Economics of *Gnetum Africana* Production in Ukanafun Local Government Area of Akwa Ibom State, Nigeria

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ABSTRACT--- ***This study analyzed the economics of Gnetum africanum production in Ukanafun Local Government Area of Akwa Ibom State. Data collected through a multi stage sampling from 100 Gnetum farmers were analyzed using descriptive statistics, production function analysis, profit function analysis, cost and return analysis as well as Likert Scale rating. Result revealed that the study area was dominated by female (66%), married (70%), literate,(84%) respondents with mean of 13 years of experience. Majority (45%) were within the age bracket of 41-50 years with mean household size of 8 persons whose farms were mostly (88%) located within a distance of 1-2 kilometers. Result of the production function revealed that educational attainment and farm size were positive and significant to Gnetum output at the 1 percent level of significance, respectively. Result of the profit function also showed that while land value, capital and cost of planting material had a significant negative effect on Gnetum profitability at the 1 % level, output price of Gnetum had a positive significant effect on Gnetum profit. Result of the cost and returns analysis revealed a total revenue and cost of N343, 671 and N113, 051.4 per hectare with a Gross Margin and Net profit of N269, 262.8 and N230, 619.6 respectively. Lastly, the major constraints to Gnetum production in order of severity were: rampant incidence of theft, high cost of land rent, low price of Gnetum, poor access to credit facilities and high cost of production inputs. The study recommended that policies that would enhance educational attainment and total hectares of cultivation, reduce land rental value and cost of planting material as well as access to credit facilities and the formation of local vigilante groups to carry out periodic farm surveillance with view to reducing the rampant incidence of Gnetum theft as the way out.***

Keywords— Gnetum Production, profitability and constraints

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1. INTRODUCTION

The potential of vegetable crops in meeting the dietary requirement, reducing incidence of nutritional deficiency and enhancing the economic status of people have been reiterated in the literature (Okon *et al*. ,2010; Owombo *et al*. 2010; Dam, 2012; Ibekwe and Adesope, 2011; Nwosu *et al*. 2012; Taiga *et al*. 2008 and Bassey *et al*. 2014), especially in Sub-Saharan Africa where poverty is pervasive and urbanization in an increase. Vegetable is an integral component of our daily diets and forms important condiment in our daily foods.

Gnetum africanum is one of the most popular vegetables grown extensively in Africa and consumed by almost all the households because of its dietary importance. Its uses for medicinal and nutritional value have been supported by several authors (Abia *et al*.2007; Schippers,2004; Schippers and Besong, 2004). Medically the leaf is used to treat nausea and is considered an antidote to some form of poison. The medicinal value of *Gnetum* spp. particularly in Asia and South America has been highlighted in a number of studies (Yao *et al*. 2006). In Cameroon it is recorded as being used in the Southwest to ease childbirth and the leaves have been noted as a disinfectant for wounds, to treat hemorrhoid and as an anti-hangover agent, the fresh leaves are crushed and used to neutralize the effects of alcohol. The Bulu ethnic group uses the leaves to treat colds; and increase blood production and to treat spleen problems (CIFOR, 2008). The leaves are also taken as an enema against constipation, to treat boils and fungal infections on the fingers (Schippers, 2004; Schippers *et al*., 2004). In Nigeria, *Gnetum* is used to treat piles and high blood pressure and also as medicine against enlarged spleen, sore throat and as a purgative. Iweala *et al*. (2009) reported on the effect of *Gnetum* during laboratory tests on weight gain, hemoglobin and white blood cells. In the Central African Republic the leaves are eaten to treat nausea and as an antidote to arrow poison made from *Periploca nigrescens* (Schippers 2004; Schippers *et al*. 2004). The purgative and laxative effect of *Gnetum* has been found to vary with varieties with older leaves producing a higher laxative effect and

having a role in hypertensive and high cholesterol patients (Isong *et al*., 1999). Afang as it is locally called in Nigeria is primarily used as a dye and purgative as well as for the treatment of sore throat and swollen spleen in children (Nkwatoh, 2007). Its marketing provides employment opportunities and generates income for farming households and the income earned from its sales can be used in purchasing processed food, clothing and other services (Robinowick, 2007). Fuashi *et al*. (2010) reported that *Gnetum Africana* contributes $1262334.7 to the economy of Cameroun and Nigeria between 2002 and 2008.

