Agrosearch
Vol. 1, No. 1, January 1995, pp 1-6

OBSTACLES TO THE ADOPTION OF YAM MINISETT TECHNOLOGY BY SMALL-SCALE FARMERS OF SOUTHEASTERN NIGERIA

M. C. MADUKWE
Dept. of Agric. Extension,
University of Nigeria,
Nsukka, Nigeria.

ABSTRACT

Yam minisett technology has the capability to increase yam production in Nigeria. After more than ten years of the introduction of the technology, this study examined obstacles that have limited the adoption by small-scale farmers.

The result shows that the major obstacles are in the areas of complex process of production, cost of input and poor marketing facility. Refining the technology to suit existing mixed cropping practices and the use of reduced farm inputs were recommended for research.

Key Words: Adoption, Yam, Minisett-Technology

INTRODUCTION

Yam (Dioscores spp.) rank second after cassava in the provision of carbohydrates in West Africa (Sodik, 1976). It represents about 20% of the daily caloric intake of Nigerians living in the forest and savannah regions (Iwueke, et al. 1983), and constitutes a major staple food for most people of southeastern Nigeria.

However, the demand for the crop for some two decades now exceeds supply (Olayide, et al. 1972; Okorji, 1986). Part of the problem is the traditional methods for yam production using wholesome yam tubers. The Traditional methods have some economic disadvantages as it encourages competition between the edible/ saleable tubers and the tubers used as planting material. Again, the input demands, such as heavy staking under the traditional methods discourage large scale production. According to Okorji and Obiechina (1993) seedyam cost constitutes up to 62% of total outlay in south-eastern Nigeria.

To overcome these problems, a new method of rapidly producing seed yams by a segmentation technique called yam minisett, was introduced to the Nigerian farmers by the National Root Crop Research Institute (NRCRI) Umudike in 1975. The method involves essentially the cutting of yam tubers to produce as many minisett as possible (about 2cm thick, with some portion of the curticle attached). The minisett is used to produce seed yam which will be used to produce ware yams for consumption and industrial use.

The advantages of the technology involves reduced cost of planting material and cost of staking, increased plant population due to reduced spacing and suppression of weeds. Also, they yield more than setts got

from ware tubers when planted. In addition the technique lends itself to tractorization.

Despite the comparative advantages, the adoption of the technology by small-scale yam farmers to boost yam production has been far from encouraging (Bachmann and Winch, 1979; Iwueke et al., 1983; Okorji, 1986; Okorji and Obiechina, 1993). What factors are responsible for the low adoption rates? Is the technology appropriate? Technology is appropriate if it is relevant to farmers' situation or circumstances (Kurwijila, 1991). According to Ohiorhenuan (1991), the failure to consider the specific needs and resource constraints of small-scale farmers has led to the development of inappropriate technology. To address the situation, recent studies on adoption (Obinne, 1991; Njoku, 1991) are more content and location specific than earlier studies which were broad and imprecise. For example Njoku found that the greatest obstacle to the adoption of improved oil palm technologies wasthe farmers' perception that their use was complex. Small holders did not know what types of insecticides and herbicides to use, how much to use or how to apply them. However, available research reports did not reveal any attempt to understand problems of small-scale farmers in adopting yam minisett technology in Nigeria.

This study therefore attempts to identify obstacles to the adoption of yam minisett technology by small-scale farmers in southeastern Nigeria. Specifically, the objectives of the study were to:

(1) describe selected personal and characteristics of respondents.
(2) determine factors that constitute obstacles to yam minisett adoption.

METHODOLOGY

Nigeria cultivates about 69% of world's total hectarage on yam out of which the southeastern states provide 40% of the land area (Onwueme, 1978). According to Bachman and Winch (1979) and Okorji (1986), an intensive study of samples selected from any of the major yam producing areas in the following states; Abia, Anambra, Benue, Enugu and Imo would yield representative results regarding yam farming in southeastern Nigeria because these areas share the same ecological features, and texture, labour-intensive farm operations and accord similar status to yam cultivation as a "man's crop".

