COMPARATIVE ECONOMIC ANALYSIS OF SEED YAM PRODUCTION TECHNIQUES IN NIGERIA

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ABSTRACT

Nigeria is known to be the largest producer of yam in the world. Increased production of yam in Nigeria is believed to be constrained by high cost of seed yams as planting materials. This study aimed at assessing the economics of three seed yam production techniques to the farmer. Three different techniques exist for producing seed yams traditionally. These are milking (early harvesting), minsett (cutting into setts), and minituber (small whole tubers). Results showed that the three techniques will return more than 80% per Naira (Nigerian Currency) invested. Going by the return per Naira generated, milking technique appears most profitable followed by minisett. Herbicide application has positive relationship with output from the three techniques, while labour input has negative influence on output from milking and minisett techniques. Seed setts on the other hand have positive influence on output from both minisett and minituber techniques.

Key words: Seed yam Production, milking, minisett, minituber

INTRODUCTION

Yam *(Discorea spp)* is an important tuber crop in Nigeria, where it is produced mainly as a food crop. This is essentially consumed locally. Yam is also a socio-cultural crop. The famous New Yam Festival (a "sacred" treatment which no other crop enjoys), which marks the beginning of eating of new yams in certain parts of the country, is a major manifestation of the socio-cultural importance of yam.

Nigeria is known to be the largest producer of yam in the world (FAO, 2004). Increased production of yam in Nigeria is believed to be constrained by high cost of seed yam (NRCRI, 1985). A large quantity of the edible yam, up to 30% of the previous year's harvest may be used to plant a new crop (Okoli and Akoroda, 1995). This makes seed yams account for over 40% of yam production cost (Ugwu 1990, Nweke et al. 1991). Different techniques exist for producing seed yam traditionally.

Present Situation

Three types of seed yams were identified in an earlier study in 2001 (Asumugha and Obiechena, 2001). Milked seed yam results form cutting off the tubers in August/September and leaving the head region of the tuber and feeder roots to sustain the plant in the remaining part of the season. Cut Setts are ware yams sliced into plantable setts, either at the milking or planting stage. Small whole tubers arise as a "bi-product" of ware yam production, or as a result of minisett technique of seed yam production. The use of small whole tubers and milked setts was more widespread among producers than the minisett technique. This is probably

due to the fact that small whole tubers and milked setts are often "bi-products" of ware yam production activity; the producer does not necessarily need a separate plot for seed yam production. In the case of seed yam production by the minisett technique, a separate plot is often required, although there are reports that in some parts of Benue state of Nigeria, the minisetts are planted on the sides of the mounds on top of which the ware yams are planted (Okoli and Akoroda, 1995). However, under the above production situation, the yield of the minisett is likely to be sub-optimal, since the minisetts may not withstand shading from the more vigorous growing ware yams.

OBJECTIVE

The objective of this study is to conduct a comparative economic analysis of the three seed yam production techniques that were observed at the farm level during the 2001 surveys (Ugwu et al. 2001, Asumugha and Obiechina, 2001). These techniques are

1. Milking (early harvesting),
2. Minisett (cutting into setts),
3. Minituber (whole yam).

JUSTIFICATION

Seed yam producers have several objectives for investing on seed yam production. Most of them produced seed yam essentially for the production of own ware yams This largely explains why over 85% of the producers source their seed yams from the previous year's harvest (Ugwu *et al* 2001). Producers essentially for own ware yam production may not produce also for the market for reasons connected with limited capital endowment, and labour constraints. It was earlier shown that the minisett technique was developed, modified and transferred to seed yam producers as a means of producing seed yams cheaply. Yet, other traditional techniques of seed yam production were also shown to be more widely used than the minisett technique. It is therefore necessary to assess the economics of these three seed yam production techniques to the farmer.

METHODOLOGY

This study was conducted in 3 major yam producing States of Delta, Nassarawa and Benue States of Nigeria. Fifty farmers practicing these techniques were randomly selected from each of the 3 States for this study. Data collected include:

*. Farmer Characteristics /socio- economic status,
* Technologies used in seed yam production
* Production inputs
* Production objectives

The three techniques were subjected to economic analysis

RESULTS AND DISCUSSION

Seed yam production objectives:

Table 1. Percentage distribution of seed yam producers by their production objective.

