

## EVALUATION OF YAM-BASED PRODUCTION ENTERPRISES IN NIGERIA

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### ABSTRACT

This research investigated yam based production enterprise in Nigeria to identify the ideal farming system for yam. Data were extracted from 360 respondents in selected major yam-producing States in Nigeria. Data were analysed by the use of descriptive statistics and economic analysis. The result of this investigation reveals that yam production is profitable but it requires a large capital outlay. Yam production was more profitable than other comparable crops. There are infinite cropping systems for yam in Nigeria. All the dominant cropping systems for yam are profitable. Yam/maize intercropping system is the most profitable crop system for yam in Nigeria. The key recommendations from this research are increased investment in yam production; adoption of Yam/Maize intercropping system; and the development of an appropriate yam production technique that will reduce the cost of yam and make its production more profitable.

### Introduction

The food situation and the conditions of Nigerian farmers are critical. Nigerian food producers are predominantly resource-constrained poor farmers, who are the most food insecure (Otaha, 2013; World Food Programme, 2015). They are unable to produce adequate food for their families (Otaha, 2013). Adoption of appropriate farming technologies and systems can improve farmer performance. This research assessed Nigerian yam production enterprises to identify improved cropping systems for yam. This project illustrated a more profitable yam production system and improved farmer wellbeing. Yam is a significant crop in Nigeria. It is a highly prized crop in the country. It has sociocultural, medicinal, nutritional and economic values. It is nutritionally superior to comparable crops including sweet potato and taro (Wanasundera

and Ravindran, 1994). Notwithstanding, yam farmers in Nigeria are performing poorly, in particular there is declining yam yield. Yam production in Nigeria is mainly impeded by high costs, unavailability of appropriate planting materials, and over reliance on labour-intensive indigenous yam production methods. These methods are expensive, encourage the use of low quality planting materials, and inhibit mechanization of yam production. There is a need to embrace an ideal farming system for yam in Nigeria. Mechanization of yam farming would reduce the drudgery of yam production but current production practices and varieties use for yam production limited mechanization possibilities (Opara, 2003). Developing the Nigerian farming system would encourage mechanization. This could increase yield and the profitability of yam production. Assessing yam

based production enterprise in Nigeria will lead to the identification of appropriate yam production techniques for a more economically viable yam production. The trend in profitability analysis in Nigeria is usually to determine the economic viability of a particular crop or cropping system in a given region (for example, Asala and Ebukiba, 2016; Ibitoye and Onimisi, 2013). This study evaluated the major cropping systems for yam in Nigeria to identify the most profitable intercrop. It also compared the profitability of the main crops in yam production systems.

### Methodology

A multi-stage random sampling technique was used to elicit data from Nigerian yam farmers for yam production. Data were extracted from three hundred and sixty respondents by the use of a well-structured questionnaire and by direct observation. Three yam-producing agro-ecological zones were randomly selected. Three States producing a minimum of 1.2 million metric tonnes of yam per annum were randomly selected from the zones. The States were Benue, Enugu and Ondo, from different geographical zones. The next stage of sampling involved randomly selecting two major yam-producing Local Government Areas (LGAs) from each State. The LGAs selected were Buruku and Katsina-ala in Benue State, Nkanu-east and Uzo-Uwani in Enugu State, and Owo and Ose in Ondo State. Sixty respondents were randomly selected from each LGA, making a total of three hundred and sixty farmers. Data collected include input and output data for the farm activities. Data were also

collected on prices, and cropping systems. Descriptive statistics were used to describe the different yam production systems. Farm-level economic results were compared using Gross Margin (GM) analysis to determine the profitability of yam, and to evaluate the cropping systems for yam in Nigeria. This analysis used information obtained from the three sampled States to represent the entire country. From the sampling technique used for this project, aggregated data from the States is a good representative of the country. Each yam-producing State had equal chance of being selected. There were one hundred and twenty respondents from each State and three hundred and sixty for the country.

### Results and Discussion

#### Cropping systems for yam in Nigeria

Yam is mainly intercropped in Nigeria. There are numerous cropping systems for yam in Nigeria. Table 1 displays the number of intercrops for yam in Nigeria. It revealed that there were over 100 cropping systems identified for yam in the country. Ondo State had the highest number of yam intercrops and fewest in Benue State. Table 2 presents the percentage crop combinations for yam in Nigeria. It shows that there are mainly two to four crop combinations for yam in Nigeria. However, some yam farmers practice sole cropping. There are more farmers practicing monocropping in Benue than in other State. Most farmers in the State combine only two crops. The majority of farmers in Ondo had four crop combinations. Yam farmers in Enugu State mainly combine five crops.