The survey covered all the ten villages of Amuzi, a major yam farming community in Imo State. A small-scale yam farmer was operationalized as a farmer with not more than two hectares of farmland under yam cultivation, and representing more than half of his total cultivable land, making more than half of his total annual income through yam sales. Based on these, about 2,000 small-scale yam farmers constituted the population. Four yam farmers identified by the extension agent working in the community and a research assistant who is a native of the community assisted in preparing a list of yam farmers for each of the ten villages. Ten yam farmers were selected in each village using random numbers assigned to the farmers. In addition, the four assisting farmers were interviewed bringing the total sample for the study to 104.

An interview schedule with options for free additional response was used for data collection in May 1992. Each respondent gave information on personal characteristics, extent of use of technologies associated with yam minisett, proportion of yam farm allocated to yam minisett production and rating of obstacles to the adoption of yam minisett technology.

Data were then subjected to frequency distribution and Factor Analysis. The Exploratory Factor Analysis using the Principal Factor Model with iterations and varimax rotation was adopted. The factor loadings under each obstacle (beta weight) represent a correlation of the variables (problem area) to the identified factor and has the same interpretation as any correlation coefficient. Kaiser's criterion using factor loadings above .30 in

naming and interpreting the factors and variables was adopted (Child, 1978; Ogunfiditimi, 1979).

RESULTS AND DISCUSSION

Personal and Farming Characteristics of Yam Farmers:

Majority of the respondents (81%) were between 41-55 years. About 73% depended mostly on self and family labour for yam production. A greater percentage (94%) had at least six years of primary education. All the respondents were aware of the yam minisett technology, and all used fertilizer, 96% used minisett dust, 39% used insecticidce, 20% used herbicide, and 14% used fungicide. This gives a picture of partial adoption of items in the technology package. The respondents relied mainly on extension agents, neighbours, and radio in that order as sources of information on yam minisett technology.

Data in Table 1 shows the proportion of farm under yam cultivation allocated to yam minisett production. Yam farmers who cultivated not more than 0.42 hectare (1 acre) of land had 8.2% of their farms under yam cultivation allocated to yam minisett production. Those who farmed from 0.43 to 0.84 ha (1-2 acres) and from 0.85 to 1.25 ha(2-3 acres) allocated 18.5% and 27.5% of their farms under yam cultivation to man minisett production respectively. The indication was that the largerthe farm hectarage under yam cultivation the higher the proportion of farm land allocated to yam minisett production. One implication of this finding is that yam minisett technology may be more suitable for large scale than small-scale farming. This is even more so because, to the small scale yam farmer, cultural value and social status tranascends the monetary or economic consideration which is the basic consideration in large scale farming (Okorji and Obiechina, 1985).

Table 1 further shows that about 17%of the yam farmers did not plant yam minisetts. About 56% of them planted yam minisett in 10% of their farms under yam cultivation, another 21% planted yam minisetts in 25% of their farms, while only 6% of the farmers planted yam minisett on 50% of their farms under yam cultivation. Thus, only about 27% of the yam farmers allocated 25% or more of their farm land to minisett production.

Obstacles to Yam Minisett Adoption:

Table 2 shows the Rotated Factor Matrix of obstacles to adoption of yam minisett technology. A total of five factors were extracted to give a clearerpicture of the extent of the obstacles. The extracted factors in their order of importance were complex production process, cost of input, poor market facility, knowledge problem and cultural complexity.

An assessment of the loadings shows that factor one - complex production process, was dominated by the problem of "technology not easily integrated to existing farming system" (.83). The indication is that the minisett technology package was in disagreement with the existing yam production practices in the study area. While mixed cropping is the traditional yam production practices (Okorji, 1986), yam minisett production was introduced to the small-scale farmers as a sole crop practice. Thus, instead of the farmer substantially replacing yam production through the use of whole tuber with the minisett technology, he saw it as another way of growing an entirely new crop, which was allocated to a distinct section of the land for yam production. This was closely followed by "technology difficult to propagate" (.82). It required the farmer who is used to planting whole tuber of unknown weights to make a change to mini-yam-sett that has to conform to certain weights and treatment before planting.