In spite of this huge potential, Schippers (2004) reported that *Gentum africanum* marketing in Africa is still at peasant level and that the quantity produced in a year remains rather obscure because production statistics of this produce are often not kept by Ministry of Agriculture or its appropriate governmental authority.Numerous studies carried out on *Gnetum Africana* (Fuashi *et al*, 2010; Ingram *et al*. 2012; Nkwatoh and Yinda, 2007) in Nigeria focused on its marketing and value chain development rather than its domestication and propagation in spite of its great potential as an income generating vegetable. Consequently, most of the *Gnetum* consumed in Nigeria is harvested from the wild while a greater part is imported from Cameroun. This is despite the fact that *Gnetum* species are not difficult to cultivate; the principal requirements being shade, a support for the vine to climb on and suitable soil type and sufficient rainfall. In the study area, the production of *Gnetum africanum* is said to possess high economic value. However, agricultural inputs are relatively scarce, thus limiting the cultivation of *Gnetum africanum.* Therefore, considering the economic importance of this vegetable, there is need to explore avenues that would boost its production rather than relying on its supply from the wild become imperative and warrant bthis study. Accordingly, the study examines the determinants of *Gnetum* African production and profitability in Ukanafun Local Government Area of Akwa Ibom State, Nigeria.

1.1 Study Area

The study was conducted in Ukanafun Local Government Area of Akwa Ibom State, Nigeria. Ukanafun Local Government Area was created in 1976. It is situated around the North-Western Coast of the State. It lies at latitude $4^{o}43^{1}$ N and longitude $7^{o}30^{1}$ E and $7^{0}\ 55^{1}$ E *and* $7^{o}55^{1}$ *E from* the equator (Udoumoh (2008). Ukanafun Local Government Area is bounded by Imo River (which separates her from Abia and River State in the West). It is also bounded by Etim Ekpo, Oruk Anam and Abak Local Government Area on the North, South and East, respectively. Ukanafun has a tropical humid climate with high incidence of rainfall sometimes exceeding 3000 per annum. There is high temperature throughout the year with a mean of 26.90^{o} C. Relative humidity, except or the short dry season remain at an average of 70% to 80% throughout the year as in other tropical climate. Ukanafun is characterized by two main seasons the wet and rainy season which usually begin in March lasted till November and the dry season which lasted from November till February. The trend of monthly rainfall runs to a peak in July and decreases in August (August break) and another in September before it finally decreases to its lowest in December. The Local Government has a landmass of approximately 254.8 square kilometer. It is made up of five clans; Northern Afaha, Southern Afaha Adat Ifang Southern Ukanafun and Northern Ukanfun. There are eleven political wards evenly spread among these clans (Udoumoh (2008).

1.2 Sampling Technique and Size

A two stage sampling procedure was used to select the sample for the study. The first stage involved the random selection of five cells in Ukanafun Local Government Area. The second stage involved the purposive selection of twenty *Gnetum africanum* farmers from each of the selected cells. This gave a total sampling size of 100. Primary data was used for the study. A validated structured questionnaire was used to obtain data from *Gnetum africanum* farmers in Ukanafun Local Government Area. Enough time was given to the respondents to study the questionnaire and ask questions where necessary

1.3 Method of data analysis

Data were analyzed using both descriptive and inferential statistics. The inferential statistics used to analyze the data are presented below:

1.3.1 Cost and Return 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

Where:

GM = Gross margin per hectare (N)

TVC = Total Variable Cost per hectare (N)

