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Profitability of organically produced fluted pumpkin among small holder farmers in Anambra State.

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Abstract: Organic agriculture (OA) is rarely practiced, despite its numerous advantages to human and environment. Evidence of profitability has been spotted as potential instrument for adoption. Although few studies have shown (OA) to be profitable, evidence of its profitability indices that will increase adoption is scarce. Thus, the profitability of organically produced fluted pumpkin in Anambra State was examined. Multistage sampling technique was used. Ogbaru, Anambra west, Ihiala, Awka South, Idemili North and Anaocha Local Government Areas (LGAs) were purposively selected due to high dominance of fluted pumpkin organic farmers. Three villages were then randomly selected from each LGA. Snowball sampling was then used to select ten (10) organic pumpkin farmers, since the list of these farmers were not available. Total of thirty (30) farmers were sampled per LGA, in all, one hundred and eighty (180) were sampled. Structured questionnaire was used to collect data on farmers' characteristics, farm enterprises and farmers' challenges. 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 51 years 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 ₦86465.09, 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.

Keywords: Organic agriculture, Budgetary analysis, Vegetable

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I. Introduction

Agricultural practices need to change to meet the United Nations (UN) Sustainable Development Goals (SDGs) by 2030. However, to achieve the SDGs may not be an easy one, as a result of difficulties surrounding agricultural practices most especially organic agriculture. Organic agriculture, although not a silver bullet, is a useful component in such strategy (Eyhorn, Muller, Reganold, Frison, Herren, *et al*, 2019). Organic agriculture is gradually gaining acceptance across the globe as it is proven to be environmentally friendly and sustainable compare to conventional agriculture (Dholakia and Shukul, 2012).

Organic agriculture is conceptualized as a holistic method of farming based on a standard which aim to achieve optimal agro-ecosystems that are socially, ecologically, and economically sustainable, (Food and Agricultural Organization (FAO), 2013; Aulakh and Ravisankar, 2017). IFOAM-as cited by (Singh, Babu, Avasthe, Yadav, 2017) defines organic agriculture as 'the production system that sustains the health of soils, ecosystem and people, by relying on ecological processes, biodiversity and cycles adapted to local conditions.

In recent times, majority of the farmers in Africa, Nigeria in particular, practice low external inputs agriculture, innovative techniques to manage pests, weeds, soil fertility, water management and animals through safe and environmentally friendly practices and thus, practicing organic agriculture by default (Meludu, Abolade and Olanrewaju, 2012; Olaito 2014; International Federation of Organic Agriculture Movement (IFOAM), 2015).

Organic farming is dependent on practices of crop rotation, use of green manure, compost and biological pest control, and mechanical cultivation in maintaining soil productivity and control pests, without the use of synthetic fertilizers, pesticides, plant growth regulators, livestock feed additives, and genetically modified planting materials (Toungos and Tanko, 2018).

The continuous use of chemical fertilizers or pesticides to improve agricultural productivity has been posing great health and environment challenges to all living organisms including man (Nicolopoulou-Stamati, Maipas, Kotampasi, Stamatis and Hens (2016). These do not only affect the texture or quality of food we eat but also play a major role in altering the climatic conditions. Thus, alleviate the problems of agrochemicals and climate change. Organic farming is a sustainable and safe bet in sustainable agriculture (Meludu, and Adesina, 2014; Pooja, Prem, Sandeep and Hariom, 2019). Although organic farms produce lower yields than comparable conventional farms (Seufert, Ramankutty, and Foley, 2012; Ponisio, M'Gonigle, Mace, Palomino, de Valpin, *et al.*, 2015; Meemkeen and Qaim, 2018), they are more profitable, more friendly to pollinators and the environment, and deliver equally or more nutritious foods with fewer pesticide residues (Kennedy, Lonsdorf, Neel, Williams, Ricketts, *et al.*, 2013; Tuck, Winqvist, Mota, Ahnström; Reganold and Wachter, 2016; Kovács-Hostyánszki, Espíndola, Vanbergen, Settele, Kremen, *et al.*, 2017). Organic farming has other advantages and they itemized below over inorganic farming (despite its high production costs emanating from to high cost of artificial inputs).

