

PROFITABILITY OF SWEET POTATO PRODUCTION AMONG FARMERS IN SHELLENG LOCAL GOVERNMENT AREA OF ADAMAWA STATE, NIGERIA.

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ABSTRACT

The study assessed the profitability of sweet Potato (*Ipomea batatas lam*) production in Shelleng Local Government Area of Adamawa State, Nigeria. Purposive and simple random sampling procedure were employed to select 65 sweet potato farmers. The results reveal that majority (77%) of the respondents were in their youthful age, capable of engaging in farming activities. Both males and females do cultivate sweet potato in the area. The results also showed 20%, 22%, 23% and 35% had tertiary, Qur'anic, primary and secondary education respectively. Eighty nine percent of the respondents have no contact with extension workers. The study reveals that 57 % of the of the respondents source of capital as personal savings. Relations, 38% and loans from Banks with 5%. Majority (56%) of the farmers started the enterprise with initial capital of less that ~~N~~45,000. The survey further reveals small farm holders (0.2 - 0.5 ha) cultivates more land (11.4 ha) than their large farm holders (1.1 and above ha) who cultivates only 4.8 hectares. But in terms of profitability large farm holders get more net profit of ~~N~~578, 447.00 compared to small holder's ~~N~~447, 539.00 per hectare. Poor storage facilities, problem of middle men

and high cost of labour were identified as the major constraints to productions as such government through their agencies concern to help the farmers in improving storage facilities, curtail the activities of middlemen in marketing their products.

Keywords: Profitability, Sweet potato, Cultivation, Farmers, Shelleng

INTRODUCTION

Sweet potato (*Ipomeabatatas lam*) originates from tropical Central America. Botanically, the underground part is classified as a storage root rather than a tuber. Sweet potato is cultivated as a perennial in tropical and sub-tropical low land agro ecologies, although it is well adopted to other zones and can grow over widely different environment [Department of Agriculture, Forestry and Fisheries (DAFF), 2011]. According to Food and Agriculture Organization FAOSTAT (2008), sweet potato is one of the most important food crops grown in more than one Hundred countries in the world. It is also one of the most widely grown root crop in sub-Saharan Africa, covering around 2.9 million tons in 2007. Ndolo *et al.*, (2001) stated that, sweet potato is regarded as a food security crop because of the low input requirement, ease of production and ability to produce under adverse weather and soil condition. It is predominantly grown in small plots by poor farmers; hence it is known as poor man's food (Woolfe, 1992). Bradbary and Holloway (1987) are of the opinion that its role in changing from a reliable low input, low output crop to an increasingly important market crop with a

short maturity period of 3 - 8 months after planting which makes growing two crops season in a year possible.

In another vein, DAFF (2011) categories sweet potato into three (3) different varieties; orange/copper skin with orange flesh e.g. Beauregard, Hernandez and Jewel; white/cream skin with white/cream flesh e.g. Hawaii, Kester land and black bok; and Red/purple skin with cream white flesh e.g. Northern star, Red Abundance and Rojo blanco. Das (1992) conducts a research on the profitability of potato cultivation, the study reveals that, the average yield was 4720 kg/ha and the average gross return amounted to TK 33040 ha. A research carried out by Akhteret, *al.*, (2011) in some selected areas of Bangladesh on potato production. The study reveals potato production is highly profitable and it could produce money to farmers. Bala (2007) conducted a study on the role of Kiri Dam in rural development revealed that potato is the major crop grown during dry season and it is highly profitable in the area.

Sweet potato cultivation came to existence in the area under study after the completion of the Kiri Dam in 1982. However, despite this long period of dry season potato cultivation, there is little or no effort been made to determine the profitability of the enterprise. Thus, the need for this study to descramble the socio-economic characteristic of the respondents. To assess the profitability and to examine the problems associated with sweet potato production in the study area. This effort will go a long way in encouraging farmers in the area to expand more on the enterprise.

