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Profit Function of Wet and Dry Season Smallholder Fluted Pumpkin Production in Southeast, Nigeria

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ABSTRACT

*The study analyzed profit function of wet and dry season smallholder fluted pumpkin production in Southeast, Nigeria using 360 smallholder fluted pumpkin farmers selected through multistage and purposive sampling techniques with the aid of structured questionnaire. Data collected were analyzed using descriptive statistics and profit function model. Results in wet season indicated that the value of the coefficient of multiple determination was 0.890546 which showed that 89% of the changes in profit of fluted pumpkin was accounted for by the explanatory variables included in the model. The F-ratio 342.7724 which was significant at 1% level showed that the coefficients of the explanatory variables included in the model were statistically different from zero. The Durbin Watson value of 1.8999 showed the absence of Autocorrelation. The output price (0.23864) and output quantity (93.1021) were positive and significantly related to profit at 1% probability level. The mean of the average production costs (-27.0568) was negatively significant to profit at 1% level, which implied that a 10% increase in the cost of production of fluted pumpkin would lead to 270% reduction in the profit level. Results in dry season showed that the value of the coefficient of multiple determination (R^2) was 0.855158 which showed that 86% of the changes in profit of fluted pumpkin were accounted for by the explanatory variables included in the model.The f-ratio (123.61630) which was significant at 1% level revealed that the coefficients of the explanatory variables included in the model were statistically different from zero. The Durbin Watson value of 1.984264 showed the absence of Autocorrelation. The output price (0.2266) and output quantity (40.3517) were positive and significantly related to profit at 1% significant level. The mean of the average production costs (-23.1937) was negatively significant to profit at 1% level, which implied that a 10% increase in the cost of production of fluted pumpkin would lead to 231% reduction in the profit level. It would be concluded that fluted pumpkin production in Southeast Nigeria is profitable. There is need for farmers and youths who are yet to engage in agriculture especially fluted pumpkin production to tenaciously embrace its cultivation due to its economic viability, profitability, productivity and sustainability in Southeast Nigeria.***

INTRODUCTION

Fluted pumpkin (*Telfairia occidentalis* Hook. F), is one of the most widely cultivated leafy vegetables in southern Nigeria and it is however, now cultivated in almost all parts of the country (Igbozulike, 2015). It is mostly grown in southern Nigeria for its leaves as important sources of protein, vitamins and minerals when consumed (Sakpere *et al*. 2016). Fluted pumpkin is a perennial crop grown on well-drained soils, slightly shaded and mulched but not so soggy soils (Olowa & Olowa, 2016). However, in Southeast, the crop is grown on poor soils as an annual during the rainy season and also during the dry season around rivers or water sources. It is grown alongside with crops such as cassava, melon, pepper and yam. It is very important in the diet of children, men, women, nursing mothers as well as livestock due to its high nutritive value (Utobo, Ezeano, Umebali, Okeke & Nwibo, 2022). Apart from this, it provides an appreciable income to small scale farmers (Utobo, Ngbede, Nwanguma & Nwankwo, 2017).

Fluted pumpkin production generates more jobs per hectare, on-farm and off-farm, than staple based agricultural enterprises like yam, rice, and so on, because of of its low cost of production (Layade *et al.*, 2020). This benefits farmers and landless laborers in both rural and urban areas as they can comfortably cultivate in their backyards, home gardens and along river banks. Value addition to fluted pumpkin generates further employment in the associated agri-businesses and further down the commodity chain from the producer to the consumer as the leaves and seeds of fluted pumpkin are now processed and packaged in different forms for future usage especially during scarcity (Ibeawuchi *et al*., 2015).