These advantages are: Organic inputs improve the soil chemical, helps to prevent environmental degradation and can be used to regenerate degraded areas, produce an optimal condition in the soil for high yields, and good quality of crops, organically grown crops are more resistant to diseases and insects, hence cost of crop protection is reduced and Organic produces are poison-free.

Profitability is the ability of a business to earn a profit. It is the primary motivating force in economic activity. Any business generating good profit is said to be efficient. That is not to say that profitability is the same with efficiency, but can be used as an important yardstick for measuring efficiency. (Hotton, 2019).

Profit and profitability rate of a firm are determined using budgetary tools and profitability ratio (Alufohai and Ahmadu, 2012). The budgetary tools include: Gross margin analysis, Profitability index, Profitability Ratio and Rate of Return on investment (RRI).

Fluted pumpkin (*Telfairia occidentalis*), is a tropical vine in the family *Cucurbitaceae* (Time and Chikezie, 2016). It is an important vegetable crop cultivated both for its leaves and edible seeds contained in its large ribbed fruits, it is mainly cultivated in West Africa, especially Nigeria, Ghana and Sierra (Ojiako, Oparaeke-Amadi, Echerobia, and Ogbueghu, 2013; Annih, Tatiana, Kinge, Mariette, and Kebei, 2020). The edible parts of the crop include the succulent young shoot, tender leaves and seeds consumed by humans and have high nutritional, medicinal and industrial values. It also helps in improving blood production, promoting fertility and in the treatment of convulsion according to (Ojiako, *et al.*, 2013; Ibronke and Owotomo, 2019). It also plays an important role in high income generation in agriculture, particularly for the rural farmers (Olowa, and Olowa, 2016; Time, *et al.* 2016).

Series of work have been done on similar study such as (Mgbenka, Onwubuya and Ezeano (2015); Ndungu, Macharia and Kahuthia-Gathu, 2018; Okonkwo-Emegha, Obiekwe, Agu-Aguiyi, Okafor, Umebali, 2020), however, studies on the profitability of organically produced fluted pumpkin especially in Anambra State is scanty.

This study examined the profitability of organically produced fluted pumpkin with a view to providing answers to the pertinent question on profitability of the organic farming as well as other indices affecting the production of organically produced fluted pumpkin.

The specific objectives were to:

1. describe the socio-economic characteristics of small scale farmers involved in organically produced fluted pumpkin;
2. estimate the cost and return of organically produced fluted pumpkin;
3. determine the challenges faced by organic farmers in the study area.

II. Methodology

Area of the Study

This study was carried out in Anambra state, South-East Nigeria. It is located at latitude $6^{\circ}20'N$ and longitude $7^{\circ}00'E$ with a total land area of four thousand eight hundred and forty-four square kilometers ($4,844 \text{ km}^2$) and the population density of about eight hundred and sixty persons per square kilometer ($860/\text{km}^2$). According to the National Population Commission (NPC, 2006), the state has an estimated population of about five million (5,000,000) people who are 98% of Igbo and 2% of Igala ethnicities.

Study Duration: December 2019 to December 2020

Sample size: 180 Farmers

Sampling technique and sample Size

Multistage sampling technique was adopted for the study. In the first stage, the study purposively selected Ogbaru, Anambra west, Ihiala, Awka South, Idemili North and Anaocha Local Government Areas (LGAs). Enquiries from Anambra State Agricultural Development Program (ASADP, 2019) shows high dominance of organic farmers involve in fluted pumpkin production in these areas. In the second stage, three (3) villages were

randomly selected from each LGA and in the third stage, snowball sampling was used to select ten (10) organic pumpkin farmers because the list of these farmers were not available. Total of thirty (30) farmers were sampled per LGA, in all, one hundred and eighty (180) were sampled. Structured questionnaire was used to collect data on farmers' characteristics, farm enterprises and farmers' challenges. Data were analyzed using descriptive statistics and budgetary analysis

Model Specification

Descriptive Statistic

$$\text{Where } \bar{X} = \frac{\sum fx}{N}$$

x = variable

f = frequency

N = Number of observations.