METHODOLOGY

The study area is Shelleng Local Government Area of Adamawa State. The local government has a population of about 148, 410 people, it shares boundary with Gombi and Song Local Government Areas to the East, to the West with Guyuk Local Government Area, it also has a common border with Shani Local Government Area of Borno State to the North and to the South with Demsa and Numan Local Government Areas (Tukur and Barde, 2014). The area is lowland with elevation of 500 - 700meters above sea level. Flood plains and alluvial swamps are common features of the area, rainfall ranges from 510 - 1040 mm/annum. Rainy season commences from the month of May and ends in October, whereas dry season begins from November to the month of March. The area has a mean temperature of 34.58^oc and a relative humidity of 60 - 70% between May and October and 27 - 35% from November to April during the dry season (Zembaet *al.*, 2016).

Sampling Techniques

Purposive and simple random sampling was adopted to arrive at the target population. The study area comprises of five districts (Shelleng, Libbo, Kiri, Bodwai and Bakta). Three districts (Shelleng, Libboand Bodwa) were selected purposively in the 1ststage, because cultivation of sweet potato is being practice within the three (3) districts. In the second stage shelleng districts was purposively selected because of its domination of potato cultivation (90%). The estimated number of sweet potato farmers was around 325. 20% of the total number i.e. 65 farmers were randomly selected to serve as the sample

(Respondent) at the final stage.

Data Analysis

The analytical tools used to analyze the data collected during the survey include; descriptive statistics and net farm income. Descriptive statistics includes; mean, percentage and frequency count were used in analyzing the socio-economic and production characteristics of the respondents while net farm income was used to analyze the profitability of sweet potato cultivation.

Net farm income (NFI) can be determined by formula;

$$NFI=GM-TFC \dots\dots(1)$$

$$GM=GI-TVC\dots\dots(2)$$

Where, NFI = Net Farm Income

GM = Gross Margin

TFC = Total Fixed Cost

TVC = Total Variable Cost

RESULTS AND DISCUSSION

Socio-economic Characteristics the respondent's

Socio-economic characteristics of sweet potato farmers includes their age, marital status, educational status, type of seed/vine variety, source of information, contact with extension, source of capital and initial capital used.

Table 1; Distribution of Respondent According to their Age Group.

The analysis of the result reveals that 77% of sweet potato farmers were young, which fall between 16 - 45 years and 23% were above 45 years; this shows that potato cultivation were dominated by youth in the study area.

Table 1: Distribution of Respondent According to Age

Age group	Respondents	Percentage (%)
16 - 25	12	18
26 - 35	20	31
36 - 45	18	28
46 - 55	09	14
56 and above	06	09
Total	65	100

Source: Field Survey, 2017

Distribution of Respondents Based on Marital Status.

The distribution of respondents according to their marital status reveals that 44 farmers out of 65 were married, with 68% while 21 respondents were single with 32%. The analysis indicates that majority of the farmers were married. This will make them serious with job because of the family responsibilities'

Table 2: Distribution of respondents based on their marital status

Marital status	Respondents	Percentage (%)
Married	44	68
Single	21	32
Total	65	100

Source: Field Survey, 2017

Classification of Respondents According to the Use of Variety

Majority (74%) of the farmers cultivate Yardaba variety while 26% of them cultivate Abakalake variety. Both Yardaba and Abakalake varieties are local names given by the local farmers morphologically both of them were under the while/cream skin with white/cream flesh category of sweet potato according to Department of Agriculture, Forestry and Fishers (DAFF, 2011). But the major different between the two is in term of its size. Yardaba use to be bigger than Abakalake.

Table 3: Distribution of Respondents according to this use of variety

Variety	Respondents	Percentage (%)
Yardaba	48	74
Abakalake	17	26
Total	65	100

Source: Field Survey, 2017

Segregation of Respondents based on Educational Status

The results revealed that 20% of the respondents had A level certificates, 35% with secondary school certificate, 22% acquired Qur'anic education and 23% were primary School leavers. In terms of adoption of innovation in Agriculture, Education plays a vital role in creating awareness that leads to adoption and finally improvement in production (Adams, 1992).

