

## GROSS MARGIN ANALYSIS OF PLANTAIN/BANANA (*Musa* spp) PRODUCTION IN ABIA STATE, SOUTHEAST NIGERIA

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### Abstract

This study was carried out in Abia State Southeast Nigeria to unstitch the uncertainty surrounding the profitability or otherwise of plantain and banana production. Multi-stage random sampling technique was used to select a sample of 100 plantain/ banana producers from a pre-survey sampling frame of 345 farmers. Data were collected using cost-route approach with the aid of well structured questionnaire administered by the researcher and trained enumerators. The relevant analyses were done using descriptive statistics and cost-return approach (gross margin analysis). The results revealed that farmers in the study area have mean age of 46 years, 7 years level of education and farm land averaging 1.42 hectares. It also showed a total output of 2,674.54kg/ha, unit price of ₦104.94/kg, total revenue of ₦280, 666.23/ha, and a total variable cost of ₦122, 542.59/ha which gave rise to a gross margin of ₦158, 123.64/ha from the business of plantain/ banana production. It was therefore concluded that plantain/ banana production is a viable farm business enterprise and recommended that extension education should be geared towards improvement in sucker multiplication programmes to ensure that planting materials are made available to the farmers at reduced cost.

*Key words:* Plantain /banana, Gross margin, sucker, Multi-stage, Cost-route,

### Introduction

Plantain and banana belong to the family *Musaceae*. Plantain is generally taller and bears fewer, larger and looser fruits than banana. There are several varieties of plantain/banana varying in size, shape, and number of fruits to a bunch (Irvine 1969). Plantain is a large herb with pseudo - stems built up from the sheath and it originated from Asia. It is grown both in the tropics and sub tropics with Central America and West Indies producing most of the crop (Yayock et al 1988). *Musa* spp, a plant genus of extraordinary significance to human societies; produces the fourth most important food in the world today (after rice, wheat and maize) (Abbott, 1992). The following varieties of plantain and banana are available in Nigeria: Plantain;(Local) Obino 1 'Ewai, Orishele, Isiokpo, Agbagba, Hybrids Cardaba,

Bluggie. Banana: (Local) Paranta, Omini (Exotic): Dwarf Cavendish Caros Michel (Adelaja and Olaniyan, 2000).

*Musa* spp grow in a wide range of environment and have varied human uses, ranging from the edible banana and plantains of the tropics to cold herby fibre and ornamental plants (Abbott, 1992). In Ghana it is produced in the forest regions and transported to urban centres such as Accra on the coast. Although South East Asia is considered to be the centre of origin of *Musa* species, a remarkable diversity of plantain exist in sub-Saharan Africa, each of these types is grown in a distinct sub region (Ortiz et al., 1996). In Nigeria today, the commercially important plantain varieties include the French and horn types. In general the choice of varieties to grow depends on the availability of planting materials, market preference and ecological factors (Yayock et al., 1998). In Abia State, climatic and soil conditions are quite conducive for good growth and development of all known tropical crops. Annual production of plantain and banana are about 20,000 metric tones with an average of 14 to 15 tones per hectare in the state, (IITA, 1996). Plantain best thrive in Umuahia, Aba, and Ohafia Local Government areas of the state where farm land are left to fallow for over 3years (IITA, 1996). Plantain thrives in a well-drained, fertile, sandy-loam soil of up to pH 4.5 and annual rainfall of at least 1200mm distributed over at least six months (Adelaja and Olaniyan, 2000). Spacing in plantain/banana production greatly affects the cropping cycle and the potential bunch weights. The recommended plant spacing is 2m within rows and 3m between rows giving a plant population of approximately 1667 stands per hectare. Plantain/ bananas are better planted in dug holes of 30cm X 30cm X 30cm with sword suckers, maiden suckers or plantlets as planting materials (Faturoti et al., 2005). The most devastating disease of plantain in Nigeria is the disease caused by *Mycosphaerella fijiensis*. Plantain weevil, *Cosmopolites sordidus* and nematodes (*Radopholus similis*, *Heterodera* sp and *Pratylenchus musicola*) are important pests that may give farmers some concern (Adelaja and Olaniyan, 2000).

