam farmers were selected by the extension officers from different extension cells to attend the meetings at designated centers. A total of 100 farmers participated in the study but only 86 questionnaires were properly completed for analyses to be made. Data were obtained on the demographic characteristics of the farmers, their awareness of minisett technology, their source of information, whether they have adopted the technology or not and the problems associated with the use of the technology. The data was subjected to descriptive statistical analysis using frequency counts and percentages.

Results

Demographic characteristics of farmers: Majority of the respondents interviewed were male (96.5%), 50% within the ages of 41-50 years and 20% below 40 years (Table 1). Majority of the farmers had small holding with 76% cultivating less than one hectare of yam plot. It was only at Oyo where a farmer had over 5 hectares of yam plot.

Table 1. Demographic characteristics of respondents.

	Oyo		Ondo		Edo			
Parameter	F	%	F	%	F	%	TF	T%
Sex								
Male	27	93.1	27	100.0	29	96.7	83	96.5
Female	2	6.9	-	-	1	3.3	3	3.5
Age (years)								
<30	-	-	1	3.7	1	3.3	2	2.3
30-40	1	37.9	1	3.7	3	10.0	15	17.4
41-50	13	44.8	18	66.7	12	40.0	43	50.0
51-60	5	17.2	5	18.5	12	40.0	22	25.6
>60	-	-	2	7.4	2	6.7	4	4.7
Size of farm (ha)								
0.1-1	25	86.2	18	81.8	15	60.0	58	76.3
1-2	1	3.4	3	13.6	6	24.0	10	13.2
3-4	2	6.9	1	4.5	4	16.0	7	9.2
>5	1	3.4	-	-	-	-	1	1.3

F frequency; % percentage; TF total frequency; T% total percentage

Source of planting materials: Thirty-nine percent of the farmers claimed that they obtain seeds for planting from a combination of minisett and traditional milking method. Sixteen percent and 14% used seed tubers from milking and mature but small tubers respectively while only 11% depended on seed yam from minisett. However, 52% of the farmers preferred seed yam from minisett while 22% preferred small tubers as planting materials. The planting materials were obtained from own farms by 37% of the farmers while 42% complement seeds produced on the farm with those produced from the market (Table 2). Rapid multiplication of yam through minisett technique was not strange to 75% of the farmers and 64% had been introduced to the technology for over 5 years. It was only in Edo state that 50% of the farmers learnt about the technique about 1-2 years ago (Table 2).

Source of information on minisett technology: Table 3 shows respondents source of information on yam minisett technology. The table reveals that 60% of the farmers interviewed in the 3 states received information on yam minisett technology from the

Table 2. Source and preference of planting materials.

	Oyo		Ondo		Edo			
	F	%	F	%	F	%	TF	T%
Type of planting material used								
Sett only	2	7.1	4	18.2	-	-	6	7.5
Small tubers	3	10.7	3	13.6	5	16.7	11	13.8
Seed tubers from minisett	3	10.7	-	-	6	20.0	9	11.3
Seed tubers from milking	7	25	1	4.5	5	16.7	13	16.3
iii &iv	11	39.3	13	59.1	7	23.3	31	38.8
Others	2	7.2	1	4.5	7	23.3	10	13.0
Preference of planting material								
Sett	2	7.1	-	-	2	6.7	4	4.9
Small tuber	5	17.9	8	34.8	5	16.7	18	22.2
Seed tuber from minisett	14	50.0	11	47.8	17	56.6	42	51.9
Seed tuber from milking	4	14.3	2	8.7	3	10.0	9	11.1
No preference	3	10.7	2	8.7	3	10.0	8	9.9
Source of planting materials								
Own farm only	17	58.6	8	32.0	7	25.9	32	37.2
Market only	-	-	3	12.0	10	37.0	13	15.1
Both	12	41.4	14	56.0	10	37.0	36	41.9

F frequency; % percentage; TF total frequency; T% total percentage

Table 3. Awareness and source of information on minisett technology.

	Oyo		Ondo		Edo			
	F	%	F	%	F	%	TF	T%
Awareness of minisett								
Aware	27	93.1	18	66.7	20	66.7	65	75.6
Not aware	2	6.9	9	33.3	10	33.3	21	24.4
Source of info on minisett								
TV radio	-	-	-	-	1	34.0	1	34.0
ADP	22	75.9	2	9.1	24	82.8	62	77.5
IITA	6	20.7	16	72.7	3	10.3	9	11.3
Friends	1	3.4	4	14.9	1	3.4	6	3.1
Training on minisett								
Trained	26	89.7	15	55.6	23	76.7	64	74.4
Not trained	3	10.3	12	44.4	10	23.3	24	25.6

F frequency; % percentage; TF total frequency; T% total percentage

Table 4. Adoption of minisett technology.

	Oyo		Ondo		Edo			
Parameter	F	%	F	%	F	%	TF	T%
Have tried yam minisett before?								
Yes	18	64.3	13	50.0	14	48.32	45	54.2
No	10	35.7	13	50.0	15	51.7	38	45.8
If yes, have you adopted the technique?								
Yes	11	64.7	10	71.4	10	62.5	31	66.0
No	6	35.3	4	28.6	6	37.5	16	34.0
Reasons for adoption								
Cheaper source of yam planting material	6	33.3	5	45.5	1	7.7	12	28.6
Increase seed yam production	7	38.9	2	18.2	8	61.5	17	40.5
Increase capital	5	27.8	4	36.4	4	30.8	13	31.0
Reasons for non-adoption								
High input/chemical cost	1	8.3	5	62.5	-	-	6	26.0
Low success rate	-	-	1	12.5	2	66.7	3	13.1
Consumes time	3	25.0	1	12.5	-	-	4	17.4
Labour intensive	5	41.7	1	12.5	1	33.3	7	30.4
Marketing problem	3	25.0	-	-	-	-	3	13.1

F frequency; % percentage; TF total frequency; T% total percentage

Agricultural Development Programme (ADP) in their state, 31.3% and 1.3% of the respondents (farmers) received information from the International Institute of Tropical Agriculture (IITA) and television/radio respectively.

