

DETERMINANTS OF FLUTTED PUMPKIN (*Telferia occidentalis*) PRODUCTION AND PROFITABILITY IN THREE AGRICUTURAL ZONES OF AKWA IBOM STATE, NIGERIA.

Original Research Article

ABSTRACT

The study examined the determinants of fluted pumpkin production and profitability in Akwa Ibom State, Nigeria. Data collected through a multi-stage sampling technique from a sample of 60 respondents in the 2013 planting season were analyzed using the profit function, gross margin analysis as well as Ordinary Least Square (OLS) regression technique. Results of the descriptive statistics revealed aged farmers with average of five years experience with high literacy level (83.3%) dominated the study area. Majority were women (61.7%) whose sources of finance were personal savings. Pumpkin farmers had a Gross Margin and Net Income of N181, 953 and N158, 413. The price parameter for labor, land value, pesticide and output price impacted significantly on the profitability of farmers. Result further revealed that farming experience; household size, age of farmers, land size, capital and organic manure were the major determinants of pumpkin output in the study area. Hence, effort should be directed towards encouraging people to venture into pumpkin production, ensuring credit availability through the provision of soft, interest free loans as well as intensifying campaign on organic agriculture as a way out.

Key words: Fluted Pumpkin; profitability, production, Determinants.

1.0 INTRODUCTION

Approximately 925 million people in the world were estimated to be hungry in 2010. Of this, about 239 million (30%) were in Sub-Saharan Africa (FAO, 2010). In 2008, 47 percent of population of Sub-Saharan Africa lived on \$1.25 a day or less (United Nation, 2012). This development calls for the evolution of a more proactive and pragmatic strategy towards enhancing agricultural output in the region. However, the potential of vegetable crops in meeting the dietary requirement and enhancing the economic status of people have been highlighted by several authors (Okon et. al 2012; Owombo,2010; Taiga et. al 2008; Nwosu et.al 2012; Dam,2012; Mlozi,2013; Ibekwe and Adesope,2011), especially in Sub-Saharan Africa where the attainment of food security is intrinsically linked with reversing agricultural stagnation and safeguarding the natural resource base (Cleaver and Scriber, 1994). Vegetable cultivation and marketing provides job, support agribusiness industry and diversified income (Dela Cruz,2006). It enhances household economic security and investment of farmers and retailers involved in its production (Yahaya, 2002). Vegetable is an integral component of our daily food. It forms important condiment in the national

diet (Ibekwe and Adesope,2010). Nutritionally, vegetable contains the essential nutrients needed for proper body development. For instance, it is a source of both micro and macro nutrients (Schipper, 2000; Bakhru, 2003; Kocher, 1986), providing between 20 and 50 percent of iron vitamin in resource poor diets (Sabo and Dia, 2009). According to Aliyu (2006), vegetable supplies part of protein, vitamin and minerals needed in diets as well as roughage which promote digestion and prevent constipation. Medicinally, diets rich in fibres from vegetable are sources of omega 3 fatty acids which help in the prevention of heart related diseases (Oguntola, 2006). The macro nutrients in vegetable also contribute to reducing incidence of colon and stomach cancer (Grubben and Denton,2004).Vegetables are succulent crops consisting of more than 90% water (AVRDC,1990),hence, its yield and quality are water dependent. It belongs to the family cucurbitacea and is said to have originated from West Africa.

Fluted pumpkin (*Telferia occidentalis*) is one of the most important vegetable crop grown extensively in almost every State but mostly in the Southern part of the country by every household and consumed by majority of Nigerians because of its dietary importance. It is one of the major income generating crops in many parts of Africa Adebisi-Adelani *et.al*, 2011). The crop is often planted in flat land or in mounds. Planting the crop in raised beds has been documented to reduce the effect of flooding during raining seasons (AVRDC, 1981). Its yield is believed to be 300% higher in dry than wet season (Aladetoyinbo, 2005). Harvested pumpkin can be eaten raw or processed by variety of methods and use in diverse ways depending on culture.