**Table 1: Number of intercrops for yam in Nigeria**

Regions	Nigeria	Benue	Enugu	Ondo
Number of intercrops	108	25	50	57
Maximum number of combined crops	7	5	6	7

Source: Field survey, 2013

**Table 2: Percentage crop combination for yam in Nigeria**

Number of crops	Nigeria (%)	Benue (%)	Enugu (%)	Ondo (%)
1	17.8	35.6	10.8	7.8
2	21.7	39.4	11.7	14.4
3	18.8	17.4	15.8	22.4
4	21.7	5.3	27.5	31.2
5	17.3	2.3	31.7	19
6	2.5	0	2.5	4.5
7	0.2	0	0	0.7

Source: Field survey, 2013

Surprisingly, yam alone is the dominant cropping system for yam in Nigeria, especially in Benue State (Table 3). Although, we have earlier reported that yam is mostly intercropped in Nigeria. A further investigation of the various cropping systems indicates that yam alone is the predominant cropping system for yam in Nigeria.

This is due to the large number of crop combinations for yam in the country. Yam is primarily intercropped with cassava in Nigeria. Other major intercrops for yam in Nigeria include Yam/Maize, Cassava/ Yam/ Maize, Yam/Cassava/ Pepper and Yam /Maize/ Pepper (Table 3)

**Table 3: Major cropping systems for yam in Nigeria**

Cropping system	Nigeria (%)	Benue (%)	Enugu (%)	Ondo (%)
Yam only	17.8	35.6	10.8	7.7
Yam/Cassava	14.3	36.4	2.5	4.6
Yam/Cassava/Maize	5.4	1.5	7.5	7.2
Yam /Maize	2.5	0.8	4.2	2.6
Yam/Cassava/Okro	1.5	4.5	0	0
Yam/Cassava/Pepper	2.2	3	0	3.3
Yam/ Cassava/Okro/Melon	1	0	5.8	2.6
Yam/ Maize/ Melon/ Okro	1.9	0	5.8	0.7
Yam/Fluted pumpkin	1.5	0	5	0
Yam/Maize/Pepper	2.2	0	0	5.9
Yam/ Pepper	1.9	0.8	0	4
Yam/ Cassava/ Melon /Pepper	1.7	0	0	4.6
Yam/ Cassava/Melon/Maize/Pepper	2	0	0	5.2

**Source:** Field survey, 2013

#### **Profitability of selected root and tuber crops**

In this investigation, we assume that all commodities produced were sold. An economic evaluation of the major crops in yam production enterprise demonstrates that yam production is more profitable than other comparable crops. However, a large capital outlay is required (Table 4). It has a higher GM than other root and tuber crops. This indicates that it is more profitable than other root and tuber crops. Farmers generate

more income per hectare yam production than from other root and tuber crops. However, an economic analysis of the crops based on return per Naira shows that cassava is the most economically viable root and tuber crop. It had a return per Naira of 1.93. This implies that cassava is profitable by returning ₦1.93 for every ₦1 invested. Yam has a return per Naira of 1.82. This shows that it is profitable by returning ₦1.82 for every ₦1 invested.

**Table 4: Economic evaluation of selected root and tuber crops**

Items	Yam	Cassava	Sweet potato	Cocoyam
Revenue (₦/ha) (A)	901,399	375,296	319,567	314,465
Planting material for yam	72,631	25,715	15,267	58,806
Fertilizer for yam	16,779	10,921	14,379	7,813
Staking material ₦/ha	53,219	-	-	-
Organic manure for yam	17,423	2,587	1,988	23,203
Pesticide for yam	8,127	1,826	2,833	7,614
Herbicide for yam	9,377	1,562	5,636	8,280
Land preparation	69,717	61,618	61,632	62,958
Planting	16,352	10,258	7,165	10,795
Fertilizer application	3,848	4,505	4,330	5,654
Mulching	4,910	-	-	1,167
Staking	32,727	-	-	-
Application of pesticide and herbicide	7,464	4,443	998	3,915
Weeding	91,146	50,569	49,597	34,043
Harvesting	92,738	20,437	39,614	20,190
Variable cost (B)	496,458	194,442	203,439	244,439
GM=A-B	404,941	180,854	116,128	70,026
Return per Naira	1.82	1.93	1.57	1.29

Source: Field survey, 2013

Note: 1 USD = ₦160

#### Evaluation of the major crops in yam production system

Although yam production in Nigeria is more expensive than other crops, yam production is relatively profitable. An economic evaluation of the major crops in yam production enterprise demonstrates that has a higher GM than the other

crops (Table 5). Yam farmers generated more money relative to farm size. Comparing the enterprises on return per Naira indicates that pepper production is most profitable. It had a higher return per Naira (2.10). This signifies a return of ₦2.10 for every ₦1 invested in pepper production.

