Assessment of Economic Viability of Fluted Pumpkin Farming in Ikorodu LGA, Lagos State.

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Abstract: The study assessed the profitability of growing fluted pumpkin on commercial scale in Ikorodu Local Government Area (ILGA).To achieve this, primary data were obtained from a sample of 100 fluted pumpkin farmers selected by multi-staged sampling from four Local Council Development Areas in the Local Government. Since farmers practice both rain-fed and irrigated farming, data were collected to assess the most profitable practice for growing this vegetable on commercial basis. Data were analyzed using frequency distribution, percentages, means, gross margin, net profit, benefit-cost and Shepherd-Future analyses, and exponential regression model of combined profit function for irrigation and rain-fed systems. Results showed that fluted pumpkin farming was equally undertaken by both male and female mostly between 41-50 years old, with no formal education and average family size of 6 per household. Further, analysis showed net profit of ₦380,150 and ₦207,150; economic efficiencies of 36.64 per cent and 28.57 per cent; and benefit-cost ratios of 2.7 and 3 for rain-fed and dry season/irrigated practice respectively. Farm size and level of education have positive correlation while age and costs of fertilizer, labour and planting materials were negatively related to farmer's profit at 1% and 5% significant level. Needless for farmers to invest in irrigation for fluted pumpkin production. Also, increased access to land, fertilizers and improved seeds would promote profitability and commercialization of fluted pumpkin enterprises in Nigeria.
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1. Introduction

Fluted pumpkin (Telfairia occidentalis Hook. F.) is one of the most popular vegetables grown in southern Nigeria for its leaves as important sources of protein, vitamins and minerals when consumed. Apart from this, it provides an appreciable income to small scale fanners (Akoroda, 1990). The edible parts of the crop includes the tender shoot, leaves, petioles and seeds that are usually cooked (Akoroda, 1990).

Farmers strive to maximize yield of high quality using effective chemical substances on the crop grown. Nitrogen is essential for adequate vegetation and should ideally be given in the form of manure, applied before planting. The use of well-decomposed manure is essential for fruit production and in this case it is recommended that about 1kgmanure/ plant be applied. Fluted pumpkin is perennial when grown on well-drained soils, slightly shaded and mulched but not so soggy soils (Idowu, Alimi, Tijani and Okobi, 2007). In the study area, the crop is grown on poor soils as an annual during the rainy season and also during the dry season adopting irrigation practices. Majorly, it is not grown along-side other crops as it done in other climes. Fluted pumpkin is very important in the diet of children, men, women, nursing mothers as well as livestock due to its high nutritive value. But in Nigeria, the output has not been able to meet the demand for human food not to mention that of livestock feed. As a result of the growing need, the task of producing enough fluted pumpkin poses an increasing challenge. Like other crops, it is affected by the seasonality syndrome, hence, the irrigation practices in dry season. The question is whether there is difference in economic efficiency and profitability of dry season/ irrigated and rain-fed practices so far in lieu of excessive dry season or inequitable distribution of rainfall attributed to climate change.

In Ikorodu Local Government Area (ILGA) with six Local Development Area (LCDA), fluted pumpkin plays an important role not only as the major source of vitamins in diets but also as a source of livelihood for the majority of farmers who grow and sell this vegetable. The general objective is to assess the profitability of rain-fed and dry season/irrigated practice and their determinants in this LGA.

1.1 Objective of the study

In view of the general objective, specifically, the study seeks to:

1. Describe the socio-economic characteristics of the farmers;
2. Assess the relative profitability of fluted pumpkin production of rain-fed and dry season practice;
3. and, Identify the determinant of profitability of fluted pumpkin production in the study area.