Fluted pumpkin production can generate higher profits than staple crops, especially when land is relatively scarce and labor is abundant. The value of fluted pumpkin, economically, per unit area is significantly higher than the value of other leafy vegetables. Although the costs of inputs such as labor can be higher, the profits are higher and the income thus generated can be used for many different purposes in terms of eradication of hunger and affording access to education and health care (Ibeawuchi *et al*., 2015). Consumers of fluted pumpkin have increased tremendously over the years; the reason for this increase and acceptance is that the seeds, shoots, leaves and stems are consumed as food by man and fodder for animals (Olabanji, Ibrahim & Olayiwola, 2018). The ecological zones in the country support varieties of crop production, ranging from cereals in the savanna region, root and tree crops in the rain forest and vegetables in all ecological zones (Akpan, Udo, Bassey, Inya-agha & Udo, 2012). Vegetable production has been inconsistent in Nigeria; for instance, in 2005 about 4924.9 thousand tones were produced, while 2487.7 thousand tones were produced in 2006 (Ibeawuchi *et al.,* 2015). Fluted pumpkin leaves and seeds are good sources of protein, mineral salts, sugars, vitamins, and essential oils that increase man's resistance to disease (Sakpere *et al*., 2019). Layade, Adeoye, Ngbede & Utobo (2020) asserted that increased fluted pumpkin production improves food security and offer employment opportunities to many rural women in Nigeria. In the Southern region of Nigeria, fluted pumpkin is popular due to its high consumption rate, easily traced to its affordability (Layade, *et al.* 2020). Fluted pumpkin (*Telfairia occidentalis*) is among the major leafy vegetables grown by farmers in the southeastern region of Nigeria (Akpan, Udoh, Bassey, Inya-Agha, & Udoh, 2012). The popularity of this vegetable crop had been linked to low cost per unit of resource use in production, short gestation period and quick returns on investment compared to other vegetable crops (Akpan *et al.*, 2012; World Health Organization, 2020).

Fluted pumpkin (*Telfairia occidentalis*) cultivation serves as a vital source of income and sustenance for smallholder farmers in the Southeast region of Nigeria. Some of the primary challenges faced by smallholder farmers in the region pertains to the limited access to modern farming techniques, advanced agricultural inputs, and effective production management practice. The lack of technological resources and technical knowledge often leads to suboptimal resource allocation and inefficient farming practices, ultimately impacting the overall productivity and economic returns of fluted pumpkin cultivation. Additionally, the inadequate infrastructure, market linkages, and price fluctuations pose further obstacles for smallholder farmers, limiting their ability

to achieve sustainable profitability and economic stability. It is against these backgrounds that the study set to estimate the profit function of wet and dry season smallholder fluted pumpkin production in southeast, Nigeria.

However, the following null hypotheses were tested to guide the study in arriving at meaningful results:

Ho_1: Fluted pumpkin production in wet season is not a profitable enterprise.

Ho_2: Fluted pumpkin production in dry season is not a profitable enterprise.

Empirical Review

Several studies in Nigeria have been carried out to analyze profit function of vegetable crops and more specifically, fluted pumpkin production.

Ume *et al.* (2021) Examined profit function of aquaculture farmers from selected states in South East, Nigeria using Cobb –Douglas stochastic production frontier function was studied using 120 farmers selected using purposive and multi stage random sampling techniques. A structured questionnaire was used to elicit primary data. Percentages responses, multiple regression model based on Stochastic Frontier Profit Function which assumed Cobb-Douglass specification form and Inefficiency function and gross margin analysis were used to address the objectives of the study. The major results of the study showed that the coefficients of prices of feeds, fingerlings, drugs, fertilizer and pond size were positive. Whereas, the coefficient of labour was negative and cut across all States, the coefficient of water was negative among Abia State farmers. Furthermore, the coefficients of age, educational levels, cooperatives and extension services were positive and cut across all States. Also, the coefficient of credit was negative and significance only in Anambra and Ebonyi States. The production of catfish and tilapia was profitable in the study area with high gross margin and Net farm income. The limitations to aquaculture production as well in the study areas were poor access to credit, water problem, poor fish breeds, poor access to extension services, high costs of building materials, feed and labour, and cannibalism. The need to improve farmers' access to credit, extension services, good fish breeds among others were proffered.

Barbaz *et al.,* (2020) Estimated profit function of wheat crop in Dhi Qar Province This research aimed to study the most important factors affecting profit function. Cross sectional data were used in the light of a random sample of 130 farmers in Dhi Qar province. The results showed that the proportion of costs of production inputs amounted to 73% of the total production costs. Also, profit function showed that the amount of output has a significant impact on profit compared to other independent variables since value of the parameter of the quantity of production amounted to about 308879Kg and was significant at the level of 1% according to t-test. The coefficient determination of about 93% for the equation estimated with OLS. However, heteroscedasticity was obvious according to the White Test. So the model was estimated using robust regression method to avoid this problem, but that led to a decrease in R^2 to about 69%. The research recommended the need to increase the rates of production growth and productivity through an organized agricultural economic policy that links the policy of supporting input requirements, both in terms of reducing prices or providing quantity and quality, especially fertilizers and seeds in conjunction with the policy of supporting prices of output. Also, research recommended encouraging farmers to expand wheat crop cultivation in the province of Dhi Qar by increasing the cultivated areas.