Several studies have been done on fluted pumpkin production and profitability in Nigeria. Dam,(2012) assessed dry season vegetable farming system in the flood plain river of Katsina- Ala in Benue State. The study revealed that the major vegetable crops grown were spinach, tomatoes and okro. Lack of capital, farm inputs, storage facilities and attack by pests and diseases were identified as major constraints affecting pumpkin production in the study area. Nwosu *et.al* analyzed the socioeconomic determinants of fluted pumpkin leaf production in Ezinihitte Mbaise Local Government Area of Imo State. From his findings, production status, source of land, labour source, household size, educational level, farming experience, farm size and production objective were the major determinants of output. Among the constraints to vegetable production were lacks of credit facilities, unavailability of inputs, pest and diseases infestation, inadequate information about inputs and output prices as well as poor road network. Nwachukwu and Onyenweakwu(2007) estimated the allocative efficiency among FADAMA fluted pumpkin farmers in Imo State, Nigeria using the maximum likelihood estimation of the translog model. Emeyonu *et.al* (2010) focused on the effect of waste water use on fluted pumpkin crop production in Imo State, Nigeria using the ordinary least square regression technique. Studies such as Enete and Okon, (2010), Udoh and Sunday (2007) documented significant influence of labour, capital, land size, planting material, fertilizer and manure on vegetable cultivation. Also, other studies such as Edet and Etim (2010) and Udoh (2005) have documented the importance of manure on vegetable production in Nigeria.

The demand for fluted pumpkin in the study area has increased tremendously due to the diverse ways in which the crop is put to use. Udoh and Akpan (2007) linked its popularity to the low cost per unit of resource use in the production, short gestation period and quick returns on invested capital compared to other crop enterprises. The introduction of the FADAMA farming system in the State was aimed at ensuring the availability of vegetables during the dry season. In spite of the aforementioned effort and the potential of fluted pumpkin, production of the crop is still carried out in small scale. The bulk of pumpkin produced cannot meet the need of Akwa Ibomites, incidence of post harvest losses continue to characterized the pumpkin subsector. There is need to examine those factors that determine fluted pumpkin production and profitability in the study area with view to improving upon its supply and profitability. This therefore forms the basis for the study.

2.0 Study area: The study was carried out in Akwa Ibom State, Nigeria. The State is located between Latitude 4 0 321 and 50 331 North and Longitude 70 251 and 80 251 East. It has a total population of 3,920,208 people out of which 2,044,510 are male and 1,875,698 female (NPC, 2006). It occupies a total land area of approximately 7,246 square kilometers. The state is an agrarian with six agricultural zones viz: Abak, Oron, Ikot Ekpene, Etinan, Uyo and Eket. Her favorable climate favors the production of both permanent and arable crops.

2.1 Sampling procedure and data collection method

Data used for the study were primary data collected through a multi- stage sampling in the 2013 planting season. The first stage involved the selection of three agricultural zones from the existing six. These were Oron, Uyo and Eket. The second stage involved the selection of one Local Governt Area from each of agricultural zones. The selected Local Government Areas were Eket, Uyo and Oron respectively. Three villages where pumpkin is grown extensively were randomly selected from the three selected Local Government Areas in the ratio of one per Local Government Area (1:1). Uya Oro village was chosen from Oron, Mbiabong Etoi from Uyo, Esit Urua in Eket . Next, 20 pumpkin farmers were selected in each of the villages with the help of key informants from a compiled list of pumpkin growers in the area, making a total of 60 respondents through which structured questionnaire were administered

2.2 Method of data analysis

The data collected were analyzed using both descriptive and inferential statistics. Apart from mean and simple percentages, other analytical techniques used were;

2.2.1 Gross Margin analysis

This was used to examine the returns on fluted pumpkin production in the study area. The formula for computing the gross margin was given as:

$$GM = TR - TVC \quad (1)$$

Where: GM = Gross margin per hectare (₦)

TVC = Total Variable Cost per hectare (₦)

TR = Total Revenue per hectare (₦)

2.2.2 Profit function Analysis

To estimate the profitability level of individual resource input used in pumpkin production, the profit function analysis was carried out. The profit function model is specified as :

$$\Pi^* = \pi^*(P_y, P_a, P_b, P_c, P_d, P_e, P_f, \dots, Z_a, Z_b), \quad (2)$$

Where,

Π^* = Amount of variable profit per hectare (₦),

P_y = price of output per hectare (₦),

P_a = Price per unit of labor (₦),

P_b = Price per unit of manure (₦)