2. Literature Review and Conceptual Framework

Several studies in Nigeria have been carried out to analyze resource-use efficiency as well as profitability of crops and more specifically vegetables. Udoh and Akpan, (2011) in their study estimated the efficiency of resource use among urban vegetable (*Talinium triangulare*) farmers in Akwa Ibom State. They reported that waterleaf farmers were inefficient in the use of these resources with land and manure being underutilized, while labour was over utilized. In terms of profitability, Udoh and Akpan, (2011) reported that farmers made profit of $1765.53 per hectare.

In studying resource use efficiency and profitability, several methods have been widely adopted. Ala (2013) examined profitability and resource-use efficiency of yam production by women in Bosso Local Government Area of Niger State, Nigeria using farm budgeting, multiple regression and MVP/MFC ratio. The result showed that farmers obtained a net profit of $63.39/ha and the MVP/MFC ratio test revealed that farm size, fertilizers and farm labour were underutilized by the farmers. Similarly, Nwauwa and Omonona (2010) in their study on fluted pumpkin production under irrigation system in Ilorin estimated the technical, allocative and economic efficiency among fluted pumpkin farming households in the metropolis and found fertilizer and labour, plot size and labour as significant factors which contributed to technical and allocative efficiency respectively. In another study, Omonona *et al*., (2011) in their study on profitability and resource-use efficiency among Ofada rice farmers in southwestern Nigeria adopted the Marginal value product (MVP) approach and found that all identified resources were underutilize. Jirgi, Ogundeji, Viljoen and Adiele, (2010) examined the profitability and resources-use efficiency of millet/cowpea mixed farmers production in Niger state, Nigeria using the farm budgeting technique and exponential production function technique. The results showed that the estimated gross margin, net farm income, was $353.67 per hectare, while the results of allocative efficiency show that seeds, family labour and agrochemicals were under-utilized.

More specifically, Ayinde, Akerele, and Ojeniyi (2007); Idowu, Alimi, Tijani and Okobi (2007) examined economic factors affecting the production of fluted pumpkin using a modified cost-route approach and regression analysis. They reported fluted pumpkin production as being profitable under existing production systems with an average net income of $205.90/ha on a mean farm size of 0.301 ha. Cost of fertilizer and farm size were however underutilized. Ayoola (2014) assessed the profitability of vegetable farming under irrigation and rain-fed systems using the gross margin, net profit, benefit-cost, shepherd-future and regression approach, concluded that investment on irrigation for vegetable production would be worthwhile for growing commercial vegetable enterprise in the study area. Regarding constraints faced by fluted pumpkin farmers, Nwosu, Onyeneke and Okoli, (2012) reported lack of credit facilities, lack of availability of inputs, pests and disease infestation, inadequate information about input and output prices, and poor road network respectively. To our knowledge, no study have been carried out in the Ikorodu LGA where 'ugu' as it is popularly called serve as means of livelihood to teaming population of Igbo tribe nor utilised elsewhere wholesomely the methodology adopted in this study.

2.2 Conceptual Framework

The conceptual framework is within the context of relative efficiency and profitability of investments in fluted pumpkin enterprises under rain-fed and dry season/irrigated systems. Thus, the concepts of gross margin, net profit and cost-benefit ratio were adopted to compare the profitability and economic efficiency of fluted pumpkin farming under irrigated and rain-fed systems. Gross margin was measured in terms of the amount in Naira that is contributed to the enterprise after paying for direct variable unit costs, while the net profit accounts for the direct fixed costs in addition. The variable costs comprised the expenses incurred on variable inputs such as fertilizers, seeds and labour, while fixed costs comprised expenses on rent on land, depreciation of capital assets such as irrigation pumps, hoes, cutlass, and wheel barrow.

Benefit-cost ratio was used as a measure of how well each naira expended on the enterprise is utilized to cover the operational and overhead expenses. Shepherd-future model was expressed as the ratio of total cost incurred in the production of fluted pumpkin to the total revenue generated as percentage. The decision rule is that lower coefficient indicates higher level of efficiency and vice-versa.