Tuncel and Kizilok (2022) determined the factors affecting profit by quantitative methods in broiler enterprises. This study was carried out to demonstrate how a regression model can be used as a decision support tool in the poultry sector, using variables that affect profit, within the scope of broiler enterprises that are engaged in contract production depending on broiler integrations. Enterprises included in the study were selected from Bolu, Sakarya and Ankara provinces those that have the 24% of the rearing flocks and the integrations in Turkey. The 68 out of 9872 broiler enterprises existing in Turkey in 2017 were included in the study by simple random sampling

method. The regression model obtained because of this study allowed producers and institutions providing consultancy services in the broiler sector to monitor the marginal effect of variables that affect profit. As a result, when price and cost factors change under different risk conditions, the research model can be used as a decision support tool.

Emegha-Okonkwo, Achoja, and Okeke, (2019) examined financial benefits of organic farming of fluted pumpkin in Nigeria using 60 organic farmers. Data collected were analysed using descriptive and inferential statistical tools. The result of the study shows that the net return to farmer was ₦188, 450 for organic fluted pumpkin production per farmer per production cycle. The test of hypothesis shows that there is significant positive difference in the gap between costs incurred and farm income earned in organic fluted pumpkin production. Factor analysis indicated that cost of labor and transportation of materials were the major determinants of profitability of organic fluted pumpkin production. Further result shows that the most serious constraints in organic production of fluted pumpkin were inadequate finance and under developed transportation system. It was recommended that financial institutions including cooperative societies should make credit available to organic fluted pumpkin farmers at relatively low interest rate to boost organic fluted pumpkin production.

Isibor, Okonkwo-Emegha, and Okafor. (2020) analyzed the profit of organic and non-organic farming among small holder fluted pumpkin farmers in Cross River State using 240 respondents selected using multistage sampling technique. Data obtained was analyzed by Enterprise budgeting method. Results indicated that the profit realized by organic fluted pumpkin farmers in Cross River State was ₦260, 060, while that of non-organic (conventional system) was ₦187, 360 per farmer per one hectare. The study concluded that organic system of vegetable production was more profitable than conventional system. It was recommended that farmers should concentrate more on organic system of fluted pumpkin production to enable good profit.

Onah, Opata, Ume, Agu, Ukwuaba, and Ume, (2022) assessed the profitability difference of selected vegetable marketers in Enugu State, Nigeria using multistage and purposive sampling techniques. Data generated were analyzed using descriptive and inferential statistics. The profitability analysis of fluted pumpkin and green amaranth marketers revealed that a gross margin of ₦25,210.0 was made by the fluted pumpkin marketers and ₦23,572.0 was made by the green amaranth marketers per month. The results of the analysis of factors affecting profitability among the fluted pumpkin marketers and green amaranth marketers revealed five variables to be significant viz: household size (-7.9043 and -7.3153), gender of the household head (0.372203 and 0.3948026), access to credit (-2.8746 and -3.0151), machinery access (8.16172 and 8.018447) except for farm size (0.1244789) which was significant for only fluted pumpkin marketers

Obiesie, Komolafe, and Meludu (2022) examined the profitability of organically produced fluted pumpkin in Anambra State using Multistage and purposive sampling techniques. Data were analyzed using descriptive statistics, gross margin (gm), budgetary analysis and 5-point likert scale. Majority of the farmers were female (84.4%) with an average age of 51years and were mostly married (91.1%). About (41.1%) had primary education, majority (85%) belong to cooperative society and only (78.3%) had contact with extension agent. The average household size was 6 persons and the average farm size is 0.52ha. The revenue from organic fluted pumpkin was ₦141902.00, the total variable cost and fixed cost were ₦55436.92 and ₦11815.23 respectively. The gross margin was N86465.09, while the net return was ₦74649.86. The profitability index and return on investment were 2.56 and 1.11 respectively. Inadequate finance, high cost of seeds, inadequate information and high cost of manure were some of the challenges of farms. Active participation in cooperatives is recommended to reduce the challenges of farmers and increase profitability