Gross margin analysis

The costs and returns to farmer were estimated using the gross margin analysis. It is given as follows;

$$GM = TR - TVC$$

Where: GM = Gross margin in naira/farmer/ha

TR = Total revenue in naira//farmer/ha

TVC = Total variable cost in naira//farmer/ha

Budgetary analysis

Profitability Ratio:

These are financial indices which show the performance of a business. The ratio as stated by Emokaro and Eighbirhemolen, (2012) and Emokaro and Eweka (2015) are as follows:

a. Return on Investment (ROI)

b. Net Return on investment (NRI)

$$ROI = \frac{\text{Revenue}}{\text{Total Cost}}$$

$$NRI = \frac{\text{Net Profit}}{\text{Total Cost}} \times \frac{100}{1}$$

III. Results And Discussions

Socioeconomic characteristics of the organic fluted pumpkin farmers

The result of the socioeconomic characteristics of the farmers is presented in Table 1

Sex: The result (Table 4.1) showed that majority (84.4%) of the farmers were female, while the remaining 15.6% were male. This implies that female play more active role in organic fluted pumpkin production than male in the study area. This study corroborates Ugbajah, Sand, Uziegbunam and Azifuaku (2015); Edet, Akpaeti, Okon, and Nyong (2015) and (Shuaibu, Yakubu, Hassan, and Emmanuel, 2020), but contradicts Alawode and Abegunde (2015) and Camillus, Margaret, Amissah, Karen, and Danso (2019) who reported greater male involvement in vegetable production in Nigeria and Ghana respectively. This implies that region and culture play important role in gender involvement in agriculture. However, this study has been able to fill the gap that undermine women's involvement in "organic farming" especially in Anambra State and Nigeria at large.

Age: The study revealed that greater proportion (47.2%) of the farmer's age fall between 50 – 59 years, while the remaining farmer's age fall between 40 – 49 years (37.8%), greater than 59 years (8.9%) and less than 40 years (6.1%). The average age of the farmers was 51 years. By implication, these farmers are not too young and not too old to execute their agricultural production activities. It implies that they are capable of impacting positively on pumpkin production in the study area. This is contrary to the finding of Adamu, Oose and Bello (2015) report that farmers less than 30 years of age were more in farmers' perception towards organic based vegetable production in Ogun state, Nigeria.

Marital status: The study found that majority (91.1%) of the farmers are married, while the remaining 8.9% of the farmers are either single or divorced. This could be responsible for the relatively large household of 5-8

people which immensely contributed to the family labour available and number of productions per year. Again, single farmers, most often, do not get the advantage of free labour being experienced by those that are married and with children. This finding corroborates Camillus *et al.*, (2019) and Shuaibu, *et al* (2020) who reported that there were more married farmers in their study areas.

Level of education: The result (Table 4.1) shows that (41.1%) of the farmers attended primary school, (30.6%) attended secondary school and (8.9%) attended tertiary education. While (19.4%) of the farmers had no formal education. The average years of formal education was found as 8 years. The implication is that many of the farmers did not complete secondary school. This implies that many of them may not have the potentials to adopt new technologies and innovation. This finding will be a source of concern to the extension workers during dissemination of extension packages. This finding, however, is at variance with Alawode and Abegunde (2015) and Edetet *al* (2015) whose studies reported that more than half of the farmers in their study areas were literate.