Plantain and banana are very important food crops in the humid forest and mid-latitude zone of Sub-Saharan Africa providing more than 25% (percent) of the carbohydrate and 10% (percent) of the calorie intake for approximately 70 million people in the region (Irvine,1969). In addition to being a staple food for rural and urban dwellers, it is a source of income particularly for smallholder farmers who produce them in compounds or home gardens. Plantains are relatively high value products, in common with most other horticultural crops. The gross value of their annual production in Sub-Saharan Africa exceed that of several other food crops such as maze, rice, cassava, and sweet potatoes (11TA, 1996). Plantain and banana based foods contain most of the micronutrients required by both children and adult for optimum growth and development of the body. The daily dietary allocations recommended by FAO for children under five years are 14mg of Iron, 10mg of Zinc, and 400µg of vitamin A (Latham, 2001). According to Honfo, et al.,(2007), the daily consumption of plantain foods by children provided approximately 0.88mg of iron, 0.26mg of zinc, and 24.55 µg Retinol Activity Equivalent (RAE). Besides, for non-pregnant and non-lactating women, FAO recommends a daily intake of 48mg of iron, 12mg of zinc and 800 µg RAE of vitamin A (Latham, 2001). Following these also, Honfo et al (2007) found that the daily consumption of plantain derived foods for mothers provided approximately 1.80mg of iron, 0.6mg of zinc and 43.35 µg RAE of vitamin A. These figures confirm that plantain and banana can make a substantial contribution to meeting micronutrient requirements of children and mothers if eaten in sufficient quantities. The production vis-a-vis supply of plantain/ banana despite the myriads of economic and nutritional importance has not met the demand thereby making the price of this commodity too high and unaffordable to an average Nigerian. Moreover there is little or no research on the profitability of plantain /banana production in Abia state which necessitated this study as an approach to encouraging farmers on need to increase production of the crops.

**Materials and Methods**

The study was conducted in Abia State, Southeast Nigeria. The name Abia is an acronym derived from the four ancient towns of the state namely Aba, Bende, Isiukwuato, and Afikpo. Geographically, Abia State lies within approximately latitudes 40<sup>0</sup> 50<sup>1</sup> and 60<sup>0</sup> North and longitude 70<sup>0</sup> 10<sup>1</sup> and 80<sup>0</sup> East (ACCIMA, 1998). Abia State has a population of 2,833,999 people and a total area of 6320km<sup>2</sup> (NPC, 2006). Agriculture which is the major occupation of the people employs about 70% (percent) of the work force (World Bank report, 1998). The location of Abia State in the tropical

rainforest zone of the country put her at the advantage of adequate seasonal rainfall which encourages the production of food crops such as cassava, yam, rice, maize, cocoyam and plantain / banana.

To ensure that all the communities and major plantain/ banana producers in the State were evenly represented, multi-stage sampling technique was adopted to select a sample of 100 smallholder plantain banana producers from a frame of 345 farmers as compiled with the help of the extension department of Abia State Agricultural Development Programme (ADP). Data were collected using structured questionnaire with the aid of trained enumerators and village extension agents. Cost route approach were used to administer these questionnaire and information on the farmers' socio-economic characteristics, quantities of inputs used and outputs produced, prices and costs associated with these items etc were collected.