Methodology

The study was conducted in Southeast Nigeria. Southeast Nigeria (Igboland) is a region of Nigeria that borders Cross river state to the east, River state to the south, Benue State to the north and on longitude 8^{o} 30^{1}N and latitude 5^{o} 45^{1} N. It is composed of the following states: Abia, Anambra, Ebonyi, Enugu, and Imo with population of 16.4 million people and projected population of 22 million people (National Population Commission, (NPC), 2006; National Bureau of Statistics, (NBS), 2017). Southeast Nigeria has a total land mass of approximately 41,440Km^2 square kilometers. Agriculture is the major backbone of the economy of southeastern Nigeria (Ebonyi State Agricultural Development Programme, (EBADEP), 2016). Petty trading, blacksmithing, pottery and weaving are some of the non-farm activities prevalent in the region. Industries found in the region include rice milling industry, the fertilizer blending plant and the building materials industry. Large deposits of solid mineral resources, such as lead, gypsum, limestone, marble stone, common salt and even crude oil exist in almost all the states in the region. The vegetation is a mixture of savanna and semi-tropical rainforest. The vegetation predisposes the region to growing of different crops which include: rice, yam, cassava, cocoyam, groundnut, cowpea and vegetables. Extensive system of rearing livestock is predominant with fish farming being exceptionally predominant in some parts of the region (EBADEP, 2016)

Sampling Techniques

A multi-stage and purposive sampling techniques were used in the selection of the respondents for this study.

Stage I: This stage involved the purposive selection of three states out of the five states in Southeast Nigeria namely Ebonyi, Enugu, and Imo because of their dominance in fluted pumpkin production (Ebonyi State Agricultural Development Project, 2016).

Stage II: Two (2) Senatorial zones were randomly selected from each of the three (3) States to give six (6) senatorial zones.

Stage III: Two (2) Local Government Areas, LGAs were randomly selected from each of the six (6) Senatorial zones to give twelve (12) LGAs.

Stage IV: Three (3) communities were randomly selected from each of the twelve (12) LGAs to give thirty-six (36) communities

Stage V: Ten (10) smallholder fluted pumpkin farmers were randomly selected from each of the thirty-six (36) communities to give three hundred and sixty (360) smallholder fluted pumpkin farmers. This formed the sample size for the study.

Model Specification

The following models were used for the study; profit function and principal component factor analysis model.

Profit function model

The index of the f-ratio of this model was used to answer the hypothesis of profitability of fluted pumpkin production in the study area.

Profit (Π) = $\beta_0 + \beta_1$ P– β_2C + β_3Q + et

Where; Π = Profit, P = output price of fluted pumpkin (₦), C = average production costs (₦),

Q = Output quantity of fluted pumpkin (kg/ha), $\boldsymbol{\beta}_0$ = intercept, $\boldsymbol{\beta}$i = represents regression coefficients, et = Random disturbances

Hypotheses Testing

The hypotheses for the study were tested using F-test at 5% level of significance. Quantitatively,

$$F^{*}cal = \frac{R^2/(K-1)}{(1-R^2)/(N-K)}$$

Where:

N = Number of Observations, K = Number of Variables, R^2 = Coefficient of Determination

Decision Rule; If F*cal>F*tab, reject the null hypothesis, H_O;

If F*cal<F*tab, accept the null hypothesis, H_O.

RESULTS AND DISCUSSIONS

Table 1: The Socioeconomic Characteristics of Fluted Pumpkin Farmers

Variable	Freq (N=360)	Percentage (%)	Mean $\overline{X}$
Sex			
Males	130	36.00	
Females	230	64.00	
Age (years)			
< 30	120	33.33	
30-40	168	46.67	
41-50	52	14.44	40.40
>51	20	5.56	
Marital status			
Married	140	38.89	
Single	60	16.67	
Divorced	40	11.11	
Widow	120	33.33	
Level of education			
No formal education	50	13.89	
FSLC	96	26.67	
JSSC/SSSC	108	30.00	
OND/HND	96	26.67	
B.Sc/M.Sc/ Ph.D	10	2.78	
Farming experience (years)			
<5	47	13.06	
5-10	129	35.83	
11-15	134	37.22	10.14
>15	50	13.89	
Farm size(ha)			
<1	300	83.33	
1-3	51	14.16	0.54
>3	21	5.83	
Annual Farm Income (₦)			
< 100,000	246	68.33	
100,000- 200,000	94	26.11	₦ 150,000
> 200,000	20	5.55	