**Table 5: Gross margin of major crops in yam production enterprise**

Items	Yam (₦)	Cassava (₦)	Pepper (₦)	Maize (₦)	Okro (₦)	Melon (₦)
Revenue (₦/ha) (A)	901,399	375,296	350,116	295,516	196,280	236,638
Planting material for yam	72,631	25,715	8,752	8,987	7,777	9,557
Fertilizer for yam	16,779	10,921	10,128	10,995	14,192	7,342
Staking material ₦/ha	53,219	-	-	-	-	-
Organic manure for yam	17,423	2,587	9,245	8,313	8,436	5,648
Pesticide for yam	8,127	1,826	7,763	8,769	8,081	4,609
Herbicide for yam	9,377	1,562	7,155	6,029	7,353	5,020
Land preparation	69,717	61,618	64,778	61,732	63,367	59,573
Planting	16,352	10,258	8,341	9,366	8,575	10,403
Fertilizer application	3,848	4,505	7,070	8,681	6,521	6,540
Mulching	4,910	-	-	-	-	-
Staking	32,727	-	-	-	-	-
Chemical application	7,464	4,443	5,276	18,126	4,553	3,915
Weeding	91,146	50,569	26,025	32,828	29,391	28,099
Harvesting	92,738	20,437	11,808	20,273	12,069	21,037
Variable cost (B)	496,458	194,442	166,342	194,098	170,314	161,744
GM=A-B	404,941	180,854	183,774	101,419	25,966	74,895
Return per Naira	1.82	1.93	2.10	1.52	1.15	1.46

Source: Field survey, 2013

Note: 1 US \$ = ₦160

### Economic analysis of the major cropping systems for yam in Nigeria

The result of this investigation detects that all the dominant yam cropping systems are profitable (Table 6). Yam /Maize intercrop was the most profitable cropping system. It had the highest Net Return and Return per Naira (2.76). It returns ₦2.27 for every ₦1 invested. Yam/cassava /maize intercrop was the least profitable cropping

system. It had the lowest profit and return per Naira (1.75). This signifies a return of ₦1.75 for every ₦1 invested in Yam/Cassava /Maize intercrop. This research also reveals that sole yam is more profitable than Yam/Cassava intercrop. It had a Net Return of 2.65. This indicates that it is profitable by returning ₦2.65 to every ₦1 invested.

**Table 6: A comparative economic analysis of major yam cropping systems in Nigeria**

	Yam	Yam/Cassava	Yam/Maize	Yam /Cassava/Maize
Revenue Yam	1,225,576	841,534	1,170,267	886,871
Revenue from cassava	-	328,214	-	296,450
Revenue from maize	-	-	326,282	186,925
Total revenue (A)	1,225,576	1,169,749	1,496,549	1,370,246
rent	15,416	15,315	15,124	15,026
Depreciated cost of capital	1,484	4,770	3,554	7,226
Price of planting material stakes ₦/ha	60,625	84,065	83,663	100,282
Fertilizer	86,813	46,963	82,692	412,134
Organic manure	0	23,241	19,731	16,778
Herbicide	6,000	0	0	0
pesticide	12,000	1,980	1,846	5,580
Land preparation	0	1,563	0	157,985
Planting	62,794.79	91,542	69,717	99,684
weeding	15,953	28,700	20,471	39,065
Harvesting	101,462	133,492	126,300	155,691
TFC	99,875	126,917	118,154	146,651
TVC	16,900	20,085	18,678	22,252
TC (B)	445,523	538,464	522,575	762,930
profit (A-B)	462,423	558,549	541,254	785,182
Return per Naira	763,153	611,200	955,296	585,064
	2.65	2.09	2.76	1.75

Source: Field survey, 2013

Note: 1 US \$ = ₦160

### Conclusion

The study noted the numerous number of possible crop combinations for yam in Nigeria. Yam/Maize is the most profitable cropping system for yam in Nigeria. The research also shows that yam production is profitable but a large capital outlay is required. This shows that farmers will make more profit relative to farm size if they increased investment in yam production. Nigerian farmers have small farms, and so investing in yam production should enable them make more profit and escape poverty. Although cassava has a higher return per naira than yam, since an average Nigerian has small farm, it is advisable for the farmers to invest in yam production for more effective and profitable use of land. Embracing Yam/Maize intercrop and increased investment in yam production can

contribute to improving the poverty status in Nigeria. Reduction in the number of crop combinations for yam will contribute to improving the performance of yam farmers. Developing an alternative yam production method that will reduce the cost of yam will make its production more profitable.

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