TR = Total Revenue per hectare (N)

1.3.2 Production Function Analysis

The implicit form of the production function analysis for *Gnetum* production in the study area is implicitly stated as follows:

$Y = f(X_1, X_2, X_3, - - - X_{11}) + e$ (3. 1)

Where

Y = Output of *Gnetum* (N),
X_1 = Age of farmers (in years),
X_2 = Sex of the farmer (male =1, otherwise =0)
X_3 = Marital status (dummy variable 1= male otherwise = 0)
X_4 = Educational level of farmers (years)
X_5 = Household size (number),
X_6 = Farming experience (years)
X_7 = Farm size (hectares)
X_8 = Capital (value of depreciated farm tools)
X_9 = Quantity of planting material (in kilogram)
X_{10} = labour (mandays)
X_{11} = Organic manure / Fertilizer (in kilogram)
U = error term

1.3.1 The profit function model

The profit function model is specified as:

$\Pi^* = \pi^*(Py, Pa, Pb, Pc, \ldots\ldots Za, Zb)$ (3.3)

Where,:

Π* = Amount of variable profit per hectare (N),(proxied by gross margin)
Py = price of output per hectare (N), (proxy as total revenue per ha per respondent)
Pa = Price per unit of labor (N),
Pb = Price per unit of manure (N)
Pc = Price per unit of planting material (N)
Za = Capital (measured as depreciated value of fixed assets used in *Gnetum* production) and
Zb = Land value (N), (whether purchased, inherited or rented).

2. RESULT AND DISCUSSION

In this section the result of the findings are presented and discussed

2.1 Socioeconomic Characteristics of Respondents

Table 1 presents the socioeconomic characteristics of respondents in the study area. From the Table, household size in the study area ranges from 1 to 17 with a mean of 10 persons per household. Majority (50%) of the respondents had a household size of 6-10 persons; this was followed by 31 percent that had a household size of 1-5 persons. The huge household sizes in the area imply abundant labour for *Gnetum* production. In the study area, Bassey *et al.* (2015) reported higher household sizes of 5-10 persons in his study on Flutted pumpkin.

In terms of farm sizes, majority (51%) had a farm size of 1-2 hectares, followed by less than one hectare (36%) while 13 percent cultivated more than 2 hectares. This is an indication that cultivation of *Gnetum Africana* was in a large scale. Age wise, result showed that most (45%) of the respondents were in the age bracket of 41-50 years, followed by 51-60 years (25%). The prevalence of respondents within the age bracket of 41-50 years indicates that farmers were in their youthful years and would impact positively on *Gnetum* production. In terms of marital status, a greater number of respondents (70%) were married, 13% widowed while 10% and 7% were divorcee and single respectively. The preponderance of married respondents justifies the huge household size abundant in the study area.

With respect to sex, a greater (66%) of respondents were female while 34% were male. This indicated that production of *Gnetum Africana* was undertaken mostly by women. This may not be connected with the fact that *Gnetum* is easy to maintain after staking. Bassey *et al*. (2015) also reported the dorminant of female farmers in Fluted pumpkin production in the study area.

In terms of distance of the farm to the house, about 88% of *Gnetum* farms were located within a distance of less than 1 to 2 kilometer while only 12% were located a distance of more than 2 kilometer. The implication of this finding is that the rampant incidence of theft of farm produce that are often times reported in most agricultural farms would be curtail.

Education wise, farmers were quite educated with a mean of 10 years. About 84 percent of respondents were literate while 16 percent did not have any knowledge of formal education. This would impact positively on *Gnetum* production as educated farmers have been reported to possess the capacity to assimilate production information brought by extension

agents faster than their non-educated counterparts and also harness it to improve their production efficiencies. Enete and Okon, (2010) and *Bassey et al*.(2015) reported a higher level of educational attainment in the study area. With regards to farming experience, farmers were quite experience with a mean of 13 years' experience. A breakdown of this shows that about 40 percent had between 11-15 years of experience, 27 percent had 6-10 years of experience, 17 percent had above 15 years of experience while 16 percent had between 1- 5 years of experience. This is capable of impacting positively on *Gnetum* production because experience farmers have been reported to enhance their production efficiency as a result of knowledge gathered through several years of trial and error. In the study area, Bassey *et al*. (2015), reported an average experience of 12 years among pumpkin producers in the study area.

