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Economic Analysis of Waterleaf and Fluted Pumpkin Production in Benin Metropolis, Edo state, Nigeria

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ABSTRACT: Vegetable farming operations range from small patches of crops, producing a few vegetables for family use or marketing, to the great highly organized and mechanized farms common in industrialized countries. In parts of Nigeria, waterleaf and fluted pumpkin farming are very important. This study evaluates the economic analysis of waterleaf and fluted pumpkin farming in Benin Metropolis, Edo State, Nigeria using well-structured questionnaire. Data obtained revealed mean age of 52 years and 53 years both waterleaf and fluted pumpkin farmers with female having a simple majority of 74.36% and 84.31% for both groups. The result also revealed a fairly equal moderate level of education with majority 56.41% and 58.82% of waterleaf and fluted pumpkin farmers attaining primary school education respectively. The mean farming experience was 6 years for both groups. Furthermore, the study revealed that fluted pumpkin enterprises was more profitable than water leaf, with a net profit of $177.0473 and $324.4252 for waterleaf and fluted pumpkin enterprise respectively. The family labour cost was the only significant factors affecting water leaf production at 5% level probability whilst pesticide cost and size of plot were the two significant factors affecting fluted pumpkin production. It was recommended for farmer of fluted pumpkin enterprise to improvised organic pesticide which will help reduce cost and as well increase their land holding for maximum and profit.

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Vegetables are frequently becoming valuable as agricultural product for local and foreign trades the importance of vegetable in the diet of people in the third world countries is becoming a major focus in our food policy and nutrition plan as yet the poor diet is still being improved with readily available and accessible green leafy vegetables (Isibhakhomen, 2019). From all available statistics, it has become apparent that per capital food production as well intake in Nigeria has steadily declined over the last decades in spite of major government agricultural programmes for a variety of reasons. These includes high population growth rate (2.5 – 3.0), poor marketing and food distribution, rural – urban drift, low purchasing power and/or lack of access to food among others. It is therefore apparent that low average per capita food intake as well as energy, consequent upon inadequate food supplies, lack of adequate nutrition information and the poor utilization of existing food resources constitute, perhaps the greatest obstacles to human and national development in Nigeria (Igene, 1996). The component of our nutrition plan that has been so easily neglected or has evade the focus of nutritionist are green leaf vegetable, it has become on orphan crop with no much production level as compared to others although not much data or many reports on the size of the current/potential market for vegetables in Africa are available, it is certainly a market could become important for vegetable producers in SSA region, at the moment most of the production is supplied domestically (Bansil, 2016). Yet vegetables have the ability to undermine the nutrition status of the Nigeria

because they have great ability to enhance the nutrition and health of consumers as most are good sources of mineral, vitamins and proteins necessary for a healthy working force. The two vegetables of this research concern are water leaf and fluted pumpkin, both are easy to cultivate and access, there is no evidence of occupational, cultural and location differences in their utilization farming in Benin Hence, this paper evaluates economic analysis of water leaf and fluted pumpkin Metropolis, Edo State, Nigeria

MATERIALS AND METHODS

The study was carried out in Ovia North East Local Government Area of Edo State. It has an estimated population of 153,849 people (Population census, 2006). It is situated between latitude $05^{0}44'$ and 07034^{1} E and longitudes $05^{0}041$ and $06^{0}43^{1}$N. Its headquarters is at Okada, Ovia North East LGA consists of twelve (12) districts which includes; Adolor, Iguoshodin, Isiuwa, Okokhu, Oduna, Ofumwogbe Oghede, Okada, Oluk, Uhen, Uhiero, Utoka, the major occupation of the people is farming.

The population of the study was mainly waterleaf and fluted pumpkin leaf producers and sample was drawn using a multi-stage sampling technique in the first stage, Ovia North East LGA was purposively selected from the five L.G..A'S in Benin metropolis because the belt of intensive waterleaf and fluted pumpkin farming is domiciled in this LGA. In the second stage a simple random technique was used to select Eight (8) communities out of the list of communities in the department of Agriculture of the LGA. Finally, 90 farmers were randomly selected from the list of Agricultural development prograamme (ADP) registered vegetable farmers comprising 31 water leaf and 59 fluted pumpkin leaf famers respectively.

The source of information were primary data. It was collected through the administration of structured questionnaire using oral interview and direct observation during the survey period. The analysis of collected data was achieved using descriptive statistics, net farm income analysis and multiple Regression model.

Analytical Techniques: Net farm income was used to analyze and compare the cost and return between water leaf and fluted pumpkin. Farm budgeting is a detailed physical and financial plan for the operation of a certain period. Farm budgeting helps the farmer to compare how profitable different kinds of enterprises combinations. Farm budgeting involves considering the resources and calculation of expected receipts, expenditure and net farm income (Olukosi and Erhabor, 1988).