Factor two, cost of input, was dominated by "poor economic return" (.77). Unlike the traditional technique the minisett technology required the use of certain technology items which must be paid for. This necessitates expectation of higher economic return.

Other obstacles under this factor were "scarcity of farm land" (.75) and "costly to implement" (.71). Scarcity of land may be considered more a social problem with serious economic implication.

Factor three, marketing facility, was dominated by "poor storage" (.87). Yam minisett product (seed yams) needs longer storage time than ware tuber. Harvesting of yam minisett product is usualy completed by November and must be stored up to April of the following year (5 months) before sales can start. This increases loss through decay. The other obstacles under the factor include "poor market facility" (.78). Unlike ware yam tuber, which has market demandfrom the period of a year's harvest to the period of next year's harvest (12 months); yam minisett product (seed yams) are demanded for only about two months in a year or planting cycle, that is, during the planting season.

Factor four, knowledge, was dominated by the problem of acquiring sound technical knowledge in adopting yam minisett technology (.82). Such technical knowledge include the following practices; cutting technique, spacing, use of chemical and fertilizer requirement. This was followed by "non awareness of the technology practices" (.76).

Factor five, cultural complexity, was dominated by "technology has conflict with norms of value" (.70). As pointed out earlier, norms and values are very important consideration by the small-scale farmers in yam production practices.

CONCLUSION

This study has shown that adoption of yam minisett technology by small-scale farmers in south-eastern Nigeria is faced with problems that borders mainly on the complex process of production, cost of input and marketing facility. A production system that will ensure the advantages of minisett technology under mixed cropping system with considerable reduction on the needed production inputs should be developed by research. This is necessary because adoption of mixed cropping system for yam production is encouraged by the level of insurance in terms of minimization of loss provided by the intercrops. Reduction on the needed production inputs will increase economic return for small-scale farmers and ensure continued adoption.

To reduce the long waiting period between harvest and sales of yam minisett product and indeed remove the burden of storage from the small farmers, government should consider buying or encouraging private enterprises and cooperatives to buy off the product immediately after harvest for effective storage and resell during the planting season.

ACKNOWLEDGEMENT

The assistance of Mr. Njoku, C.U., a native of Amuzi in collecting data for this study is hereby acknowledged.

REFERENCES

Bachmann, E. and Winch, F.E. (1979). "Yam Based Farming Systems in the Humid Tropics of Southern Nigeria". International Institute of Tropical Agriculture, Ibadan. Discussion Paper No. 2/79.

Child, D. (1970). The Essentials of Factor Analysis. New York; Holt, Rinehart and Winston Ltd.

Food and Agricultural Organization (1985). Production Year Book No.39 Rome: F.A.O. United Nations.

Iwueke, C.C., Mbata, E.N. and Okereke, H.E. (1983). "Rapid Multiplication of Seed Yam by Minisett Technique". Advisory Bulletin, National Root Crops Research Institute Umudike, No. 9.

Kurwijila, R.V. (1991). "Observations on the Use of Appropriate Technology in Agricultural Development in Tanzania. Journal of Tropical Agriculture and Veterinary. Vol. 29(1): 33-43.

Njoku, J.E. (1991). "Determinants of Adoption of Improved Oil Palm Production Technologies in Imo State Nigeria". In Issues in African Rural Development 1991 (eds.) Doss, C.R. and Olson, C. pp. 218-233, USA: Winrock International Institute for Agricultural Development.

Obinne, C.P. (1991). Adoption of Improved Cassava Production Technologies by Small-Scale Farmers in Bendel State. Journal of Agriculture, Science and Technology, I(1): 12-15.