119 P_c = Price per unit of pesticide (₦)

120 P_d = Price per unit of planting material

121 Z_a = Capital (measured as depreciated value of fixed assets used in pumpkin production) and

122 Z_b = land value (₦), (whether purchased, inherited or rented).

123

124 2.2.3 Production function analysis

125 The implicit form of the production function analysis for pumpkin production in the study area is implicitly
126 stated as follows:

$$127 \quad Y = (X_1, X_2, X_3, X_4, \dots, X_{11}, + U) \quad (3)$$

128 Where Y = output of vegetable (₦),

129 X_1 = Educational level of farmers (years)

130 X_2 = Farming experience (years)

131 X_3 = Household size (number),

132 X_4 = Age of farmers (in years),

133 X_5 = land size (hectares)

134 X_6 = labour (mandays)

135 X_7 = Capital (value of depreciated farm tools)

136 X_8 = Organic manure (in kilogramme)

137 X_9 = Quantity of planting material (in kilogramme)

138 X_{10} = harvesting frequency (number of times)

139 U = error term

140 The model can be stated explicitly as:

$$141 \quad Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 \dots b_{10}X_{10} + U \dots \quad (5)$$

142 Where $b_1 \dots b_{10}$ are coefficients to be examined and

143 $X_1 \dots X_{11}$ are the explanatory variables defined in equation (1) above.

144 3.0 RESULT AND DISCUSSION

145 3.1 Socioeconomic characteristics of respondents

146 Table 1 presents the socioeconomic characteristics of pumpkin farmers in the study area. Results
147 revealed that female farmers (61.7%) dominated the study area. The dominance of female farmers is

because pumpkin production is not that tedious and can be undertaken by women. Majority (66.7%) were married, 20% single while 11.3% were divorcees. Experience wise, farmers were quite experience with an average experience with an average experience of 12 years. 25 percent had less than 5 years experience, 50 percent had between 6-10 years, 16.7 percent had 17-21 years while 8.3 percent had more than 21 years of experience. This is capable of impacting positively on pumpkin production in the study area. With regards to household size, 33.3 percent had a household size of less than 5 people, 58.3 percent had between 5 and 10 while 8.3 percent had a household size greater than 10. The implication of this large household size showed available labor for pumpkin production in the study area. Enete and Okon,(2010) reported a large household size in the study area. In terms of source of financing pumpkin production, 50 percent financed their farming operations through personal savings, 38.3 percent borrowed from friends and relatives while 11.7 percent financed theirs through other sources. None of the farmers were able to access finance from formal sources. The age range of farmers in the study area was from 19 to 63 years with majority being within the age bracket of 41-50 years (43.3%), followed by above 50 years (28.3) while 21.7% and 6.7% were within 31-40 and 0-30 years age brackets. The dominance of 41-50 years showed that farmers were still young. This is capable of impacting positively on pumpkin production. Enete and Okon (2010) reported a dominant age group of 31-40 years in the study area. Educationally, about 83.3 percent of respondents were literate. 50 percent attended primary school, 28.3 percent attended secondary school, 5 percent had tertiary education while 16.76% did not have any formal education at all. The implication of this high rate of literacy implies that farming information from extension agents and other sources can be better assimilated, processed and put to practice. Beside educated farmers are early adopters of farming both farming and agricultural marketing innovations. In the study area, Enete et al (2010) reported that about 90 percent of respondents were literate. With respect to labor source for pumpkin production, 66.7 percent of farmers in the study area made use of family labor while 25 percent and 8.3 percent made use of hired and borrowed labor respectively. The high use of family labor justifies the huge household size in the study area.

3.2 Average costs and returns in pumpkin production in the study area

Table2 present the average costs and returns of pumpkin production in the study area. Total revenue of ₦ 297,150.6 was realized per hectare of pumpkin. The total cost of ₦ 138, 737.60 was incurred. Of this, variable cost constituted about 83.03 percent (₦115, 197,6) of total cost of pumpkin production. Further analysis of the variable cost component showed that labor accounted for 88 percent, manure 3.4%, pesticide 8.6 percent and planting material 1.3 percent of total variable cost of production. A gross margin and net income of ₦ 181,953 and N158, 413 were realized per hectare. This indicated that pumpkin production is profitable in the study area. Comparing the net return with the national minimum wage of

18,000 revealed that pumpkin production is a profitable venture in the study area, hence can constitute a good source of employment for our young school leavers and the teeming population. Enete et. al (2010) reported a gross margin and net income of ₦327,252.56 and ₦322,412.88 on their study in waterleaf in the study area