Production objective	% of producers
Mostly for own production of ware yams	53.13
Mostly for sale	2.08
Both for sale and for own production of ware yams	44.79
Total	100.00

Seed yam producers have several objectives for investing on seed yam production. Most of them produce seed yam essentially for the production of own ware yams (Table 1). This largely explains why majority of the producers source their seed yams from the previous year's harvest.

Table 2. Percentage distribution of seed yam producers by type of labour employed in seed yam production.

Type of labour	% of producers
Mostly family	3.13
Mostly hired	22.91
Both family and hired	73.96
Total	100.00

Almost 75% of seed yam producing households supplemented family with hired labour (Table 2). The proportion of producers who relied mostly on family labour was relatively small. This is probably due to rural-urban drift and the quest for education which makes children unavailable for farm work. Yam mounds in Benue State are usually prepared by November and left to be planted up by February to take advantage of cheap labour to ensure that large area is prepared before planting starts.

TABLE 3: Percentage distribution based on years of farming experience for farmers practicing the techniques of seed yam production

Technique	Experience(Yr)	Frequency	Percentage (%)
MILKING	1-5	0	0.00
	6-10	0	0.00
	11-15	1	2.00
	>15	49	98.00
	TOTAL	50	100.00
MINISETT	1-5	0	0.00
	6-10	9	18.00
	11-15	9	18.00
	>15	32	64.00
	TOTAL	50	100.00
MINITUBER	1-5	1	2.00
	6-10	6	12.00
	11-15	9	18.00
	>15	34	68.00
	TOTAL	50	100.00

SOURCE: FIELD SURVEY, 2005

More than 60% of the producers have over 15 years of farming experience in these traditional methods of seed yam production.

TABLE 4: Percentage distribution based on educational attainment for farmers practicing the techniques of seed yam production

Technique	Education(Yr)	Frequency	Percentage (%)
MILKING	No formal education	50	100.00
	Primary education	-	0.00
	Secondary educ..	-	0.00
	Post secondary	-	0.00
	TOTAL	50	100.00
MINISETT	No formal education	50	100.00
	Primary education	-	0.00
	Secondary educ..	-	0.00
	Post secondary	-	0.00
	TOTAL	50	100.00
MINITUBER	No formal education	13	26.00
	Primary education	12	24.00
	Secondary education	19	38.00
	Post secondary	6	12.00
	TOTAL	50	100.00

Almost 100% of respondents practicing the traditional milking and minisett techniques had no formal education, while 74% of them practicing minituber technique had one form of education or the other.

TABLE 5: Percentage distribution based on gender of farmers practicing the techniques of yam production

TECHNIQUE	GENDER	FREQUENCY	PERCENTAGE (%)
Milking	Male	50	100.00
	Female	-	0.00
	Total	50	100.00
Minisett	Male	50	100.00
	Female	-	0.00
	Total	50	100.00
Minituber	Male	37	74.00
	Female	13	26.00
	Total	50	100.00

SOURCE: FIELD SURVEY, 2005

Mostly the males practice the milking and minisett, while only 26% of the females practice the minituber system.

TABLE 6: Partial budget results for milking technique of seed yam production.

Return/Variable Input	QUANTITY	UNIT COST(N)	VALUE (N)
Marketable Tubers (250g-1kg) Kg	75500	31.60	2315000.00
Land Preparation (MD)	101.4	630.00	65260.00
Seed Yam Purch (Kg)	2912.5	160.00	466000.00
Sett Preparation(MD)	29	560.00	17360.00
Stake Purc (100/Bd)	11	1500.00	16815.00
Staking(MD)	-	-	-
Twine (No. Of Rolls)	-	-	-
Fertilizer Purch (Kg)	1210	50.00	60500.00
Fertilizer Application(MD)	27.50	570.00	15750.00
Herbicide Purch (Lt)	10.50	1000.00	10500.00
Herbicide Application	4.20	1500.00	6300.00
Weeding	142.96	616.00	83086.00
Minisett Dust (Sachet)	-	-	-
Harvesting (MD)	142.40	626.00	90740.00
Total Gross Income			2315000.00
Total Variable Cost (TVC)			831311.00
Net Farm Income (NFI)			1483689.00
Return Per Naria (R/N)			178.48%

SOURCE: FIELD SURVEY, 2005

TABLE 7: Partial budget results for minisett technique of seed yam production.