Household size: The study revealed that majority (96.1%) of the farmer’s household size ranges from 5 – 8 people, while others range from 1 – 4 people. None of the farmers sampled had a household size greater than 8 people. Equally, the average household size was found as 6 people. The implication is that this household size is large enough to supply cheap family labour for organic fluted pumpkin production in the study area. This agrees with Edetet *al* (2015) who opined that household size is one of the major determinants of pumpkin output in their study area.

Farm size: The result (Table 4.1) shows that majority (61.7%) of the farmer’s farm size ranges from 0.41 – 0.80 ha, while others range from 0.01 – 0.40 ha (32.8%) and greater than 0.80 ha (5.6%). The mean farm size was found as 0.52 ha. This implies that organic fluted pumpkin production is in small-scale in the study area. Thus, they are not into mechanization. They simply use simple farm tools like hoes, cutlasses, hand forks and rakes. This small-scale of land holding makes it difficult to commercialize their farm. Again, this finding was in agreement with the study of Alawode and Abegunde (2015) and Usman, Abdullahi, Qasimu and Adamu (2016) whose findings revealed that more than half of the farmers in their study area were small scale farmers

Organic farming experience: The study reveals that majority (91.7%) of the farmers had 7 – 12 years organic farming experience, while other had 1 – 6 years organic farming experience. None of the sampled farmers had more than 12 years organic farming experience. The average organic farming experience was 9 years. This implies that the farmers are relatively experienced and this is capable of impacting positively on pumpkin production in the study area. This collaborates finding from Edetet *al* (2015) which stated that farmers with experience and high literacy level dominated their study area.

Purpose of production: Greater proportion (45.6%) of the farmers produce pod for planting, (39.4%) produce for consumption, (10.6%) for processing while (4.4%) for export, usually for friends and family travelling overseas. This implies that majority of the farmers produce mainly for planting and consumption.

Contact with extension agents: The study revealed that majority (78.3%) of the farmers had 1 – 8 visits from extension workers, while others had 7 – 16 visits (21.7%). The average visits were 9 times. This high extension contact among the farmers was as a result of their cooperative membership and sensitivity of organic farming. This study corroborates Usman, *et al.* (2016) which stated that more than half of the farmers (53%) had contact with extension agents. But at variance with Olabanji, Ibrahim and Olayiwola (2018) which stated that about 93% of the respondents had no access to extension services.

Number of productions per year: The result (Table 1) revealed that (90.0%) of the farmers reported that they produce three times a year, while others (10.0%) produced four times a year. The implication is that farmers produced both in raining season and dry season. Evident that the farmers produce also using irrigation. This corroborates Olowa, and Olowa, (2016) who stated that farmer practiced rain-fed and dry season/irrigated respectively, in their study area of Lagos State, Nigeria.

Table 1: Socioeconomic characteristics of the organic fluted pumpkin farmers

Socioeconomic variable	Frequency	Percentage (%)	Mean
Sex:			
Female	152	84.4	
Male	28	15.6	
Age (years):			
< 40	11	6.1	
40 - 49	68	37.8	51
50 - 59	85	47.2	
> 59	16	8.9	

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Marital status:			
Married	164	91.1	
Otherwise	16	8.9	
Level of education:			
No formal education (0)	35	19.4	
Primary (1 - 6 years)	74	41.1	8
Secondary (7 - 12 years)	55	30.6	
Tertiary (> 12 years)	16	8.9	
Household size (people):			
1 - 4 people	7	3.9	
5 - 8 people	173	96.1	6
> 8 people	0	0	
Farm size (ha):			
0.01 - 0.40	59	32.8	
0.41 - 0.80	111	61.7	0.52
> 0.80	10	5.6	
Farming experience (years):			
1 - 6 years	15	8.3	
7 - 12 years	165	91.7	9
> 12 years	0	0	
Purpose of production:			
Export	8	4.4	
Processing	19	10.6	
Consumption	71	39.4	
Pod for planting	82	45.6	
Visitation from extension agents			
1 - 8 times	141	78.3	
7 - 16 times	39	21.7	9
> 16 times	0	0	
Number of productions per year:			
Less than three times	0	0	
Three times	162	90	
Four times	18	10	

Source: Filed Survey, 2021.