3.3 Profit function analysis

Table 3 presents the result of the profit function which was employed to determine the factor that influenced the profitability of pumpkin production in the study area. From the table, 89.63 percent of the variability in profit is explained by the combined effect of the variable price items in the function. Result revealed that the price parameter for labour, land value and pesticide had negative significant effects on the profit level while the price variable for output price had a positive significant effect on the profit level of farmers

Table 1 : Demographic characteristics of pumpkin farmers

Variable	Number	Frequency
Gender		
Male	23	38.3
Female	37	61.7
Farming Experience		
Less than 5 years	15	25
5-10 years	30	50
11-16 years	10	16.7

223	17 and above	5	8
224			
225	Household size		
226	Less than 5	20	33.3
227	5-10	35	58.3
228	Greater than 10	5	8.3
229			
230	Sources of Finance		
231	Personal savings	30	50
232	Friends and Relatives	23	38.3
233	Other sources	7	11.7
234			
235	Age		
236	0-30	4	6.7
237	31-40	13	21.7
238	41 -50	26	43.8
239	Above 50	17	28.3
240			
241	Educational background		
242	No formal Education	10	16.7
243	Primary school	30	50
244	Secondary school	17	28.3
245	Post secondary	3	5
246			
247	Labor source		
248	Family Labor	40	66.7
249	Hired Labor	15	25
250	Borrowed Labor	5	8.3

Source: computed from field survey data, 2013.

Table 2: Income and Expenditure by Pumkim Farmers per Hectare

Items	Units	Value (₦)
Revenue items		
Value of output	(kg)	297,150.60
Total Revenue		297,15.60
Cost items		
(i) Variable cost		

273	(a) Labour		101,376
274	(b) Cost of manure (kg)		3,926.00
275	(c) Pesticide (liters)		9,895.60
276	(d) Planting material (kg)		1,500.00
277	Total variable cost		115,197.60
278	(ii) Fixed Cost		
279	(a) Land (hectare)		10,120.00
280	(b) Depreciation		13,420.00
281	Total Fixed Cost		23,540.00
282	Total Cost(TVC+ TFC)		138,737.60
283	Gross Margin (TR-TVC)		181,953.00
284	Net Income (GM-TFC)		158,413.00
285			

286 Source: Computed from field survey data,2013. **Note:** N160 is equivalent to 1 US \$

287 **Table 3 : Profit function analysis for fluted pumpkin**

288	Parameter	Coefficient	Standard error	t-value	P-value
289	Intercept	3146.61	2245.01	1.4016	0.2122
290	Labor cost	-3.8511	0.4461	-8.6328	<0.00001
291	Manure cost	-2.3150	1.8631	-1.2426	0.2190
292	Output price	8.2816	0.9172	9.0292	<0.00001
293	Capital	-0.5218	0.5046	-1.0340	0.2730
294	Land value	-0.9336	0.0719	-12.9847	<0.00001
295	Pest control	-3.2152	0.1151	-27.9339	<0.00001
296	Planting material	-0.3834	0.3152	-1.2164	0.2199

297 Source: Field survey,2013

298 3.3 Determinants of fluted pumpkin production

299 Table 4 presents the regression result for the factors affecting pumpkin output in the study area. Of the
 300 four functional forms that were estimated, (linear, semilog, double log and exponential), the linear model
 301 was chosen as the lead equation because of the high R^2 value and the significant number of explanatory
 302 variables.

303 The coefficient for farming experience was positive and significant at 5 percent level. Experienced
 304 farmers are perceived to better understand and processed new farming information from extension
 305 agents and other sources and hence, improves upon their efficiency and output. They are also known to
 306 be early adopters of new farming techniques. Enete and Okon (2010), Nwosu et. al (2012) and Bassey

and Okon (2008) reported a significant differences between farming experience and water leaf, amaranth spp and cassava output in the study area respectively.

Household size impacted positively on pumpkin production in the study area at 5 percent level. Since pumpkin production is labor intensive, large household sizes would imply available labor for pumpkin production. This is the case in the study area where the vegetative pattern and land tenure system does not favour mechanization. Other studies such as Okorji et.al (2010), Nwosu et. al (2012) and Enete and Okon (2010) reported similar findings

The age coefficient had a positive significant impact on output at 5 percent level of probability. This implied that output of pumpkin reduces with increase in farmer's age. This finding is surprising given that aged farmers were supposed to be more experienced than start- up farmers. Okorji et. al (2010) reported similar findings on their study on dry season vegetable at Imo State.

