

PROFITABILITY OF MINITUBER SEED YAM PRODUCTION TECHNIQUE IN SOUTH EAST AGRO-ECOLOGICAL ZONE: EVIDENCE FROM ABIA STATE, NIGERIA

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ABSTRACT

An experiment was conducted at Umudike to evaluate the profitability of minituber production technique using selected improved white yam varieties developed in 2003 as a back up to the miniset technique. The three white yam varieties selected were TDr89/02677, TDr89/02665 and TDr89/02565 known for their high potential yield. Sets of 8-10 grams were planted directly in the field for two years with spacing of 10cm x 100cm between ridges 10cm x 20cm between rows on a ridge (double row) and 10cm x 10cm intra row. The data were collected using cost route approach were analysed using descriptive statistical and Net return analysis. The result on establishment count on average of 4 weeks after planting (WAP) + 8 weeks after planting (WAP) showed that TDr89/02677, TDr89/02665 and TDr89/02565 gave 52.2, 46.1 and 43.5% sprout count while percentage stand count were 63.0, 53.9 and 52.2% respectively. The result of the profitability of the study showed that the three improved yam varieties (TDr89/02677, TDr89/02665 and TDr89/02565) were profitable as incomes generated were ₦141, 100.00, ₦49, 900.00 and ₦46, 300.00 respectively and on average gave an income of ₦79, 100.00.

Key Words: Profitability, Minituber technique, Yam, Nigeria

INTRODUCTION

Socio-economic studies on yam production conducted in Nigeria include Lageman (1977), Buchman (1981), Eluagu and Chinaka (1985), Dorosh (1988), Ezech (1994), Ezech *et al.*, (1992) and Ezech, (1998). These works in yam production are of different dimensions. Lageman (1977) was interested in comparing income contribution of yam among other crops and found that yams constituted an average of 32% of farmers' gross income. Buchman (1981) was interested in investigating the problems and trends of yam holdings, while Eluagu and Chinaka (1985) were more concerned with the economics of different staking methods. Edwards and Cropper (1987) in the West Indies and Lyonga (1981) in Cameroon have shown that despite the high production costs, yam production is profitable.

Across yam belt of Nigeria, yam commands highest socio-cultural value among food crops (Orkwor *et al.*, 1998). Yams are important in Nigeria as it supplies cheap caloric energy to over 80% of the populace. Recent reports have shown that Nigeria is the largest producer of this commodity in the world (Orkwor *et al.*, 1998, and FAO, 2008). Nigeria produces over 36 million metric tons of yams annually (FAO, 2008). However, the productions of yam tubers in Nigeria are in the hands of small-scale farmers. With this, the demand for yam tubers in Nigeria still exceeds its supply (Andreas, 2003). The gap between supply and demand for yam still remains over 50 million metric tons per annum.

Among the inputs required in yam production, labour and planting material (seed yams) are the most demanding (Ezech, 1998). In Nigeria, labour demand ranged from 300 to 400 man-days per hectare at costs of ₦30, 000.00 - ₦40, 000.00 i.e., (\$375-\$500.US Dollars) (Lyonga, 1981; Orkwor and Adeniji, 1998). From empirical point of view, about 10,000 normal size (150-250g) seed yams are required to plant up a hectare for ware yam production. Hence, at ₦15.00 per seed yam, a total of ₦150, 000.00 (\$1875.00) was

required for planting materials. However, under the miniset technique as many as 60,000 minisets of 25-30grams is required to plant one hectare for seed yam production. A study has shown that about 35-50% of the total production cost is constituted by planting material (Orkwor, 1998 and Spore, 2011). This implies that it will take about 5000-6000 seed yams of normal size of 200 to 250 grams to plant a hectare. In recent times, the prices of seed yams have changed drastically with impending high cost. With the rising cost of fertilizer there is likelihood that the price of seed yam might go up in the near future.

From theoretical point of view, National Root Crop Research Institute, (NRCRI), Umudike has categorized yam tubers into several grades for ease of marketing and analysis. Yam tubers greater than one kilogram (>1kg) are group as ware yams, seed yams (250grams to 1kg), and mini seed yams (<50g) based on Ezeh (1991, 1993 and 1998) works. However, since these studies, a lot of development has been carried out in yam research. Table 1 shows a modification of earlier work on yam tuber classification carried out by Ezeh.

Table 1: Yam Tuber Classifications

Yam Tubers	Category (Kilogram)
Ware Yams	Greater than one kilogram (>1kg)
Seed Yams (Grade 1)	250 grams to one kilogram (250g-1kg)
Seed Yams (Grade 2)	100 grams to 249 grams (100-249g)
Mini seed yams, now mini tubers	50 grams to 99 grams (50-99g)
Micro seed yams, now micro tubers	< 50 grams

Source: Ezeh (1991, 1993 and 1998); Ikeorgu and Dabels, (2005); Ogbonna *et al.*, (2011).