Membership of farmers' cooperative: Figure 1 revealed that majority (85.0%) of the farmers are members of agricultural cooperative societies, while the remaining 15.0% are not members of agricultural cooperative societies. By implication, it shows that farmers in the study area organized themselves into a cooperative to increase their access to contiguous land and other agricultural incentives from the government. Like their counterparts elsewhere in the world, cooperatives in Nigeria are formed to cater for the common benefits of their members (Attah, Mbah and Okeke 2018). This collaborates with finding of Nlerum and Ogu (2014) that reported that nearly 90% of the respondents were members of farmers' cooperative societies.

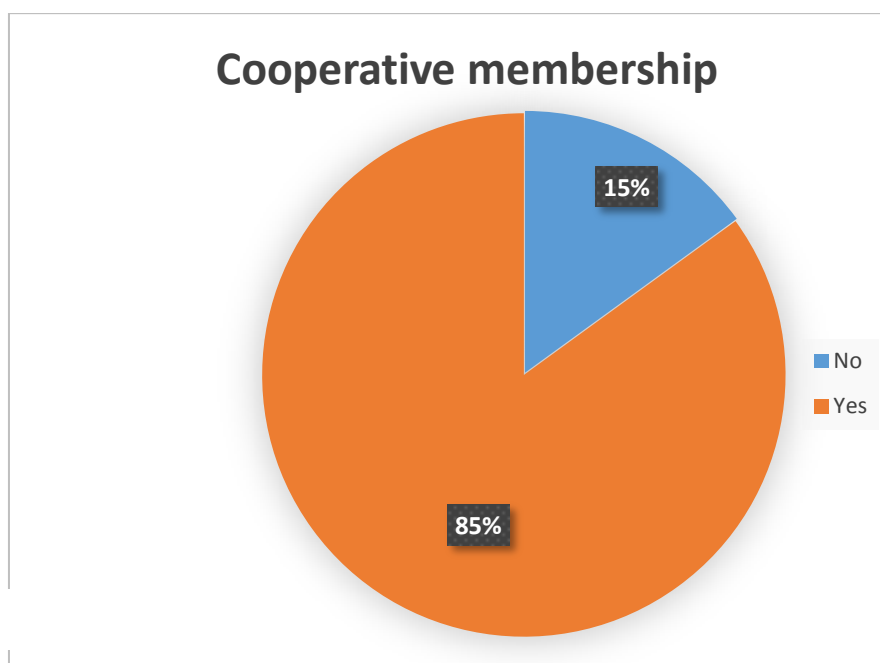


Fig. 1

Costs and returns of organically produced fluted pumpkin

The profit from organic fluted pumpkin farming is presented in Table 2. The result revealed that revenue realized from organic fluted pumpkin sales was ₦141902.00 (₦46791.00 for vegetable and ₦95111.00 for pods), the total variable cost and fixed cost are ₦55436.92 and ₦118152.3 respectively. The gross margin or profit was ₦86465.09, while the net return was ₦74649.86. The profitability index (PI) (which is the ratio of revenue to operational cost) and return on investment (ROI) (which is the ratio of net return to total cost) were 2.56 and 1.11 respectively. The implication is that the profit from organic fluted pumpkin can cover for its operational expenses about 3 times in the next farming operation. Again, for every ₦1 investment made will return a profit of ₦1.11 which shows that the enterprise is worthwhile. This finding was in agreement with Alawode and Abegunde (2015) and Edetet *al* (2015) whose findings alluded that organic fluted pumpkin is a profitable enterprise.