Specification of Net farm income

$$NFI = GI - TC \quad 1$$

$$TC = TVC + TFC \quad 2$$

Where; NFI = Net farm income (₦/ha); GI = Gross income (₦/ha); TVC = total variable cost (₦/ha); TFC = total fixed costs (₦/ha)

The variable components includes; Cost of seeds (₦); Cost of fertilizer (₦); Cost of herbicide (₦); Cost of labour (₦); Cost of Pesticides (₦)

The fixed cost component includes; Depreciation of farm tool; Rent on land (₦); Total revenue; Total costs

T-test was used to compare the profitability of waterleaf and fluted pumpkin enterprise, it is given as;

Production Function Analysis: Multiple regression model was used to examine input – output relationship and the implicit form of the model is given by;

$$Y = F(X_1, X_2, X_3, X_4, X_5, X_6, X_7, U_1) \quad (3)$$

Where Y = Output of vegetable crop production in kg; X_1 = planting material (seeds in kg); X_2 = fertilizer (kg)
X_3 = herbicides (kg); X_4 = pesticides (kg); X_5 = Farm size (hectares); X_6 = Family Labour (Man/days); X_7 = Hired Labour (man/days); μ = error term

The explicit form of this function takes the following forms

$$Y = \beta 0 + b_1x_1, + b_2X_2, + b_3X_3, + b_4X_4, + b_5X_5, + b_6X_6, + b_7x_7, + \mu \quad 4)$$

Where; Y = as specified above; $X_1 - X_7$ = as specified above; $B_0 - B_7$ are parameters to be estimated

RESULT AND DISCUSSION

Socio-economic characteristics of respondent: Table 1 shows that majority of both water leaf and fluted pumpkin leaf farmers were females 74.4% and 84.3% respectively. It could be seen from the results that females engage more in vegetable farming than other male counterparts, this findings corroborate the study of Odiaka and Akorada (2008) as well as that of Nwosu, Onyeneke and Okoh (2012). It is also shown in the table that 35.9% and 35.2% of both sampled vegetable farmers were between the ages of 41 – 50 years with a mean age of 52 and 53 years respectively. Thus, majority of the sampled vegetable farmers were middle aged. The modal class of educational level of respondents of both groups was primary education

56.4% and 58.8% respectively. This is not surprising as this LGA is the most educationally disadvantaged in the study area. Finding also showed that a simple majority of both waterleaf and fluted pumpkin leaf farmers (53.8% and 51%) respectively had (1-4 persons in their households. Finding further revealed that majority of water leaf and fluted pumpkin leaf farmers were married 82% and 90% respectively. Finally, the results of socio-economic data showed that majority 58.9% and 54% of both farmers expressed having 1 to 5 years farming experiences.

Table 1: Socio-economic characteristics of waterleaf and fluted pumpkin leaf farmers

		Waterleaf farmers			Fluted pumpkin leaf farmers		
Variable	**(x)**	**Frequency**	**%**	**(x)**	**Frequency**	**(x)**	**%**
Sex							
Male		10	25.64		8		15.64
Female		29	74.36		43		84.31
Total		39	100		51		100
Age							
< 30		0	0		0		0
30 – 40		5	12.82		6		2.0
41 – 50		14	35.90		18		35.29
51 – 60	**52**	12	30.77	**53**	16		31.37
61 – 70		8	20.51		11		21.57
> 70		0	0		0		0
Total		39	100		51		100
Educational status							
No formal education		9	23.08		9		17.6
Primary education		22	56.41		30		58.82
Secondary education		5	12.82		6		11.76
NCE		1	2.56		4		7.84
OND		2	5.13		2		3.92
Total		39	100		51		100
Household size							
1 -4		21	53.85		35		50.98
5 – 8		17	43.59		16		45.10
9 – 12	**5**	1	2.56	**5**	2		3.95
Total		39	100		51		100
Mean		5			5		
Marital status							
Single		4	10.26		5		9.8
Married		32	82.05		4		90.2
Divorced		3	7.69		-		-
Total		39	100		51		100
Farming Experience							
1-5		23	58.97		28		54.90
6 -10	**6**	13	33.33	**6**	22		43.14
11 – 15		2	5.13		1		1.96
16 and above		1	2.56		0		0
Total		39	110		51		100

Source: *Field survey (2021)*

Gross Margin Analysis of vegetable crop production: The estimated cost and returns analysis of waterleaf and fluted pumpkin production in the study area is shown in table 2. The table show that the highest cost component for water leaf was pesticide at ₦7,000 while for fluted pumpkin leaf the highest cost component was the cost of fertilizer ₦9,591 the lowest cost component was market charges for both vegetable production with estimated value of ₦385.00 and ₦411.00 respectively.

