

Economic Analysis of Production Technologies of Watermelon (*Citrullus lanatus*) among Smallholder Farmers in Akwa-Ibom State, Nigeria

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ABSTRACT

The study was carried out to analyze the economics and production technologies of water melon among small holder farmers in Akwa- Ibom State. Multistage sampling technique was used in data collection. The data were collected from 240 organic and non-organic small holder watermelon farmers. The primary instrument used for data collected was structured questionnaire. Data obtained was analyzed by Enterprise budgeting method, Anova and descriptive statistics. The technologies used in the study area in water melon production were Organic and Non-organic (conventional system). The total revenue and the gross margin of conventional water melon producers realized per farmer per annum were N407,000 and N207,000 respectively, while the total revenue and gross margin for organic water melon producers were N562,385 and N433,141 respectively. The study suggests that awareness should be created by the extension officers on the use of organic farming technology.

Keywords: Water Melon, Economic, Production, Technologies, Gross margin, Budgetary

INTRODUCTION

Watermelon is one of the most popular and widely grown cucurbitaceous fruit vegetables in tropical and subtropical countries of the world. Its global consumption is greater than that of any other cucurbits and account for 6.8% of the world area devoted to vegetable production (Abdulwali, 2020). There are over 1,200 varieties of watermelon worldwide and quite anumber of these varieties are also cultivated in Africa (FAO, 2011). According to Adeoye, Jatto, Abegunrin, Eniola & Oke, (2020) watermelon is the most preferred among five other exotic vegetables examined in Nigeria. Watermelon contains 60% more lycopene than tomato. Lycopene in the human diet is associated with prevention of heart attacks and certain cancers. Rind of watermelon contains an important natural compound called citrulline, an amino acid that the human body makes from food. Citrulline is found in high concentration in liver, and is involved with athletic ability and functioning of the immune system (Adeoye, et al., 2011). It is a good source of fiber which is important for keeping digestive tract operating properly by preventing constipation, hemorrhoids and diverticular disease. Currently, watermelon is the third most cultivated crop in the world (Chomba, 2016). The only other crops that are more cultivated are potatoes and tomatoes. However, over the years, water melon has not only been known as a fruit, it has been linked to many health benefits (Abdulwali, 2020). They have been linked with prevention of heart related conditions and correcting metabolic deficiencies. Watermelon is loaded with nutrients such as potassium, magnesium, iron, folic acid, B vitamins as well as vitamin A and C. Hence, watermelon can be used to prevent sunburn, build the skin and the lycopene content can also help reduce cancer risk. Watermelon is widely cultivated in Northern Nigeria; it is very popular in the North. Large quantities of watermelon consumed in Southern Nigeria comes from the Northern part of the country. However, water melon can be cultivated in any part of the country. One of the requirements of water melon is that it requires a hot and dry climate, making the northern part of the country naturally suited for farming watermelon (Abdulwali, 2020). In Southern Nigeria, planting commences in September which is the early planting season. Planting can be done in the mid-planting season which is either in late September or early

September. The mid-season planting is highly dependent on the rain. The rains which is expected to commence in mid-September starts much earlier, then planting is possible in this period. Watermelon can be cultivated organically or inorganically (conventional) with chemical fertilizers (Chomba, 2016). The ideal soil for cultivating watermelon is either sandy soil or loamy soil. The farm should be adequately sunlit and to boost soil fertility, organic manure or fertilizer in the right proportion should be added to the soil. In spite the nutritive value of watermelon there are few researches on the profitability in south south. Therefore, this study tends to analyze the Economics of Organic and Non-Organic Watermelon (*Citrullus lanatus*) Production in Akwa-Ibom State, Nigeria. The specific objective was to: analyze the cost and returns of organic and non-organic watermelon production in the study area.

METHODOLOGY

The Study Area

Akwa-Ibom State

Akwa-Ibom State is a state in Nigeria. The state is located in the coastal southern part of the country, lying between latitudes 4°32'N and 5°33'N, and longitudes 7°25'E, and 8°25'E of the equator. It shares boundary with Cross River State on the East, Rivers State and Abia State on the west, and on the south by the Atlantic Ocean. The population of the state is over five million people (NPC, 2006). The state was created in 1987 from the former Cross River State and is among the highest oil and gas producing states in Nigeria. Uyo is the state capital with over 500,000 dwellers. The state has an airport and two seaports of a world class construction at Oron. The state has a 30,000-seat ultramodern sports complex with good facilities. The state is known as a home to the Ibom E- Library with world class information. The main spoken languages in the state are Ibibio, Annang, Eket and Oron. There are extensive saltwater mangrove swamps along the coast and tropical rain forests and Oil palms farther inland. The state experiences abundant rainfall with very high temperature and mean annual temperature that lies between 26°C and 28°C, while mean annual rainfall range from 2000mm to 3000mm. Maximum humidity is usually recorded July while the minimum occurs in January (Ubokudom & Idiong, 2016).