3. Methodology

3.1 Area of the Study

The study was carried out in Ikorodu LGA, Lagos state. The state is a commercial centre of Nigeria. It shares its boundaries with *Oyo* and *Ogun* states in Nigeria and an international border with the Republic of Benin. The state has a population of about 9 million people (NPC, 2006). The state has two distinct seasons annually: the dry and wet seasons. It has sizeable expanse of arable land, rich fertile soils which is good for the cultivation of a wide variety of food crops like yam, cassava, maize, cowpea, fruits and vegetables. The sizable expanse of land is majorly situated in *Badagry, Epe* and Ikorodu agricultural zones of the state. Fluted pumpkin, *amaranthus* and cabbage are significant vegetable crops commonly

grown in these zones throughout the year while Ikorodu is popular with fluted pumpkin production. Dry season vegetable production is done along the coastal areas or supported by irrigation where applicable. Cultivation and consumption of fluted pumpkin (*Telferia occidentalis*) is a thriving business in the state. Fluted pumpkin originated from the eastern states of Nigeria from where it was introduced to some different parts of Nigeria. Hence majority of the correspondents used in this study were from the Eastern part of Nigeria resident in Ikorodu and involved in the production of fluted pumpkin. The vegetable has no local name hence it is still widely referred to as *'ugu'* in the state, the original name it is called in the East.

3.2 Sample Selection and Data

The target population of this study is the households that produce fluted pumpkin in Ikorodu LGA. A 2-stage sampling procedure was used to select a representative sample for the study. The first stage was the purposive selection of four LCDA known for 'ugu' production namely Ikorodu North Local Development Area (IKNLCDA), Ikosi-Agbowa Local Development Area (IALCDA), Ijede Local Development Area (IJLCDA) and Imota Local Development Area (IMLCDA) and the second stage involved the random selection of 25 household-respondents from each of the local development areas engaged in both dry and wet seasons fluted pumpkin production, making a total of 100 respondents. The data for the study were extracted from the respondents through questionnaire method followed with personal interview by the researcher where necessary. Primary data about farmer's socio-economic characteristics such as sex of respondent, family size, age (years) and educational level (years). Also, data were obtained on production variables such as farm size (ha), farm output (₦); variable costs such as cost of fertilizer, labour, planting materials and herbicide; and fixed costs such as rent on land as well as depreciation of capital assets such as irrigation pumps, hoes, cutlasses and wheel barrow.

3.3 Data Analysis and Analytical Procedures

The tools employed for analysis in this study were descriptive and inferential statistics. The descriptive statistical tool comprised frequency counts, percentages and gross margin analysis, which were used to analyze the socio-economic characteristics of the fluted pumpkin producers and profitability of the enterprise in the study area. The regression analysis was used to estimate the socio-economic determinant and coefficients of profitability, while the shepherd-future was used to determine the economic efficiency of the fluted pumpkin farming households in the study area.

3.3.1 Models specification

The functional form of the multiple regression is:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \ell_1$$

Where, Y= Profit (₦)

β_0 = Intercept (₦)

β = Marginal effect of X_s on Y

X_1= Farm size

X_2= Educational level (years)

X_3= Age of the farmer (years)

X_4= Cost of fertilizer (₦)

X_5= Cost of labour (₦)

X_6= Cost of planting materials (₦)

ℓ = Error term

1. Sherpherd-Future:

SF= (TC/TR) X 100;

Where, TC= Total cost (₦)

TR= Total Revenue (₦)

2. Gross Margin analysis:

GM= TR – TVC;

Where, GM= Gross Margin

TR= Total revenue

TVC= Total variable cost (₦)

4. Results and Discussion

4.1 Socio-economic characteristics of fluted pumpkin farmers

Table 1 describes the socio-economic characteristics of fluted pumpkin farmers in the study area.