Table 4: Distribution of Respondents According to Educational Status

Educational level	Respondents	Percentage (%)
Quranic	14	22
Primary	15	23
Secondary	23	35
Tertiary	13	20
Total	65	100

Source: Field Survey, 2017

Sources of Information of Respondents

Entries in Table 5 also showed various source of information of the respondents. The study indicated that 74% of the farmers got information on cultivation from their neighbors, while 15% states that extension workers are their source of information and the least with 11% depends on the mass media in search of information.

Table 5: Respondents Sources of Information

Source of Information	of Respondents	Percentage (%)
Extension Agent	10	15
Mass Media	07	11
Neighbour	48	74
Total	65	100

Source: Field Survey, 2017

Classification of Respondents based on Contact with extension workers

Majority of the respondents denies having contact with extension workers (89%) while very few of them accept contact with extension agents (11%). The results could also be un connected with the education level of the respondents and also the source of information in Agricultural innovation which reveals only 20% attended tertiary institution and most information from neighbors as indicated in table 4.

Table 6: Contact with Extraction Workers

Contact with Respondents	Percentage (%)
Contact	11
No contact	89
Total	100

Source: Field Survey, 2017

Classification of Respondents According to Their Source of Capital for Cultivation

The distribution of respondents according to their source of capital for the cultivation of sweet potato in table 7 reveals that majority (57%) of the respondents personally saved their capital, 38% got their capital from their relatives and the least 3% obtained it from Agricultural Banks in the farm of loan.

Table 7: Distribution of respondents Based on their Source of Capital

Source of Capital	Respondents	Percentage (%)
Savings	37	57
Relations	25	38
Agric Bank	03	05
Commercial Bank	00	00
Total	65	100

Source: Field Survey, 2017

Initial Stating Capital of the Respondents

The distribution of respondents according to the stating capital in sweet potato cultivation in the study area reveals that 39% starts with ~~N~~25 to ~~N~~34, 000, 26% start with more than fifty five thousand (~~N~~55,000), 18% start with ~~N~~45,000 - ~~N~~55,000, 9% start with ~~N~~35,000 - ~~N~~44,000 and 8% start with ~~N~~15,000 - ~~N~~24,000. The study shows that, sweet potato cultivation, does not require much money to start the enterprise.

Table 8: Distribution of Respondents According to the Initial

Capital in the Business

Initial capital (N)	Respondents	Percentage (%)
5,000 - 14,000	00	00
15,000 - 24,000	05	08
25,000 - 34,000	25	39
35,000 - 44,000	06	09
45,000 - 54,000	12	18

55,000 and above	17	26
Total	65	100

Source: Field Survey, 2017

Classification of Respondents According to Gender.

Out of 65 respondents 14% there were women and 86 were men. The results of the study shows that in the study area both males and females engage in sweet potato cultivation.

Table 9: Distribution based on sex of the respondents

Gender	Respondents	Percentage (%)
Male	56	86
Female	09	14
Total	65	100

Source: Field Survey, 2017

PRODUCTION CHARACTERISTICS OF THE RESPONDENTS

Size of Land Used

The distribution of respondents according to the size of their farmland reveals that 59% of the respondents cultivates between 0.2 - 0.4 ha, 29% cultivates between 0.5 - 0.7 ha, 6% cultivate between 0.8 - 1 ha and 6% also cultivate more than 1.1 ha, the result indicates that majority(59%) of farmers have smaller size of land for their cultivation.

Table 10: Distribution of Respondents according to Farm size

Farm size (ha)	Respondents	Percentage (%)
0.2-0.4	38	59
0.5-0.7	19	29
0.8-1.0	04	6
1.1 & above	04	6
Total	65	100

Source: Field Survey, 2017

Distribution of Respondent According to Land Ownership

Table 11 shows the distribution of respondent based on how they acquired their land. The study reveals that 45% of them got their land on hire basis, 34% inherit the land while the least with 21% respondents purchased their land.

Table 11: Distribution of Respondents Based on Land Acquisition

Land acquisition	Respondents	Percentage (%)
Hire	29	45
Inheritance	22	34
Purchase	14	21
Total	65	100

Source: Field Survey, 2017

Distribution of Respondent Based on Cropping System

On the basis of cropping system as shown in Table 12 the respondents were classified whether they practice sole cropping that is sweet potato alone or they mixed it with other crops. The results indicated that the higher

percentage of 65 do practice mixed cropping while 35% adopt sole cropping.