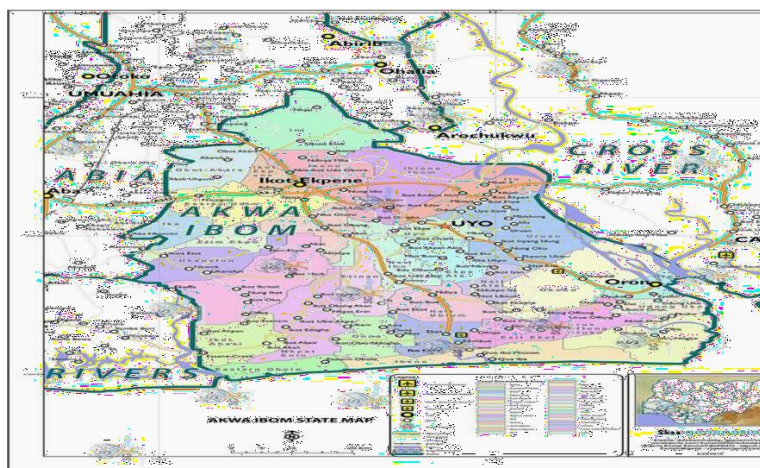


Figure 3.1: Political Map of Akwa-Ibom State. Researchgate.net, (2023).

Population of the Study

The population of the study constituted all the smallholder organic and non-organic (conventional) watermelon farmers in Akwa-Ibom State.

Sampling Technique and Sample Size

A multistage random sampling technique was adopted in the selection of agricultural zones, local

government areas, communities and respondents.

In the First stage, fifty percent (50%) of the agricultural zones, that is, 3 zones in the State were randomly selected. These were Eket, Uyo and Ikot-Ekpene. zone.

In the second stage, two LGAs were randomly selected from each of the three agricultural zones, giving a total of six LGAs that were selected.

In the third stage, four communities were randomly selected from each of the six (6) LGAs. This gave a total of 24 communities.

In the fourth stage, 10 farmers were randomly selected from each of the 24 communities giving a total of 240 respondents that were selected for the study.

Furthermore, 120 respondents were used as sample for the control group (non-organic Water Melon farmers) while 120 respondents were used for the experimental group (organic Water Melon).

Method of Data Collection

Primary and secondary data were used for the study. The primary data was obtained from questionnaire administered to the water melon farmers.

Method of Data Collection

Data for this study were derived from primary sources which include the use of structured questionnaire, personal interviews, observations and informal discussion. Structured questionnaire was used for literate farmers and interview schedules for the illiterate farmers. All the copies of the questionnaires were administered to the farmers. The questionnaire for water melon farmers was a section:

Section A: Costs and returns of organic and non-organic water melon farmers.

Data Analysis

Objectives i. were realized using enterprise budget with cost function and profit function.

Mathematical Expression/Model Specification

Gross Margin Model

Gross margin is the difference between revenue and variable costs directly associated with the crop production divided by revenue and expressed as a percentage. It is calculated as thus;

$$GM = TR - TVC \dots\dots\dots (1)$$

$$TC = TFC + TVC \dots\dots\dots (2)$$

$$NP = TR - TC \dots\dots\dots (3)$$

Where:

TC = total cost, TFC = total fixed cost, TVC = total variable cost GM = Gross margin, TF = Total revenue, NP = Net profit. Enterprise Budget Analysis Model

$$NP = (TR - TVC) - TFC$$

Where;

- NP = Net Income or Net Returns in Naira (₦)
- TR = Total Revenue in Naira (₦)
- TVC = Total Variable Cost in Naira (₦)
- TR –TVC = Gross Margin in Naira (₦)
- TFC = Total Fixed Cost in organic and non-organic water melon

RESULTS AND DISCUSSION

Average difference between the profitability of organic and non-organic Water Melon production in Akwa-Ibom State

The results of differences in mean profit achieved by organic and non-organic water melon producers in Akwa-Ibom State.

The result on costs and returns of smallholder watermelon farmers showed that the average profits realized from non-organic water melon sales were #207,000 while the profits for organic water melon sales were #308,000. The revenue realized from organic and non-organic water melon production were #562,385 and #407,000 respectively. The profitability index (PI) and return on investment (ROI) were 0.832 & 0.720 for organic producer, while the (PI) & (ROI) for non- organic producer were 0.732 & 0.701. This indicates that non-organic water melon farmers are doing well with a profit but not better than organic water melon producers. It indicates that farmers of organic water melon in the study area are good business venture with good profits. This result is in line with the report of Olowa & Olowa (2016) that the mean profit of vegetable production is very encouraging and profitable. And also contrary to the report of (Ndubuisi, K, E) who stated that insecurity affects profitability especially in organic production

Profit of organic farming technology of water melon production in Akwa -Ibom state (average profitability per farmer per farming season).