The Yam Mini tuber seed yam production Technique was developed by Yam Research Programme in 2003 as a back up to the Yam Mini sett Technology developed in 1982 (Ikeorgu and Nwokocha, 2001). The technique has been found to produce micro tubers, mini tubers and seed yams ranging from 30 grams to 150 grams using 6 grams to 10 grams cut setts and could be planted directly into prepared ridges, mounds or beds. The technique has been reported to produce seed yams of up to 900 grams on a good soil. The technique has been developed to provide uniformity in seed yam sizes as handy for export and reduced scarcity and high cost of seed yams often experienced by farmers (Ikeorgu and Dabels, 2005).

The technique has been applied in the newly released seven hybrid white yam varieties in 2005, 2006 and 2007 for mini tuber production in both open screen house and field and the results have been excellent going by agronomic practices (Ikeorgu and Agoh 2006 and 2007). Research studies has shown that majority of Nigerian farmers are yet to derive benefit from these hybrid yams varieties due to its scarcity. Applying the practical principles of profit and utility maximization may increase the rapid multiplication of these scarce planting materials. Therefore, there is the need to evaluate the profitability of mini tuber production technique so that farmers would be guided for more income generation and enhance poverty reduction. The outcome of the study would be link to seed yam producers who may wish to diversify into seed production for export since the technique has the advantage of producing seed yams of similar uniformity in shape and sizes. Hence, the study aimed to evaluate the profitability of the mini tuber seed yam production technique as a guide to seed yam producers.

MATERIAL AND METHODS

The study was conducted at the Yam research field of National Root Crops Research Institute, (NRCRI), Umudike, Nigeria in 2009 and 2010. The experiment was conducted

under farmer’s level using all the three improved yam varieties with potential yield of 30 tonnes per hectare. Setts of 10grams were planted directly in the field in May, 2009 and 2010 when the rain had stabilized with spacing of 10 cm x 10 cm intra-row and 10 cm by 100 cm between the ridges. The data were collected using cost route approach starting from sourcing of planting material to grading and price evaluation of tubers harvested. The data were analyzed using net return analysis following Ezedinma *et al.* (2006), Ogbonna *et al.* (2007) and Alimi and Manyong (2000). The model is expressed as;

$$\begin{array}{lll}
 \text{NR} = \text{GR} - \text{TC} & \dots & 1 \\
 \text{TC} = \text{TVC} + \text{TFC} & \dots & 2 \\
 \text{R/₦ investment} = \text{NR/TC} & \dots & 3
 \end{array}$$

Where, NR = Net return, GR = Gross return, TC =Total cost, TVC = Total variable cost, TFC = Total Fixed cost, R/₦ = Return per Naira.

RESULTS AND DISCUSSION

The result on establishment count on average of 4 weeks after planting (WAP) + 8 weeks after planting (WAP) is presented in Table 2. The results showed that TDr89/02677, TDr89/02665 and TDr89/02565) gave average of about 52 percent, 46 percent and 43 percent sprout count. This implies the actual number of micro setts (10 grams) that survived after planted. The result of the stand count at harvest is presented in Table 3. The results showed that the percentage stands counts at harvest were on average of about 63 percent, 54 percent and 52 percent respectively indicating number of stands that were harvested with tubers.

Table 2: Percentage Sprout Count of Improved White Yam Varieties using Mini tuber Seed Yam Production Technique, 2009 and 2010

Yam varieties	2009		2010		Mean
	4WAP	8WAP	4WAP	8WAP	
TDr89/02677	36.40	53.20	42.00	77.00	52.15
TDr89/02665	28.50	52.50	31.00	72.00	46.13
TDr89/02565	29.30	53.60	28.00	65.00	43.50
Mean	31.40	53.10	33.67	71.33	

Table 3: Percentage Stand Count at Harvest of Improved Yam Varieties, 2009 and 2010

Yam varieties	2009	2010	Mean
TDr89/02677	67.00	59.00	63.00
TDr89/02665	54.70	53.00	53.85
TDr89/02565	63.30	41.00	52.15
Mean	61.70	56.33	

The result on the cost implications of the minituber technique using selected improved yam varieties were presented in Tables 4, 5 and 6 respectively. The results showed that the technique (Table 4) using the improved yam variety such as TDr89/02677 has a much

comparative advantage over the other varieties in Tables 5 and 6 as profit was ₦141, 100.00. This shows that this variety could provide much additional income to the farmer when used for minituber production in order to raise seed yams.