Table 1: **Socioeconomic characteristics of respondents**

Variable	Frequency	Percentage
Age		
20-30	8	8
31-40	15	15
41-50	45	45
51-60	25	25
Above 60	7	7
Mean	**44.3**	
Marital status		
Married	70	70
Divorced	10	10
Widow	13	13
Single	7	7
Sex		
Male34	34	34
Female	66	66
Farm distance		
<1-2	68	68
>2-5	10	10
Above 5	22	22
Educational attainment		
No formal education	16	16
Primary school	20	20
Secondary school	46	46
Post -secondary school	18	18
Farming experience		
1-516	16	16
6-10	27	27
11-15	40	40
Above 15	17	1\7
Household sizes		
1-5	31	31
6-10	50	50
11-15	11	11
Above 15	8	8
Farm sizes		
Less than	36	36
1-2	51	51
Above 2	13	13
Total 100 100	100	100

Source: Computed from field survey data, 2016.

2.2 Average Cost and Return in Gnetum Production in the Study Area

Table 2 presents the average costs and returns of *Gnetum* production in the study area. As noticed in the table, total revenue of N343, 671.00 was realized per hectare of *Gnetum* while the total cost incurred was N113, 051.4. Out of this, variable cost accounted for 65.818 percent (N74, 408.2) while fixed cost accounted for 34.182 percent (N38, 643.2) of the total production cost. A breakdown of the variable cost component showed that labour accounted for 49.6 percent, planting material, 12.4 percent, manure, 7.6 percent while stakes and rope accounted for 5.1 and 5.2 percentages of variable cost of production. Also, findings revealed a gross margin and net profit of N269.262.8 and N230,619.6 per hectare of *Gnetum* respectively. This is an evident that *Gnetum* production in the study area was profitable. This result is in consonance with the work of Louis (2010), who posited that *Gnetum* contributes up to 62% of producer's income, with an annual average profit of 598,729 FCFA. It provides up to 75% of retailer's and 58% of exporter's incomes, giving an average exporter at Idenau an annual average profit of 481,708,750 FCFA.

Table 2: Average Cost and Return per Hectare of *Gnetum Africana*

Item	Unit	Value
Revenue items		
Value of output	Naira	343,671.00
Total revenue	Naira	343,671.00
Cost items		
Variable costs	Naira	36,936.20
Labour	Naira	5.647.00
Cost of manure	Naira	9.526.00
Planting material	Naira	18.673.00
Stakes	Naira	3,896.00
Rope		**74,408.20**
Total Variable cost		
Fixed cost		
Land purchase/ Rent	Naira	30,608.40
Capital	Naira	8034.80
Total Fixed Cost	Naira	**38,643.2.00**
Total Cost = (TVC +TFC)	Naira	113,051.40
Gross Margin= (TR-TVC)	Naira	**269,262.80**
Net Income = (GM – TFC)	Naira	**230,619.6**

Source: Computed from Field survey data, 2016 Note: N381 is equivalent to $1

2.3 Results of Production Function Analysis

Table 3 presents the result of the multiple regression analysis for the determinants of *Gnetum Africana* production in the study area. Of the three functional forms (linear, semi-log and double log) that were regressed, the double log function was chosen as the lead equation, the choice of the lead equation was informed by the conformity of the estimates to a priori expectation and the number of significant variables. Result yielded R^2 value of 0.7557 implying that about 75.6 percent of the variability in Gnetum output was explained by the independent variables in the model. The F statistics and the constant term were significant denoting the appropriateness of the estimated model.