The results showed that majority of respondents were female and within the age group of 41 – 50. This implies that pumpkin farmers were within the ages regarded as economically productive in a population. Family size was about six for majority of the farmers. About 61% had no education, 12% had primary education while 27% had secondary education, indicating low literacy rate among the farmers. About 81% of farmers have farming experience ranging between ten and twenty years; suggesting the possession of necessary farming skills for increased productivity and efficiency. In terms of land status, about 7% of fluted pumpkin farmers are land owners, 3% inherited land while 90 percent obtained their farmland on lease from '*Omo-onile'*. Land ownership status might be a decision factor with respect to investment on irrigation facilities as long as farmers could guarantee continuous access to the use of land. Result also showed that about 96 percent of farmers have less than 2 hectares of farm size thus farm sizes are largely small-scaled and fragmented. Olayide,

Eweke and Bello-Osage (1980) classified small scale farmers as those having 0.1- 5.9ha farm size. More than sixty percent of fluted pumpkin farmers employ mostly hired labour for farm operations; indicating low availability of low family labour as an option for reducing the cost of labour.

Table 1. Socioeconomic Characteristics of Respondents

Characteristics	Frequency	Percentage
Age (Years)		
<40	32.0	32.1
41-50	51.0	51.0
>50	17.0	17.0
Educational Level		
No formal education	61.0	61.0
Primary (1-6 years)	12.0	12.0
Secondary (7-12 years)	27.0	27.0
Gender		
Male	59.0	59.0
Female	41.0	41.0
Family size		
<6	67.0	67.0
6-10	19.0	19.0
>10	14.0	14.0
Farming Experience (Years)		
<10	43.0	43.0
10-20	38.0	38.0
>20	19.0	19.0
Land status		
Bought	7.0	7.0
Inheritance	3.0	3.0
Rent/Lease	90.0	90.0
Farm size (Ha)		
<1	87.0	87.0
1<X<2	9.0	9.0
>3	4.0	4.0
Type of Labour		
Family	27.0	27.0
Hired	57.0	57.0
Both	16.0	16.0

4.2 Relative Profitability and Economic Efficiency of fluted pumpkin Enterprise

Table 2 explains the relative profitability and economic efficiency of fluted pumpkin enterprise. The estimation showed that the average total variable costs per hectare were ₦157,500 and ₦70,000; average values of output per hectare were ₦600,000 and ₦290,000; and gross margins per hectare were ₦442500 and ₦220000 respectively. Shepherd-future coefficients were 0.366 and 0.285 and the benefit-cost ratios were 2.7 and 3.5 for fluted pumpkin farming during rainy season and dry season respectively. The results of benefit-cost ratios indicated that fluted pumpkin farming during dry season yielded greater revenue in excess of operational and overhead costs when compared to rain season farming. Similarly, the shepherd-future coefficients indicated greater economic efficiency in the production of fluted pumpkin farming during dry season relative to raining season. Intensive fluted pumpkin farming during dry season therefore guarantees higher income among small scale fluted pumpkin farmers. This result contradicts similar studies in literature (Ayoola, 2014; Gani and Omonona, 2009).

4.3 Determinants of Profitability of Fluted Pumpkin Production

The production function for this study was estimated using the combined exponential functional form. The exponential regression model of combined profit function gave the coefficient of multiple determination (R^2) value of 0.91 (Table 3), implying that 91 percent of the variation in farmer's profit is explained by the independent variables while the remaining 9 percent could be accounted for by the error term. The parameter estimates indicated that farm size and level of education were positively correlated with the farmers' profit at one percent and five percent levels, implying that an increase in the farm size and level of education will lead to an increase in income from fluted pumpkin farming as formal education could aid the managerial ability of farmers and enable them achieve greater efficiency in farming. Age of farmers was significantly negative, implying that older farmers tend to be less efficient. The cost of fertilizer is also negatively correlated with farm income and was not significant, showing that an increase in the amount spent on fertilizer will lead to decrease in profit on vegetable production, and suggests the need for more efficient use of fertilizer input. The negative cost of labour (Table 3) means that an increase in the amount spent on labour will lead to reduced profit. Cost of planting material was also negatively correlated with profit and significant at one percent, meaning that an increase in the cost of planting material might reduce profit from fluted pumpkin, suggesting that greater efficiency in the use of improved planting materials might enhance the profitability of fluted pumpkin. The results reinforce the findings of Ayoola (2014) and Ayanwale and Abiola (2008) that farm size, level of education and capital inputs are critical determinants of efficiency of vegetable production.