Return/Variable Input	Quantity	Unit Cost(N)	Value (N)
Marketable Tubers (250g-1kg)Kg	12375	160.00	1980000.00
Land Preparation (MD)	32.8	500.00	16400.00
Seed Yam Purchase (Kg)	6540	100.00	654000.00
Sett Preparation (MD)	-	-	-
Stake (100/BD)	45.1	500.00	22550.00
Staking (MD)	24.1	500.00	12050.00
Twine (No. Roll)	11.1	75.00	832.50
Fertilizer Purchase (Kg)	640	50.00	32000.00
Fertilizer (MD)	39	300.00	11700.00
Herbicide Purchase (Lt)	14.9	1000.00	14900.00
Herbicide Application (MD)	5.9	1200.00	7080.00
Weeding (MD)	52.8	500.00	26400.00
Minisett Dust (Sachet)	-	-	-
Harvesting (MD)	46.7	500.00	23350.00
Total Gross Income			1980000.00
Total Variable Cost (Tvc)			821262.50
Net Farm Income			1158737.50
Return Per Naira			141.09%

SOURCE: Field Survey 2005

TABLE 8: Partial budget results for minituber technique of seed yam production.

Return/Variable Input	Quantity	Unit Cost (N)	Value (N)
Marketable Tubers (250g-1kg) Kg	9768.6	140.00	1357604.00
Land Preparation (MD)	29.2	500.00	14600.00
Seed Yam Purchase (Kg)	5228.3	100.00	522830.00
Sett Preparation (MD)	-	-	-
Stake (100/BD)	-	-	-
Staking (MD)	-	-	-
Twine (No. of Roll)	-	-	-
Fertilizer Purchase (Kg)	560	65.00	36400.00
Fertilizer Application (MD)	8.1	400.00	3240.00
Herbicide Purchase (Lt)	4.4	1000.00	4400.00
Herbicide Application (MD)	50.5	1250.00	63125.00
Weeding (MD)	45.4	500.00	22700.00
Minisett Dust (Sachet)	25	50.00	1245.00
Harvesting(MD)	50.5	500.00	25250.00
Total Gross Income			1367604.00
Total Variable Cost(TVC)			693790.00
Net Farm Income (NFI)			673814.00
Return Per Naira(R/N)			97.12%

SOURCE: Field Survey 2005

The partial budget results showed that the three techniques will return about 100% per naira invested in the business. The order of decreasing returns, however, is milking, Minisett, Minituber.

Determinants of yam output in the three technologies using regression functional forms.

Determinants of yam output in the three Technologies using regression functional forms in seed yam production in Nigeria were estimated using the Cobb-Douglas, Exponential and Semilog functional forms of the ordinary least square regression technique. The functional form that gave the best fit was used in each technique.

TABLE 9: Summary of regression results for the three techniques (milking, minisett, and minituber)

Techniques Variables	Milking(D)	Minisett (S)	Minituber (S)
Labour (X1)	-0.255	-4291.6	444.17
	(-4.21)***	(-17.19)***	(1.53)
Seed yam (X2)	-0.017	1308.82	6753.40
	(-1.36)	(12.83)***	(30.70)***
Fertilizer (X3)	0.503	1994.12	-2077.02
	(4.25)***	(34.71)***	(-8.56)***
Farm size (X4)	0.650	-1499.99	2756.71
	(4.05)***	(-5.89)***	(6.90)***
Herbicide (X5)	0.134	3615.51	1832.45
	(2.13)**	(19.59)***	(4.55)***
Intercept	8.233	2634.13	-38240.00
	(13.27)***	(2.12)**	(-14.11)***
F-Value	(649.75)***	(465.13)***	(1346.61)***
R2	0.986	0.942	0.979
No. of observation	50	50	50

Figures in parentheses are t-Ratios. ** 5% and *** 1% significant levels
D = Cobb-Douglas and S = Semi-Log Functional Forms

CONCLUSION

- From all indications, the three traditional techniques are profitable to the producers. Going by the return per naira generated, milking technique appears most profitable.
- Multiple regression results show that herbicide application has positive relationship with output from the three techniques.
- Labour has negative influence on output from both milking and minisett techniques
- Seed setts have positive influence on output from both minisett and minituber techniques.

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