Table 2 Cost and return of organically produced fluted pumpkin

Sn.	Item	Quantity	Unit price (N)	Amount (₦)
1	Revenue			
	Vegetable (bundles)	81.14	576.67	46791.00
	Pod (kg)	50	1902.22	95111.00
	Total			141902.00
2	Variable cost (VC)			
	site clearing	2	3176.67	6385.1067
	Tilling	3	3136.67	9096.343
	Planting	3	3024.44	9587.4748
	Weeding	3	2710.56	6884.8224
	Staking	2	2466.11	4784.2534
	organic fertilizer application	2	2906.67	6365.6073
	irrigation	2	2621.11	4901.4757
	Harvest	2	2676.67	5005.3729
	Packing	1	2226.11	2426.4599
	TVC			55436.92
3	Fixed cost			

Equipment depreciation (10% of TFC)	11815.23
TFC	118152.3
Total cost (TC)	67252.15
Gross margin	86465.09
Net returns	74649.86
Profitability index	2.56
Return on investment (ROI)	1.11

Source: Filed Survey, 2021.

Challenges faced by organic fluted pumpkin farmers

The challenges faced by organic farmers in their production of fluted pumpkin was captured on a 5point Likert scale presented in Table 3. A mean threshold of 3.0 was set for decision making process, variables with a mean score of 3.0 and above were said to be the challenges facing the farmers. Alternatively, those variables with a mean score below the threshold were not challenges of concern to the farmers. Based on the nine items of challenges identified, seven had a mean threshold of 3.0. These challenges were inadequate finance (M = 4.96), lack of awareness (M = 4.02), high cost of pumpkin seeds (M = 4.52), inadequate farm size (M = 4.18), high cost of transportation (M = 4.65), No difference in preference of organic produces (M = 3.85) and delay in uptake of nutrients (M = 3.10). The cluster mean of 3.50 was an indication that majority of the farmers were affected by these challenges. Also, the standard deviation was high enough to show variability of farmer's responses. This result was in agreement with the study of Alawode and Abegunde (2015) which noted that insufficient fund and maintenance from weed were the major challenges of organic vegetable farming in their study. Corroboratively; the study equally aligned Mgbenka, *et al.* (2015) who found that lack of technical know-how, difficulties in use of commercial organic fertilizer, lack of Awareness of techniques, little or no polices to safeguard of activities, lack of institutional support were the challenges of organic farming in Nigeria.

Table 3 Challenges faced by organic fluted pumpkin farmers

Sn.	Challenges	Mean	Std. Dev.	Remark/decision
1	Inadequate fin.	4.96*	0.21	Agree
2	Lack of awareness	4.02*	0.15	Agree
3	High cost of pumpkin seeds	4.52*	0.82	Agree
4	Inadequate farm size	4.18*	0.49	Agree
5	High cost of transportation	4.65*	0.59	Agree
6	No diff. in preference of org. produces	3.85*	0.86	Agree
7	Inadequate ext. services	2.89*	0.31	Disagree
8	Inadequate supply of animal droppings	2.24	1.40	Disagree
9	Delay in uptake of nutrients	3.10*	1.19	Agree
Cluster mean		3.50	0.67	Agree

Source: Field Survey, 2021.

IV. Conclusion and recommendations

The findings revealed that engaging in the production of organic fluted pumpkin was profitable with profitability index (PI) 2.56 and return on investment of 1.11. It also revealed that the revenue realized from the sales of organic fluted pumpkin was ₦46791.00/ha for vegetable and ₦95111.00/ha for pods. However, inadequate finance, lack of awareness and high cost of pumpkin seeds, inadequate farm size and high cost of transportation, were some of the challenges confronting the farms in the study area.

This study established the profitability organic fluted pumpkin, however; its profitability can be improved if farmers have access to loans and other inputs. Therefore, it is recommended that farmers should organize themselves and participate actively in cooperative society to enable them have access to government programmes, bank loans and non-governmental organization support (as most non-governmental organization programmes favours women in agriculture).

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