Household size			
<5	120	33.33	
5-10	200	55.55	7.5
>10	40	11.11	
Extension Contact			
Yes	116	32.22	
No	244	67.78	
Co-operative membership			
Yes	300	83.33	
No	60	16.67	

Source: Field Survey 2024

Table 1 revealed that majority (64%) of fluted pumpkin smallholder farmers were females. This implied that females were more engaged in fluted pumpkin production compared to their male counterpart in the study area. This finding agreed with the findings of Addebiyi and Adejumo (2017) and Jobirov, Yuejie, Kibona (2022) who reported that women were more involved in vegetable production. The results also showed that the smallholder fluted pumpkin farmers had average age of 40years. This average age implied that they were within the active population. This is consistent with the findings of Esiobu et al., (2019) who reported that farmers in their active working age are adopters, innovative and good risk managers.

Results further revealed that majority (39%) of the farmers were married. The result meant that fluted pumpkin production was undertaken mainly by married people. This finding is in consonance with the findings of Eze et al., (2015) who reported that married people were mostly engaged in farming activities with their household as a way of diversifying their household income. Results of farming experience showed that fluted pumpkin farmers in the study area had 12.20years average farming experiences. This implied that farmers with more years of farming experiences would be more efficient in input combination, better knowledge of climate change issues, market fluctuations in prices and as such would operate a more effective and profitable agricultural production activities. This was also in conformity with Esiobu et al., (2019) who reported that past knowledge of agricultural production management gives the farmers the leverage of setting attainable objectives.

The results of the farm size of fluted pumpkin farmers revealed that they operated on the average of 0.54ha of land. This result implied that fluted pumpkin farmers in the study area were micro-holder farmers according to Small and Medium Enterprises Development Agency of Nigeria (SMEDAN), (2017) who reported that micro enterprise farmers are those that operated on less than 5hectares of land and employed less than 5 persons. Result also showed that smallholder fluted pumpkin farmers had average annual income of N 150,000. This implied that fluted pumpkin production is not the only source of livelihood of the smallholder farmers. This is consistent with the findings of Nwibo and Okorie (2013) who reported that farmers with higher farm income would easily be involved in entrepreneurial activities than those of their counterpart who have poor farm income.

Results of extension contact indicated that majority (68%) of the farmers had no contact with extension agents and as such, might affect their production output. This agreed with the findings of Benjamin et al., (2020) who reported that inadequate extension contacts are detrimental to the productivity of farmers due to poor advisory services and on farm teaching.

Table 2: Profit Function of Fluted Pumpkin in Wet Season

Variables	Coefficient	Std. Error	t-value	Prob.
Constant (C)	7342.3720	902.3350	8.1371	0.0018
Price of output (PY)	0.2386	0.0170	14.0353	0.0000
Average Total Cost	-27.0568	3.5784	-7.5611	0.0021
Output Quantity (Y)	93.1021	15.5784	5.9764	0.0132
R-squared	0.890546		Mean dependent var	14308.95
Adjusted R-squared	0.823282		S.D. dependent var	9936.853
S.E. of regression	10051.86		Akaike info criterion	21.40047
Sum squared resid	1.82E+09		Schwarz criterion	21.54968
Log likelihood	-221.7049		Hannan-Quinn criter	21.43285
F-statistic	342.7724		Durbin-Watson stat	1.8999
Prob. (F-statistic	0.000000		Observation	360

Source: Field Survey, 2024

Results in Table 2 indicated that the value of the coefficient of multiple determination was 0.890546 in the function, which reflects the goodness-of-fit of the regression line, showing that 89% of the changes in profit of fluted pumpkin was accounted for by the price of fluted pumpkin, quantity of output and average production costs. Similarly, the value of the f-ratio of the model was 342.7724 which was significant at 1% level revealed that the coefficients of the explanatory variables included in the model were statistically different from zero, hence the goodness-of-fit of the model. The Durbin Watson value of 1.8999 showed the absence of Autocorrelation. The output price (0.23864) and output quantity (93.1021) were positive and significantly related to profit at 1% probability level. The output price implied that a unit change in the output price would increase the profit level by 24%. The mean of the average production costs (-27.0568) was negatively significant to profit at 1% level, which implied that a 10% increase in the cost of production of fluted pumpkin would lead to 270% reduction in the profit level. This finding was in consonance with Onah *et al.* (2022), Ume *et al.* (2021) and Tuncel and Kizilok (2022) who maintained that increase in cost of production would lead to reduction in profit.