Table 2. Costs and Returns on Fluted pumpkin Production of Dry Season/irrigated and rain-fed Practice.

Cost and Return	Unit Price (₦)	Life span	Rain-Fed		Dry Season	
			Quantity	Total cost	Quantity	Total cost
Fixed costs						
Cutlass	1000	2 years	12	6000	5	2500
Irrigation equipment	22000	2 years	5	55000		
Wheel barrow	4000	2 years	-	-	-	-
Land (rent)	Lump sum	-	-	-	-	10000
Hoe	900	6 years	3	1350	-3	1350
Total fixed cost			**62,350**		**12,850**	
Variable costs						
Labour cost	1500	-	27mandays	40500	10m/day	15000
Pesticide cost	-	-	-	-	-	-
Herbicide cost	-	-	-	-	-	-
Fertilizer cost	4000	-	15(50kg bags)	60000	9kg/ha	36000
Seed cost	1200	-	10kg/ha	12000	9.5	11400
Cost of Transportation	Lump sum	-	Lump sum	45000		8000
Tractor Hiring	-	-	-	-	-	
Total Variable Cost			**157500**		**70000**	
Total Production Cost			**219850**		**82850**	
Total Revenue			600000		290000	
Net Profit			380150		207150	
Gross Margin			**442500**		**220000**	
Benefit-Cost Ratio			**2.7**		**3.5**	
Economic Efficiency			**36.64%**		**28.57%**	

Table 3. Parameter Estimates of Exponential Regression Model of Combined Profit Function for Vegetable Production

Variables	Coefficient	Standard error	t-value	p>/t
Farm size	72105.89	29675.94	2.43	0.017**
Education	3564.318	4589.122	0.78	0.439
Age	-6951.961	494.602	-4.65	0.000***
Fertilizer	-0.956839	0.6603224	-1.45	0.150
Labour	-0.2022912	1.674137	-0.12	0.904
Planting Material	-3.411511	0.5859465	-5.82	0.000***
Constant	20222125	77502.95	2.61	0.010
R^2	0.91			
F-value	126			

= 5% significance, *= 1% significance

5. Conclusion

The Study assessed the economic efficiency and socio-economic determinant of profitability of fluted pumpkin farming during dry and rain seasons in Ikorodu local Government area of Lagos state. The findings showed that majority of the farmers were between 41 years age and above, with low literacy rate and average family size of 6 per household. Results also showed net profits of ₦380150and ₦207150 per year, economic efficiency of 36.64 per cent and 28.57 per cent, and benefit-cost ratios of 2.7 and 3.5 respectively for fluted pumpkin production in rain season and dry season. Parameter estimates reveals that farm size and level of education have positive correlation while age, cost of fertilizer, labour and planting materials were negatively related to farmer's profit. Moreover, results indicated that age, farm size and planting materials were significant at one and five per cent levels. Thus, it was concluded that fluted pumpkin production is more profitable during the dry season. Needless for farmers to acquire irrigation equipment at the present scale of production, hence, dry season farming using swampy or river as the presently practiced is suitable for cost efficiency. On the basis of the results, we recommend that land policies that increase access of farmers to adequate land for fluted pumpkin farming, increase farmer's access to and skill for improved efficiency in use of fertilizer and seeds would promote profitability of fluted pumpkin during both dry and rainy seasons.

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