From the result, the coefficient for education variable was positive and significant at the 1 percent level of significance showing that increase in educational attainment of farmers would increase *Gnetum* production in the study area. Judging from its coefficient, a 10 percent increase in educational attainment would increase *Gnetum* output by 6.04505 percent. The plausible justification for this is that educated people are always so well informed and can easily access production information from extension agents and other sources and harness it to boost output of *Gnetum* in the area. This finding is in line with those of *Bassey et al.,* (2015) and Okon and Enete, (2009) on their study on Flutted pumpkin in the study area.

The coefficient for farm size was also positive and significant at the 1 percent level implying that output of *Gnetum* will increase with increase in farm size. Its coefficient shows that a 10 percent increase in farm size will increase output of *Gnetum* by 6.1524 percent. This result is justified in that large farm size implies additional area of cultivation which invariably translates into increased output. Also, large farm sizes are often associated with economy of scale. This finding corroborates those of Okon and Enete, (2009) Bassey *et al*. (2015), and, Akpan *et al*., (2011) who also reported positive significant relationships between farm sizes and vegetable output in Akwa Ibom State.

Table 3: Production functions of *Gnetum africanum* output

Variable	Linear	Semi-log	Double log (L)
Constant	4032.02 (1.29)	5.023778 (9.87)***	4.493157 (13.35)***
Age	164.5499 (0.46)	0.0004384 (0.70)	0.0889982 (1.15)
Sex	4859.128 (0.53)	0.0105744 (0.67)	0.012273 (0.21)
Marital status	8623.108 (0.72)	0.0123857 (0.58)	0.0028009 (0..38)
Education	4472.651 (2.92)**	0.0099718 (3.69)***	0.2275142 (3.76)***
Household size	-383.4032 (-0.32)	0.0005985 (0.28)	0.0111763 (0.24)
Farming experience	1428.365 (1.55)	0.0007481 (0.58)	0.0261268 (0.60)
Farm sixe	74695.49 (7.54)***	0.1142.43 (6.52)***	0.3557053 (5.78)***
Capital	-1.660449 (-1.25)	-3.88e-06 (-1.57)	-0.0121343 (-0.29)
Planting material	0.709363 (0.59)	2.17e-06 (1.00)	0.0847933 (1.60)
Labour	85.32676 (1.52)	0.000352 (0.36)	0.906375 (1.61)
Manure//Fertilizer	-1.096724 (-0.81)	1.04e-06 (-0.43)	- 0.0230355 (-0.69)
R^2 =	0.8115	0.7806	0.7557
F (11, 88) =	34.43	28.16	24.47
Prob> F =	0.000	0.000	0.000***

Note: ***, ** and * signifies significant at 1, 5 and 10 percent, respectively and L signifies the lead equation
Source: Output of STATA software version 11.

2.4 Results of the Profit Function Analysis

Table 4 presents the result of the profit function analysis that was employed to ascertain the factors that affects the profitability of *Gnetum Africana* in the study area. From the table, the combine effect of the variables explained about 79.82 percent of the variation in the maximum variable profit. Result further revealed that the price parameter for planting material, land value and capital had negative significant effects on profit level while the variable for output price had a positive significant effect on the profit level of *Gnetum* farmers. In terms of level of significance, while the price parameters for planting, material, land value and capital were negative and significant at 5 percent that of output price was positive and significant at the 1 percent level. Judging from their coefficients, a 10 percent increase in planting material, land value and capital will decrease *Gnetum* profitability by 15.38581, 53.38581 and 63.81506 units respectively while a 10 percent increase in price of *Gnetum* will increase its profitability by 63.08863 units.

The negative significance relationship of land value may be due to the high land rent and purchased prices that were observed in the study area. Also, the negative significant relationship of planting material and capital is justified in that both are cost components, hence, impacts negatively on final profit. The negative effect of land value agreed with the findings of Bassey *et al*. (2015) who equally reported negative significant relationship in his study on fluted pumpkin. The positive and significant value for output price (total revenue) was corroborated by Bassey et al, (2015).