Table 3: Profit Function of Fluted Pumpkin in Dry Season

Variable	Coefficient	Std. Error	t-Statistic	Prob.
Constant (C)	1015.1280	74.3011	13.6624	0.00015
Price of Output (PY)	0.2266	0.0174	13.0230	0.00039
Average total cost (ATC)	-23.1937	3.8421	-6.0367	0.01233
Output Quantity (Y)	40.3517	1.9460	20.7357	0.00005
R-squared	0.855158	Mean dependent var.		12685.79
Adjusted R-squared	0.818948	S.D. dependent var.		8791.167
S.E. of regression	3740.665	Akaike info criterion		19.49617
Sum squared resid	0.24E+08	Schwarz criterion		19.74487
Log likelihood	-199.7098	Hannan-Quinn criter		19.55014
F-statistic	123.61630	Durbin-Watson stat		1.984264
Prob.(F-statistic	0.000002	Observation		360

Source: Field Survey, 2024

Results showed that the value of the coefficient of multiple determination (R^2) was 0.855158 in the function, which reflects the goodness-of-fit of the regression model, showing that 86% of the changes in profit of fluted pumpkin were accounted for by the price of fluted pumpkin, quantity of output and average production costs included in the model. Similarly, the value of the f-ratio of the model was 123.61630 which was significant at 1% level revealed that the coefficients of the

explanatory variables included in the model were statistically different from zero, hence the goodness-of-fit of the model. The Durbin Watson value of 1.984264 showed the absence of Autocorrelation (Table 3). The output price (0.2266) and output quantity (40.3517) were positive and significantly related to profit level at 1% significant level. This showed that output price and quantity supplied to the market were directly related. The output price implied that a unit change in the output price would increase the profit level by 23%. The mean of the average production costs (-23.1937) was negatively significant to profit at 1% level, which implied that a 10% increase in the cost of production of fluted pumpkin would lead to 231% reduction in the profit level. This finding was in consonance with Onah et al. (2022), Ume et al. (2021) and Tuncel and Kizilok (2022) who maintained that increase in cost of production would lead to reduction in profit.

Test of Hypotheses

$Ho_{1:}$ Fluted pumpkin production is not a profitable enterprise in the rainy season

The stated hypothesis was tested using F-test of the profit function model that related profit (dependent variable) to price of output, production cost and output quantity. From the point of view of the significant value of the f-ratio (342.7724), Table 2, the stated null hypothesis was rejected and would be concluded that fluted pumpkin production is a profitable enterprise in the rainy season in Southeast, Nigeria. This finding was in consonance with the findings of Oluwalana *et al.,* (2019); Onugu *et al.,* (2021) and Ezeano *et al.,* (2022) whose works reported the profitability of fluted pumpkin production in their various study locations.

$Ho_{2:}$ Fluted pumpkin production is not a profitable enterprise in the dry season

The stated hypothesis was tested using F-test of the profit function model that related profit (dependent variable) to price of output, production cost and output quantity in the dry season (Table 3). From the point of view of the significant value of the f-ratio (123.61630), the stated null hypothesis was rejected and would be concluded that fluted pumpkin production is a profitable enterprise in the dry season in Southeast, Nigeria. This was supported by the findings of Olowa and Olowa (2016); Oluwalana *et al.,* (2019); Onugu *et al.,* (2021) and Utobo *et al.,* (2022) whose studies reported the profitability of fluted pumpkin production.

CONCLUSION AND RECOMMENDATIONS

Based on the findings of the study, the research concludes that fluted pumpkin production in Southeast Nigeria is profitable.

There is need for farmers and youths who are yet to engage in agriculture especially fluted pumpkin production to tenaciously embrace its cultivation due to its economic viability, profitability, productivity and sustainability in Southeast Nigeria. There is also need to develop and provide modern means and techniques that will raise the level of productivity and reduce costs to ensure effectiveness of productive resources and optimization of economic efficiency. Government should also assist the fluted pumpkin growers in providing the needed inputs especially improved varieties to enhance fluted pumpkin production in the zone.

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