From the Table waterleaf production had a total cost of ₦44,863 per ha per production cycle while fluted pumpkin leaf production incurred on average cost of ₦52,737 per ha per production cycle. The gross margin estimate for waterleaf and fluted pumpkin leaf production were ₦143,358.00 and ₦ 254,477.00 respectively while the total revenue for waterleaf and fluted pumpkin cost were ₦176,75.00 and ₦294,272.00 respectively.

The evidence of profitability of both waterleaf and fluted pumpkin leaf farmers is shown by the net farm income of ₦131,812.00/ha and ₦341,535.00/ha respectively. Also, the returns on a naira invested is ₦2.94 for farmer engaged in waterleaf production and N4.58 for farmers into fluted pumpkin leaf production. This shows that fluted pumpkin leaf production was more profitable in the study area, a probable reason might not be unconnected with the high demand and versatility in the usage of fluted pumpkin and nutrient value.

Table 2: Cost and return of waterleaf and Fluted pumpkin per ha

Category	Water leaf Mean	Pumpkin Mean
Variable Cost	**₦**	**₦**
Seed cost	1,876.00	6,666.00
Fertilizer cost	6,783.00	9,591.00
Herbicide cost	4,893.00	5,611.00
Pesticide cost	7000,00	4,167.00
Transport cost	750.00	847.00
Market charges	385.00	411.00
Labour cost (hired)	5,792.00	5,588.00
Labour cost (Family)	5,838.00	6,914.00
TVC	33,317.00	39,795.00
FIXED COST		
Depreciation (Total)	2,649.00	2,866.00
Cost of land rent/ha	8,897.00	10,076.00
TFC	11,546.00	12,942.00
REVENUES		
Unit price bundle	**955.00**	**986.00**
Quantity harvested	**185.00**	**304.00**
TR	**176,675.00**	**294,272.00**
GM	**143,358.00**	**254,477.00**
NI	**131,812.00**	**341,535.00**
ROI	**2.94**	**4.58**

Difference is significant at 5% (5 = 2.95, df = 88, prob < 0.01)
Source: Field Survey, (2021)

Production function analysis: The Production function that was used to determine the effect of factors affecting the production of both water leaf and fluted pumpkin was multiple linear logistic regression and results is shown in Table 3. The above was chosen being the lead equation. The value of coefficient of determination (R^2) for both waterleaf and fluted pumpkin was 0.464 and 0.659 respectively indicating that about 46% and 69% of variation in output of waterleaf and fluted pumpkin is explained by the input include in the regression model while the remaining 53% for waterleaf and 44% for fluted pumpkin leaf is as a result of non-inclusion of some explanatory variable as well as other factors outside the control of the farmers.

Result also showed that the cost of family labour was significant at 50% level of probability for water leaf production enterprise while for fluted pumpkin production, the variables that were positive and significant at 5% level of probability were the cost of pesticides and size of land holdings.

This result implies that cost of family labour was positive and has significant effect on water leaf production while for fluted pumpkin, variables captured to have relevant and significant effect on output were cost of pesticide and land size. This is consistent with apriori expectation.

Table 3: Multiple Regression Analysis for the factors that affect production of waterleaf and fluted pumpkin leaf production

	B	**Std. Error**	**T-value**	**Prob. Level**	**B**	**Std. Error**	**T-value**	**Prob. Level**
Constant	50.37	43.144	1.167	0.252	22.920	6.0398	0.398	0.70
Seed cost	0.011	0.019	0.562	0.578	0.007	0.008	0.924	0.361
Fertilizer cost	0.001	0.004	0.177	0.866	0.005	0.003	1.531	0.133
Herbicide cost	0.010	0.007	1.456	0.155	0.004	0.009	0.470	0.641
Pesticide cost	0.026	0.015	1.787	0.084	0.045	0.021	2.149	0.037
Labour cost (Hired)	0.002	0.004	0.559	0.580	0.007	0.007	0.990	0.328
Labour cost (family)	0.010	0.004	2.308	0.028	0.002	0.006	0.367	0.715
Plot size (ha)	16.100	38.307	0.420	0.677	159.637	460.067	3.465	0.001
R- Square = 0.464					R square = 0.659			
Adjusted R square = 0.343					Adjusted R square = .604			
Std. Error of estimate = 82.829								

Significant at 5%; Source: Field survey (2021)

Conclusion: The results from the study showed that fluted pumpkin leaf production enterprise had more profit in vegetable crop production than their counterparts who were engaged in waterleaf production enterprise.

Also, the net return on a naira invested was more for farmers engaged in fluted pumpkin leaf enterprise than farmers who were engaged in water leaf enterprise. It is recommended therefore, for farmers to form co-operative society which will empower them financially to increase its production because of the profitability of fluted pumpkin farming.

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