Table 4: Profit function analysis for *Gnetum Africana* in the study area

Parameter	Coefficient	Standard error	T-value	P> (t)
Constant	32864.03	7353.956	4.47	0.000
Total revenue	0.6308868	0.0433078	14.57	0.000
Cost of manure	0.8775164	0.6446944	1.36	0.177
Planting material	-1.538581	0.5895190	-2.91	0.005
Labour cost	0.2774851	0.6433805	0.43	0.667
Land value	-5.354114	2.597218	-2.06	0.042
Capital	-1.381506	2.469733	-2.58	0.011
F (6, 93) = 61.31				
Prob > F = 0.000				
R^2 = 0.7982				

Source: Output of computer software STATA 11.0 using field survey data, 2016.

2.5 Constraints to Gnetum Production

Table 5 presents the constraints to *Gnetum Africana* production in the study area. As evidenced by the table, rampant incidence of theft (3.40), high cost of land rent (3.33), low prices of product (3.30), high cost of production inputs (3.13) were among the factors identified as being critical constraints to the production of *Gnetum* in the study area. The reason behind why lack of storage facilities was chosen as the least constraint might be because in the study area, matured *Gnetum* that is ripe for sale is often harvested by buyers in the farm after bargaining with the farmers based on number of plots and sizes. Therefore, farmers do not need to store the harvested products. That of labour might not be unconnected with the high household sizes in the area which results in abundant labour.

Table 5: Farmers response to socioeconomic factors affecting *Gnetum* production in the study area

Constraints	To a very critical extent	To a critical extent	To some extent	Not at all	Scores	Mean	Remark
Rampant incidence of theft	55	30	15	-	340	3.40	Critical
High cost of land	40	53	7	-	333	3.33	Critical
Low price of products	20	60	30	10	330	3.30	Critical
Poor access to credit	36	44	20	-	316	3.16	Critical
High cost of Production input	38	42	15	5	313	3.13	Critical
High cost of labour	15	8	30	47	191	1.91	Minor
Incidence of pest and Diseases	16	4	30	50	186	186	Minor
Inadequate extension Visit	0	15	20	65	150	1.50	Minor
Lack of storage Facilities	0	10	15	75	135	1.35	Minor

Mean score > 2.5 = critical constraints; < 2.5 = minor constraints
Source: Field survey (2016).

3. CONCLUSION

The study has successfully analyzed the economics of *Gnetum africanum* production in the study area. Several findings have been made and constraints to the production of *Gnetum* identified in the study area. The study concludes that *Gnetum* production in the study area was profitable and should be encouraged

4. RECOMMENDATIONS

The following recommendations are derived from the findings

(1) Educational attainment and farm size were found to enhance output of *Gnetum africanum* in the study area, hence, effort should be directed towards boosting educational attainment and increasing farm sizes. Building schools and encouraging mass literacy programs through the promotion of the existing Universal basic education can be a way out. In terms of farm size, government in addition to allowing farmers access to

undeveloped public lands in the area should equally acquire land and lease out to prospective *Gnetum* farmers as a way to encourage them increase their scale of production.

(2) Land value, capital and planting material were also found to impact negatively on the profitability of *Gnetum*, therefore, policies that will reduce land rental value and cost of planting materials should be pursued. Such policies should be tailored towards the supply of improved planting materials as well as the provision of soft loans to *Gnetum* farmers. To further boost their access to capital, *Gnetum* farmers should be encourage to form cooperatives so as to access those benefits that has been eloping them.

(3) To reduce the rampant incidence of theft in the area, *Gnetum* farmers should form local vigilante groups that would carry out periodic farm surveillance in the area. This is possible given that *Gnetum* farms in the study area were located close to residential houses.

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