Adoption of yam minisett technology: The farmers that adopted the technology claimed that minisett generates more seed yam than the traditional vine milking technique as mentioned by 40.5% of the respondents (Table 4). Some of the farmers (28.6%) claimed that yam minisett is a cheaper source of planting material and 31% claimed that the technology has increased their capital. Among the total number of farmers interviewed, 54% have tried the minisett technology once and 66% of them were still producing seed yam from the minisett technology. The farmers that did not adopt the technology complained of inadequate training (36%), high labour requirement (13%) and inadequate capital (13%) as reasons for non-adoption of the technology.

Problems associated with minisett production: The major problems associated with yam minisett technology and the reasons for low adoption as claimed by the farmers are high labour requirements, inaccessibility to chemical inputs, also of adopters acknowledge that the technique consumes time (Table 5). In Oyo state, inability to secure market for the seeds is a constraint to 25% of the adopters (Table 4).

Discussion

A lot of materials and ideas have been generated through increased scientific research which has been communicated or taken to the doors of Nigerian farmers and other rural dwellers. The rate at which these technologies were adopted differs with location and farmers circumstance. Farmers awareness of minisett technology differs from one state to the other in southwestern Nigeria, effort should therefore be made to extend the technology to farmers.

The adoption of a new idea with regards to yam minisett technology is a decision to continue full use of the technology after going through the adoption process of awareness, interest, evaluation, training and final adoption. Minisett technique in yam production generates more seed yam than the traditional vine milking technique and if well utilized will increase yam production and economic status of yam farmers.

The involvement of more men than women in yam minisett production shows that the technology is labour intensive particularly as claimed by the respondents. Also, majority of the respondents are within the ages of 41-50 years which, according to Food and Agriculture Organization (FAO)[5], are the economically active population. The age of the respondents can influence the adoption and production of yam minisett technology.

Majority of the respondents' interviewed allocated less than 0.1 hectare of land to minisett production. This may be due to the fact that farmers cannot utilize all their land to yam minisett production since they have to cultivate other crops to sustain their family. The respondents that allocated more than one hectare to yam minisett production may be the very few that produce yam for commercial purpose and know the advantages of yam minisett technology over the traditional vine milking technology.

In Ondo and Edo states, 33% of the respondents have not heard about the technology. Farmers prefer seeds from minisett but yam seeds from traditional milking system contributed significantly to the planting materials used by farmers. Forty six percent (46 %) have not adopted minisett and more than 50% of the respondents in Edo and Ondo states were non-adopters. Majority of the respondents identified high input and labor cost as reasons for non-adoption, but in specific cases marketing problems and low success rate was identified in Oyo and Edo states respectively. Yellow yam (*Dioscorea cayenensis*) was found as difficult to sprout. The agrarian community in Oyo encountered difficulty in selling; some yam seeds are produced by most farmers.

The communication of agricultural technologies to farmers is very necessary since the basis of research is to transfer new findings to the end users (farmers). Efforts should therefore be

Table 5. Problems associated with minisett production.

	Oyo		Ondo		Edo			
Problems	F	%	F	%	F	%	TF	T%
1. Marketing & storage	5	18.5	-	-	-	-	5	18.5
2. Lack of capital	-	-	5	20.8	1	4.8	6	25.6
3. Labour intensive	9	33.3	2	8.3	6	22.6	17	46.0
4. Inavailability of yam sett	-	-	3	12.5	2	9.5	5	13.5
5. Lack of awareness	-	-	1	4.2	1	4.8	2	5.4
6. Consumes time	1	3.7	1	4.2	-	-	2	5.4
7. Surpluses of seed yam	1	3.7	-	-	-	-	1	2.7

F frequency; % percentage; TF total frequency; T% total percentage

made to pass on knowledge (information) to farmers through different means in such a way that they (farmers) act on the knowledge to achieve useful result.

Based on the findings of the study and observations from the field during the course of the study, the following recommendations are proffered, application which will enhance the adoption of minisett technology: 1) establishment of seed companies to produce minisett at a cheaper price for the benefit of farmers; 2) improvement of milking system to ensure sanitation and high quality seeds for farmers and selection of early maturing varieties, so that period of milking and second harvest can be longer and increase seed yield; 3) popularize the use of legume fallow crops as a control for nematodes and other soil-borne pests; 4) integration of minisett technology into the ware yam production by small holders; 5) easy accessibility to loans by seed producers; 6) establishment of market information to enhance seed distribution and provision of storage facilities.

Conclusions and Recommendations

The study has shown that majority of the farmers (75.6%) are aware of and trained on minisett technique but still experience acute shortage of planting material. Also, majority of the farmers (58.1%) use milking system to generate planting material. Adopters of the technology complained of high labour requirements and high cost of chemical for seed yam production, and that the technology consumes time. In Oyo, surplus seed yams commands low price and this discouraged the adoption of the technology hence the need for storage facilities and expanded market opportunities along the yam belt in the West African sub-region and even in the Pacifics where yam is produced.

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