Ogunfiditimi, T.J.O. (1979). "Construction of Five Factor Attitude Instrument for Evaluation of the Food for Work Programme" Journal of Social Psychology, 107: 25-33.

Ohiorhenuan, L.A. (1991). "Nutritional Concerns in Agricultural Research in Nigeria" In Issues in African Rural Development 1991 (eds) Doss, C.R. and Olson, C. pp. 254-281, USA: Winrock International Institute for Agricultural Development.

Okorji, E.C. (1986). Productivity of Yam Under Alternative Cropping Systems Adopted by Smallholder Farmers of Southeastern Nigeria" Agricultural Systems 22: 231-241.

Okorji, E.C. and Obiechina, C.O.B. (1985). "Bases for Farm Resource Allocation in the Traditional Farming System: A Comparative Study of Productivity of Farm Resources in Abakaliki Area of Anambra State, Nigeria" Agricultural Systems 17: 197-210

Okorji, E.C. and Obiechina, C.O.B. (1993). "The Role of Seedyam Procurement Arrangements for Yam Production Specialisation in the Smallholder Cropping System of Anambra State, Nigeria". African Development Review 5(1) pp. 70-80.

Olayide, S.O.; Olatunbosun, O.; Idosogie, E.O. and Abragom, J.D. (1972). "A Quantitative Analysis of the Food Requirements, Supplies and Demands in Nigeria, 1968-1985". Agricultural Atlas, Lagos. Federal Department of Agriculture.

Onwueme, I.C. (1978). The Tropical Root Crops. New York: John Wiley and Sons Ltd.

Sodik, S. (1976). Methods for Seed and Seedling Establishment of Yam, D. Rotunda Poor, IITA, Ibadan: IITA.

Table 1: Percentage Distribution of Respondents by Proportion of Farm under Yam Cultivation Allocated to Yam Minisett Production

Total Area of Land under Yam cultivation (in hectare)	Proportion of Farm under Yam Cultivation Occupied by Yam Minisett				
	0%	1/10(10%)	¼(25%)	½(50%)	$\bar{X}$ %
0.01 - 0.42 ha (less than 1 acre)	13.5	26.9	3.8	-	8.2
0.43 - 0.84 ha (1 - 2 acres)	3.8	25.0	9.6	1.9	18.5
0.85 - 1.25 ha (2 - 3 acres)	0	3.8	7.6	3.8	27.5
Total (%)	17.3	55.8	21.2	5.7	

Table 2: Rotated Factor Matrix of Obstacles to Adoption of Yam Minisett Technology in Southeastern Nigeria

Obstacle Variable	Factor 1 Complex Production Process	Factor 2 Cost of Input	Factor 3 Marketing Facility	Factor 4 Knowledge	Factor 5 Cultural Complexity
1. None Awareness of Technology Practices	.02*	-.10	-.22	.76	.00
2. Scarcity of Farm Land	-.03	.75	-.23	-.10	.07
3. Conflict with Norms and Value	-.16	.21	-.10	-.08	.73
4. Not Easily Integrated to Existing Farming System	.83	.18	.01	.00	-.32
5. Difficult to Propagate	.82	.02	-.06	-.02	.11
6. Costly to Implement	.36	.71	.22	.06	.02
7. Poor Economic Return	.04	.77	.13	.17	.22
8. Poor Marketing Facilities	-.02	.04	.78	-.16	-.01
9. Poor Storage	-.02	.04	.87	.15	-.04
10. Unavailability of inputs	.52	.60	-.20	.25	-.11
11. Costly Inputs	.63	-,03	-.51	-.18	.27
12. Chemical Inputs Harmful to Soil and Man	.36	.10	-.02	.05	.70
13. Technology Complex	.68	-.00	.17	.19	.39
14. Need to Acquire Large Technical Knowledge	.02	.13	.26	.82	-.02

*Figures are same as correlation coefficients