Table 12: Distribution Respondents According to the Cropping System Practice

Cropping system	Respondents	Percentage (%)
Sole cropping	23	35
Mixed cropping	42	65
Total	65	100

Source: Field Survey, 2017

Distribution of Respondents According to labor Used

The results indicated that 31% of the respondents used family labour, 18% used Hire labour and 51% used both family and hire labour. The finding is in line with Olumide and Lawal (2010), family labour is the most predominant in Nigeria and most part of Africa.

Table 13: Labour Use by the Respondents

Type of labour	Respondents	Percentage (%)
Family	20	31
Hired	12	18
Both	33	51
Total	65	100

Source: Field Survey, 2017

Distribution of Respondents Based on Method of Land Preparation

Table 14 reveals the distribution of respondents according to method of land preparation. Majority of the respondents engage in manual land preparation using hoe, cutlass, rake, axe etc., and they account for 82%, 12% uses the mechanical method of land preparation i.e. using machine such as tractor. The reason for the higher percentage engaging in manual land preparation, may not be unconnected with the size of their farms, because most farms are smaller, they can easily prepare their land manually. The hoe is still the most common implement among small scale farmers (Rowland, 1993).

Table 14: Method of Land Preparation

Land preparation	Respondents	Percentage (%)
Manual	53	82
Mechanical	12	18
Total	65	100

Source: Field Survey, 2017

Sources of Nutrient Used by Respondents

Majority of the respondents' decline use of any nutrients (54%), those that applied chemical fertilizer and organic manure were 18% each. Because of the fertility of the area; the area where these farmers cultivate is a around the bank of the river, during the rainy season the dammed river (River Gongola) flooded the area brings a lot of silt, deposits around, and when it flows back during dry season,

place is already fertile, only few apply either chemical or manure to boost their production.

Table 15: Distribution of Respondent Based on Nutrient Applied

Source of Nutrient	Respondents	Percentage (%)
Chemical fertilizer	15	23
Manure	15	23
None	35	54
Total	65	100

Source: Field Survey, 2017

Type of Propagation

The study reveals that 95% uses vegetative propagation (vine cuttings) and 5% propagated by seeds (Table 16).

Table 16: Distribution of respondent according to the type propagation

Propagation	Respondents	Percentage (%)
Vegetative	62	95
Seed	03	05
Total	65	100

Source: Field Survey, 2017

Distribution of Respondents on the Basis of Weed Control Table 17 shows the distribution of respondents on the basis of weed control, 23% uses Herbicide, 25% uses manual (Hoe) and 52% used both manual and herbicides.

Table 17: Distribution of Respondents Based on Weed Control

Methodology used control	Respondents	Percentage (%)
Herbicides	15	23
Manuel (Hoe)	16	25
Both	34	52
Total	65	100

Source: Field Survey, 2017

Per hectare Cost of Sweet Potato in the Study Area In the Table 18, per hectare cost of sweet potato cultivation in the study area for ranges of 0.2 - 0.4, 0.5 - 0.7, 0.8 - 1.0, and above 1.1 are shown in table 18. The total variable cost includes: Land cleaning, holes, seed/virus, planting, weeding, herbicides, fertilizer, pesticides, harvesting and transport. Fixed cost are land hiring, and others. Total Cost is the sum of all the variable cost and the fixed cost. The results showed that the total cost of 0.2 - 0.4 ha(11.4ha) was the highest (~~N~~220, 461.00) followed by 0.5 - 0.7(7.2ha) (~~N~~193, 600.00), then 1.1 ha(4.8ha) and above (~~N~~109,553.00) are the least is 0.8 - 1.0ha(3.6ha) with ~~N~~87,662.00

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Table 18: Per hectare Cost of Sweet Potato Cultivation in the Study Area (₦)