The coefficient for land size was significant at the one percent, implying that increasing land size would increase output of pumpkin. Increasing land size means that the available labour in the study area could be efficiently utilized by farmers. The positive relationship between land size and output can be attributed to economy of scale. This finding is consistent with Akpan et.al (2011). Other studies such as Enete and Okon (2010) reported an inverse relationship in the study area.

The capital coefficient was positive and significant at the one percent level. This suggests the importance of capital in pumpkin production in the study area. This result compares favorably with Enete and Okon (2010).

Also, the coefficient of organic manure had a positive significant impact on output at 10 percent level. The use of organic manure to improve the soil fertility would invariably enhanced output of fluted pumpkin in the study area. Enete and Okon (2010), Udoh and Sunday (2007) reported similar findings in the study area.

Table 4: Result of the multiple regression analysis/ production function analysis

Coefficient/variable	Linear (L)	Semi-log	Double-log	Exponential
Intercept	3864.210 (21240.99)	9.8125*** (0.3019)	7.3901 (4.7529)	-50009.19 (28762.78)
Educational level	718.765 (457.621)	0.0305*** (0.0082)	0.0561 (0.0439)	13873.88 (26549.69)
Farming Experience	3141.232** (1152.372)	0.0046 (0.0134)	0.0716 (0.0722)	294.575 (165.028)

Household size	804.625** (271.836)	0.0324 (0.0259)	0.1932*** (0.0181)	3258.30** (1346.451)
Farmers Age	-1676.70** (684.546)	-0.0034 (0.00732)	0.0754 (0.2176)	1965.17 (2718.73)
Land size	0.8843*** (0.2285)	2.1561*** (0.5714)	2341.55 (2151.41)	1478.75 (857.13)
Labor	14.0021 (8.0652)	0.0015 (0.008)	0.2328 (0.6982)	1389.75 (868.13)
Capital	2.9672*** (0.8970)	1.9521* (1.1410)	0.0975 (0.1312)	2134.87 (1791.28)
Organic manure	9.8741* (5.1082)	0.0026* (0.0014)	0.6580 (0.3781)	5643.40*** (1810.81)
Planting material	0.0321 (0.6520)	0.0211 (0.0782)	-0.0974* (0.0562)	-3162.73 (3026.14)
Harvest. Frequency	-2871.40 (5011.10)	-0.0035 (0.0063)	0.1153 (0.0862)	-373.401 (989.212)
R ²	0.8345	0.7174	0.8091	0.6924
Adj. R ²	0.8074	0.6887	0.7774	0.6607
Observations	60	60	60	60

Source: field Survey, 2013. N/B, figures in brackets are standard errors. *** Significant at 1%, **significant at 5%, and *significant at 10%. (L) is the lead equation.

4.0 Conclusion

The study examined the determinants of pumpkin production and profitability in Akwa Ibom State, Nigeria. The summary statistics revealed that pumpkin production was dominated by literate farmers (83.3%), majority which were female (61.7%) with average household size of 7 persons. The major sources of finance, dominant age group and labour sources were personal savings, 41-50 years and family labor (66.7%) respectively. The price parameter for labor, land value, pesticide and output impacted significantly on pumpkin profitability. Farmers had a gross margin and net income of ₦181, 953 and ₦158, 413, implying that pumpkin production is profitable. Farming experience, household size, age, land size, capital and organic manure were the major determinants of pumpkin output in the study area.

5.0 Recommendations.

Based on the findings of this study, it is recommended as follows:

- (i) People should be encouraged to go into pumpkin production. This can be achieved through series of awareness campaigns, provision of basic production inputs like planting material, pesticides, manure etc. If possible, government should acquire large expanse of lands and

lease them out to pumpkin growers at reduced rates and less stringent conditions. This would go a long way to reduce the land rental value and ensure access to land.

(ii) To ensure capital availability, soft, interest free loan should be given to pumpkin farmers. This would enable them acquire land, procure production inputs and increase their scope of production.

(iii) Awareness campaigns on the use of organic manure should be intensified. All hands should be on deck to support the on-going campaign on organic farming, as it is a right step in the right direction towards boosting agricultural outputs.

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