Table 4: Profitability Analysis of Minituber Production Technique using improved yam Variety of TDr89/02677

Variable	Quantity	Labour Man-day	Unit Price (₦/t)	Total ₦/t
Gross benefit (A)				
Average Yield (2009 and 2010)	11.28 (t/ha)	-	-	-
Gross benefit (A)	11.28 (t/ha)	-	40,000.00	451,200.00
Land Preparation	Tractor	-	-	12, 500.00
Planting Material (seed yams)	1.8 tons	-	20,000.00	36,000.00
Staking material	-	-	-	142,000.00
Fertilizer (NPK)	200kg	-	140	28,000.00
Cost of Herbicide	1Litre	-	-	2,600.00
Spraying		1	400.00	400.00
Planting		20	400.00	8,000.00
Fertilizer application		16	400.00	6,400.00
Staking/twining		22	400.00	8,800.00
Weeding (4, 8, 12 WAP)		104	400.00	41,600.00
Transportation	-	-	-	1,500.00
Harvesting		71	400.00	21,300.00
Total Variable Cost (TVC)				309,100.00
Depreciation of Farm tools				1,000.00
Total Cost (B)				310,100.00
Net benefit (A-B)				141,100.00

The result on the cost implications of the technique was summarized in Table 7. The results showed that the three improved yam varieties (TDr89/02677, TDr89/02665 and TDr89/02565) used for the study gave profit as incomes were ₦141, 100.00, ₦49, 900.00 and ₦46, 300.00 respectively. The improved white yam variety of TDr89/02677 popularly called miracle yam has a comparative advantage over the others and on average the mini tuber technique gave an income of ₦79, 100.00. This implies that the technique could provide an additional income to the farmer.

Table 5: Profitability Analysis of Minituber Production Technique using Improved Yam Variety of TDr89/02665

Variable	Quantity	Labour Man-day	Unit Price (₦/t)	Total ₦/t
Gross benefit (A)				
Average Yield (2009 and 2010)	9.06 (t/ha)	-	-	-
Gross benefit (A)	9.06 (t/ha)	-	40,000.00	360,000.00
Land Preparation	Tractor	-	-	12, 500.00
Planting Material (seed yams)	1.8 tons	-	20,000.00	36,000.00
Staking material	-	-	-	142,000.00

Fertilizer (NPK)	200kg		140	28,000.00
Cost of Herbicide	1Litre	-	-	2,600.00
Spraying		1	400.00	400.00
Planting		20	400.00	8,000.00
Fertilizer application		16	400.00	6,400.00
Staking/twining		22	400.00	8,800.00
Weeding (4, 8, 12 WAP)		104	400.00	41,600.00
Transportation	-	-	-	1,500.00
Harvesting		71	400.00	21,300.00
Total Variable Cost (TVC)				309,100.00
Depreciation of Farm tools				1,000.00
Total Cost(B)				310,100.00
Net benefit (A-B)				49,900.00

Table 6: Profitability Analysis of Minituber Production Technique using improved Yam Variety of TDr89/02565

Variable	Quantity	Labour Man-day	Unit Price (₦/t)	Total ₦/t
Gross benefit (A)				
Average Yield (2009 and 2010)	8.91 (t/ha)	-	-	-
Gross benefit (A)	8.91 (t/ha)	-	40,000.00	356,400.00
Land Preparation	Tractor	-	-	12,500.00
Planting Material (seed yams)	1.8 tons	-	20,000.00	36,000.00
Staking material	-	-	-	142,000.00
Fertilizer (NPK)	200kg		140	28,000.00
Cost of Herbicide	1litre	-	-	2,600.00
Spraying		1	400.00	400.00
Planting		20	400.00	8,000.00
Fertilizer application		16	400.00	6,400.00
Staking/twining		22	400.00	8,800.00
Weeding (4, 8, 12 WAP)		142	400.00	42,600.00
Transportation	-	-	-	1,500.00
Harvesting		71	400.00	21,300.00
Total Variable Cost (TVC) B				309,100.00
Depreciation of Farm tools				1,000.00
Total Cost (B)				310,100.00
Net benefit (A-B)				46,300.00

Table 7: Summary Profitability of mini tuber seed yam production technique using improved white yam varieties, 2009 and 2010

Yam variety	Yield t/ha 2009	Yield t/ha 2010	Mean Yield t/ha	Gross return ₦/ha	Total cost ₦/ha	Net return ₦/ha
TDr89/02677	13.84	8.71	11.28	451,200	310,100	141,100*
TDr89/02665	9.32	8.68	9.06	360,000	310,100	49,900*
TDr89/02565	12.72	5.10	8.91	356,400	310,100	46,300*
Mean	11.95	7.50	9.75			79,100**

Note: *Income per variety **Average income /ha

CONCLUSION

Although all the three white yam varieties performed excellently well in term of profit, TDr89/02677 has a comparative advantage over the others. However, on average the mini tuber technique gave an income of ₦79, 100.00. Therefore, the technique is a profitable venture and could be recommended to commercial seed yam farmers.

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