Data were analysed using descriptive statistics such as (mean, frequency distribution, and percentages) and Gross margin analysis(GM)

Where GM = Total Revenue less Total variable cost  
 = TR - TVC .....1a

or Total value product less total variable cost  
 = TVP – TVC.....1b

and  
 TVP =P<sub>1</sub> Q<sub>1</sub> +P<sub>2</sub> Q<sub>2</sub> +... P<sub>m</sub> Q<sub>m</sub>.....2

Q<sub>j</sub> = f(X<sub>1</sub> X<sub>2</sub>... X<sub>n</sub>) .....3

TVC = P<sub>1</sub> X<sub>1</sub> + P<sub>2</sub> X<sub>2</sub> +... P<sub>n</sub> X<sub>n</sub>.....4

$$TVC = \sum_{i=1}^n P_i X_i \dots\dots\dots 5$$

$$TVP = \sum_{j=1}^m P_j Q_j \dots\dots\dots 6$$

$$GM = P_j f(X_i, X_2, \dots X_n) - \sum_{i=1}^n P_i X_i \dots\dots\dots 7$$

or

$$GM = \sum_{j=1}^m P_j Q_j - \sum_{i=1}^n P_i X_i \dots\dots\dots 8$$

Where

- TVP = Total value product = Total revenue
- TVC = Total variable cost
- GM = Gross margin

- P<sub>i</sub> = Price of input i ; as i goes from 1, 2, 3, .....n
- P<sub>j</sub> = Price of output j; as j goes from 1, 2, 3, .....m
- X<sub>i</sub> = Input X
- Q<sub>j</sub> = Output Q

**Results and Discussion**

Table 1 shows the socio-economic characteristics of Plantain and banana farmers in the study area

**Table 1: Socio-economic characteristics of Plantain and banana producers in Abia State**

Characteristics	Frequency	Percentage
<b>Age range (mean = 46years)</b>		
21-30	5	5
31-40	10	10
41-50	60	60
51-60	25	25
<b>Educational Level –Years (Mean= 7)</b>		
No formal education 0	34	34
Primary education 1-6	22	22
Secondary education 7-12	9	9
Tertiary education 12- 17	35	35
<b>Farm Size -Hectare (Mean =1.42)</b>		
0.001-0.99	29	29
1.00- 1.99	55	55
2.00- 2.99	11	11
3.00- 3.99	5	5
<b>Household Size -Number of persons (Mean= 6)</b>		
1-5	54	54
6-10	32	32
11-15	14	14
<b>Farming experience –Years (Mean= 7)</b>		
1-5	35	35
6-10	48	48
11-15	17	17
<b>Marital Status</b>		
Married	69	69
Single	31	31
<b>Extension Services</b>		
Access	53	53
No access	47	47

Source: Field survey Data, 2011

Table 1 shows that the mean age, level of education, farm size, household size and farming experience are 46 years, 7 years, 1.42 hectares, 6 and 7 years respectively. These imply that most farmers who are involved in plantain/ banana production are youthful and energetic and therefore capable of effectively and efficiently utilizing the available resources towards production of plantain banana and also put in to practice improved techniques of production. The mean level of education entails that the farmers in the study area have not acquired adequate formal education which may have affected their level of knowledge and adoption of improved technology and hence the level of plantain /banana production in the area. The mean farm size of 1.42 hectares shows that the farmers in the study area are predominantly smallholder farmers who farm with rudimentary capital and therefore limited in scope of operation and production. The household size implies that the farmers are conscious of birth control measures and the likely pros and cons of large family

sizes. Plantain/ banana farmers in the study area have acquired enough experience on the farm as to how best to improve on the plantain/ banana enterprise. Furthermore, the table showed that 69 and 53 percent of the farmers are married and have had contact with extension agents respectively. These showed that most of the farmers are have family responsibilities and committed to the business of plantain and banana production. Besides, they have had reasonable contacts with extension agents who would have impacted on them the available innovations of plantain and banana production. This is expected to have a positive effect on plantain / banana production. However, their level of education seems to be the hindrance to adoption of such innovations.

Table 2 shows the Cost – Return Statement of Plantain/ banana Producers in Abia State.