Item	Quantity	Unit Price (N)	Total Cost (N)
Variable cost			
Planting material/seed	115 pods	257	29,431
Organic material	24 bags	3,140	74,313
Hired Labour	5 Mandays	—	9,667
Irrigation	—	—	7,333
Transportation	—	—	6,333
Communication	—	—	2,167
Total Variable Cost			1,29,244
Fixed Cost			11,300
Total Cost			1,49,544
Revenue / Returns			
Pods	507 Kg	1,110	5,62,385
Total Revenue			5,62,385
Gross Margin			4,33,141
Profitability			0.832
ROI			0.72

Source: Field Survey, 2023

Difference between the profit of organic and non-organic technology (conventional system) of water melon production in Akwa-Ibom State

One-sample Statistics

Technology	N	Mean	Std. Deviation	Std. Error Mean
Organic	120	206894.4587	235987.7541	69874.6532
Non-organic	120	107589.6589	854621.7512	69862.7584

One-Sample Test				
Technology	T	Df	Sig. (2-tailed)	Mean difference
Organic	19.335	119	0.000	206894.4587
Non-organic	29.127	119	0.000	107589.6589

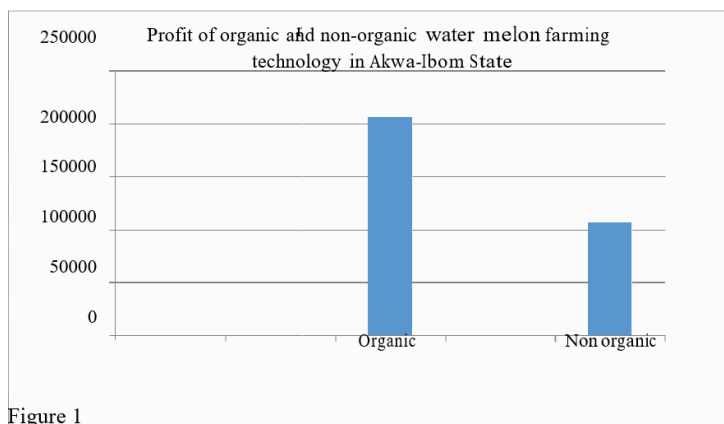


Figure 1

Figure 1 Profit of organic and non-organic water melon farming technology in Akwa-Ibom State

Profit of non-organic farming technology of water melon production in Akwa -Ibom state (average profitability per farmer per farming season).

Item	Quantity	Unit Price (N)	Total Cost (N)
Variable cost			
Planting material/seed	115 pods	257	39,000
Fertilizer	20 bags	6,000	1,20,000
Hired Labour	5 Mandays	—	9,000
Irrigation	—	—	8,000
Transportation	—	—	11,000
Communication	—	—	13,000
Total Variable Cost			2,00,000
Total Fixed Cost			34,000
Total Cost			2,34,000
Revenue / Returns			
Pods (Kg)			4,07,000
Total Revenue	507	1,110	4,07,000
Gross Margin			2,07,000
Profitability			0.732
ROI			0.701

Source: Field Survey, 2023.

Difference between the profit of organic farming technology and non-organic technology (conventional system) of water melon production in Akwa-Ibom State.

The results showed that the gross margin in Akwa-Ibom state in organic water melon production were N

433,141 while the gross margin of non-organic (conventional system) were ₦207,000 with the mean difference of ₦ 226,141. The result showed that organic technology of water melon production is more profitable in Akwa-Ibom State. Organic producers had profit above non- organic. The bar chart shows the picture of the profitability. This result is in line with the report of (Abdulwali, 2020) who reported in his work Budgetary analysis revealed a profitability of watermelon with gross margin of ?2.18 is realized for every ₦1 invest on watermelon per hectare.

CONCLUSION

The results showed that the mean profit of organic water melon production in Akwa-Ibom state were ₦ 433,141 while the mean profit of non-organic (conventional system) were ₦207,000 with the mean difference of ₦ 226,141. The result showed that organic water melon production is more profitable than non- organic in Akwa-Ibom State. Organic water melon producers had profit above non- organic producers with ₦109,800.

RECOMMENDATIONS

1. Government and non- governmental organizations should create more awareness about technologies and health benefits of watermelon to improve the farmers output, sales and profit.
2. Financial institutions, such as banks, co-operative societies should be available to give financial assistance to watermelon farmer
3. Non- organic farmers are therefore advised to convert to organic farming to enable more profit.

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