Cost Head	0.2 – 0.4(ha)	0.5 – 0.8	– 1.1	and Total 0.7(ha)	1.0(ha)	above	
Land clearing			23,947	19,722	15,667	16,136	75,472
Holes 33,684				55,000	20,222	21,250	130,156
Seed/Vines 10,526				17,500	4,778	5,000	37,804
Planting			17,368	16,667	10,778	11,458	56,271
Weeding			17,105	22,917	10,772	12,083	62,877
Herbicide			13,305	14,833	6,778	7,865	42,781
Fertilizer			12,368	0.00	1,667	2,438	16,473
Pesticide			6,210	11,083	3,056	3,323	23,672
Harvesting			30,263	18,750	8,444	10,000	67,457
Transport			33,421	9,211	0.00	0.00	42,632
Total Variable Cost (TVC) 198,197				185,683	71,384	89,553	555,582
Land hiring 9,211				7,971	10,000	12,500	39,628
Others 12,763				0.00	6,278	7,500	26,541
Total Fixed Cost (TFC)			21,974	7,917	16,278	20,000	66,169
Total Cost (TVC + TFC)			220,461	193,600	87,662	109,553	621,751

Profitability of Sweet Potato Cultivation

Table 19 reveals the profitability of sweet potato cultivation in the study area. The results indicated that production is higher with farmers cultivating between 0.5 - 0.7 hectare with 186 bags/ha and the least were farmers that cultivate from 0.8 - 1.0 hectares with 118 bags per hectare. The results also showed a net profit of ~~N~~447, 539/ha for farmers cultivating 0.2 - 0.4 ha, ~~N~~550, 400/ha for 0.5 - 0.7 ha, ~~N~~384, 330/ha for 0.8 - 1.0 ha and ~~N~~578,447/ha for farmers cultivating more than 1.1 ha. Considering the total land cultivates, profitability is higher for those cultivating more than 1.1 ha. As similar studies conducted by Abu Zafar *et al.*, (2013) shows large farmers earn higher when compared with their counterparts with small farms in Rangpur district in Bangladesh. Similarly a research conducted by Akhter *et al.*, (2001) in some selected area of Bangladesh on profitability also revealed higher profitability which provide money to the farmers.

Table 19: Per Hectare Profitability of Sweet Potato in the Area under Study

Items	0.2 0.4	-0.5 0.7	-0.8 1.0	-1.1 above	and Total
Total land used	11.4	7.2	3.6	4.8	27
Potato output (75kg bag)	167	186	118	172	643
Cost/Bag (₦)	4,000	4,000	4,000	4,000	4,000
Total Revenue	668,000	744,000	472,000	688,000	2,572,000
Total Cost	220,461	193,600	87,662	109,553	611,276
Net profit	447,539	550,400	384,338	578,447	1,960,724

Field Survey, 2017

Constraints to Sweet Potato Production

Table 20 reveals the problems associated with cultivation of sweet potato in the area under study. These problems were ranked as Poor storage facilities, problems of middlemen, high cost of labour and in- adequate seeds. Others are poor marketing, high cost of transport, inadequate seeds, poor marketing, high cost of transport, inadequate capital, inadequate extension works, high cost of fertilizer and problem of pest and diseases.

**Table 20: Distribution of Respondents According to
 Constraints Associated with Cultivation of Sweet Potato**

Constraints	Respondents	Rank
In adequate capital	19	7 th
In adequate seed/vines	25	4 th
High cost of fertilizer	15	9 th
In adequate extension workers	18	8 th
High cost of labour	30	3 rd
Problem of millennium	31	2 nd
Pest and Diseases	14	10 th
Poor storage	34	1 st
High cost of transport	20	6 th
Poor marketing	21	5 th
Total	227*	

Field Survey, 2017

CONCLUSION AND RECOMMENDATION

Based on the findings of this research, it can be seen that sweet potato cultivates in Shelleng District of Shelleng Local Government Area of Adamawa State, Nigeria is profitable; despite some constraints such as poor storage facilities, middle men encroachment, high cost of labour etc. It is recommended that Government should come to the aid of the farmers through their agencies (Agricultural Development programme) to improve on the method of storage and establishment of cottage industry

that will process the produce so that the farmer's income from sweet potato can improve. Involvement of middle in the marketing of products should also be checked.

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