**Table 2: Average Annual Cost>Returns of Plantain /banana farmers in Abia State.**

Item	Value ₦/ha/annum	Percentage
<b>Returns</b>		
Quantity produced (kg/ha)	2,674.54	-
Price ₦/kg	104.94	-
<b>Total Revenue (TR)</b>	<b>280,666.23</b>	-
<b>Variable Cost</b>		
Transport cost	1,648.24	1.35
Fertilizer cost	10,387.31	8.48
Cost of planting materials	96,197.18	78.50
Labour cost	14,309.86	11.68
<b>Total Variable Cost (TVC)</b>	<b>122,542.59</b>	<b>100</b>
<b>Gross Margin (TR-TVC)</b>	<b>158,123.64</b>	

Source: Field Survey Data, 2011

According to Table 2, the total annual revenue from plantain/ banana production per hectare was two hundred and eighty thousand, six hundred and sixty-six naira twenty-three kobo (₦280,666.23), while the total variable cost was one hundred and twenty-two thousand, five hundred and forty-two naira fifty-nine kobo (₦122,542.59) given rise to a gross margin of one hundred and fifty-eighty thousand, one hundred and twenty-three naira, sixty-four kobo (₦158,123.64/ha). This result implies that plantain/banana producers in the study area were doing well and this should encourage more entrants into the business of plantain/banana production leading to increases in plantain/banana production. The table also showed that planting materials (plantain/banana suckers) constituted 78% of the total variable cost of production. This implies that planting materials were one of the greatest constraints to plantain/banana production followed by labour cost.

### Conclusion

It was concluded that plantain/banana production is a viable farm business enterprise given that a gross margin of ₦ 158,123.64/ha/annum was obtainable from the business which indicates a potential high profit if the fixed cost component is properly managed. It was therefore recommended that extension efforts should be geared towards rapid multiplication of plantain/banana suckers to make the planting materials available and affordable to the farmers thereby reducing the observed high expenses on planting materials.

### References

Abia State Chamber of Commerce Industry Mines and Agriculture (ACCIMA) (1998)  
 Abbot J.C. (1992), Agricultural Economics and Marketing in the tropics. Longman Nigeria  
 Adelaja B.A. and Olaniyan A.A (2000) Production of the Ten Most Important Fruit Trees in Nigeria. In Agronomy in Nigeria- A Book on the Theory and

Practice of Agronomy, Agronomy Re-Union Day M.O.Akoroda (eds) University of Ibadan, Ibadan Nigeria

Faturoti B.; Tenkouano A.; Lemchi J.; and Nnaji, N (2004). Plantain and Banana Production. A *Manual on Field Establishment and Maintenance*, IITA, 2004.

Honfo F.; Hell, K.; Coulibaly, O.; and Tenkouano A, (2007) Micronutrient Value and Contribution of Plantain- derived foods to daily intakes of Iron, Zinc, and  $\beta$ -Carotene in Southern Nigeria. In Info Musa *The international Journal on Bananas and Plantain* Vol. 16 No 1 and 2 June & December, 2007.

International Institute for Tropical Agriculture (IITA) (1996). *Musa Africa*: Abstract from the International Conference on plantain and banana for Africa

Irvine F.R. (1969). *West African Crops* Britain, Oxford University Press.

Latham, M.C (2001) La nutrition dans les pays en development, FAO Rome. In Info Musa *The International Journal on Bananas and Plantain* Vol. 16 No 1 and 2 June & December, 2007.

National Population Commission (NPC) (2006) *Nigerian Agricultural Magazine* Vol.4 No.3 Pp. 22 August/September, 2000.

Ortiz R. J.H. Crouch; D.Vuylstek (1996) Perspectives on the application of biotechnology to assist the genetic enhancement of plantain and banana (*Musa* spp.) Internet paper accessed 23/12/2011 <http://www.ejbiotechnology.info/content/vol1/issue1/full/2/index.html>

World Bank Report (1998) United States Department of Agriculture (1998) *Agricultural Fact Book*, 1997. USDA/Office of Communication, Washington, D.C.

Yayock Y., G. Lombin and J.J. Owonubi, (1988) Response of Plant and Ratoon Plantain Crops to KO Fertilization. Internet paper accessed 24/12/2011 <http://kari.academia.edu/johnshiyam/Paper>