

# Economics of Organic Manure Use in Tomatoes Production in Enugu State, Nigeria

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## ABSTRACT

The study dwelt on the economics of organic manure use in tomatoes production in Enugu State, Nigeria, using a sample of 120 randomly selected respondents, each from farmers that used organic manure only in tomatoes production and those that combined both organic and chemical fertilizers; making a total of 240 respondents. Questionnaire was administered to get information from the respondents. Data analysis was done using Gross margin and z-statistic. The result indicated that generally tomatoes farming was profitable, but using only organic matter with gross margin of N390, 996/ha/annum (1074.16 USD) was more profitable than combined use of organic manure with chemical fertilizers with gross margin result of N324, 000/ha/annum (890.10 USD). The above result shows that organic manure should not be viewed as something useless rather as an underutilized resource which should be used on the farm to increase farm production.

**Keywords:** Economics, Organic manure, Use, Tomatoes, Gross margin, Enugu Nigeria.

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## Highlights of this paper

- This paper is one of the few studies which have investigated into the economics of organic manure use in tomatoes production in Enugu State, Nigeria.
- The paper's primary contribution showcased organic manure as an underutilized resource which should be used in tomatoes production, since it is cheaper, readily available and environmentally friendlier when compared to chemical fertilizers.

## 1. INTRODUCTION

With worsening economic conditions in Nigeria and increased interest in organic food, many people are turning to vegetable production to supplement their family's diet. Tomatoes are important vegetable crops grown in Nigeria. Tomatoes are fruity edible plants of a vine just as are cucumbers, squashes, beans and peas that belong to the genus *Lycopersicon esculentum* and Solanaceae or nightshade family [1].

Tomato contains 71% water, 3% protein, 5% carbohydrate, 10% vitamins and 1% ash [2]. They are excellent source of lycopene (an antioxidant); and people who consume tomato products experience marked reduction in cancer risk [3]. Tomatoes production requires minimal inputs, a fertile soil, adequate sunshine and soil moisture [4]. Tomatoes perform best in humus soil especially soils that are rich in organic matter [5]. Against these propositions, modern agriculture depends on high input of chemical fertilizers and pesticides for crop production. Although such technology-based agricultural practice has increased agricultural productivity and abundance, the resulting ecological and economic impacts have not always been positive [6]. Sequel to the above premise, there is need to re-direct farmers' attitude on the use of organic waste in tomato farming, so that these wastes could be viewed as an under-used resource and not as something "useless". One way of re-directing tomatoes farmers' attitude is to present the economic gains from the use of organic manure in tomatoes production.

This study therefore sought to:

- i. Determine and evaluate the costs and returns of organic manure use only and combined use of organic manure with chemical fertilizers in tomatoes production.
- ii. Compare costs and returns from organic manure use only and use of both organic manure and chemical fertilizers in tomatoes production.

## 2. MATERIALS AND METHODS

### 2.1. Study Area

This study was conducted in Enugu State, Nigeria which lies approximately between latitudes 5° 55'N and 7° 08'N of the equator and longitudes 6° 55' E and 7° 08' E of the Greenwich Meridian. The State has a tropical wet and dry climate or the AW climate of the Koppen's classification. Temperature is high all year round with an annual mean of 27°C. There is a long wet season from April to October, interrupted by a short, dry season, usually in August, followed by a long dry season – November to March. The rainfall total is 1580mm per year. The soils of Enugu State are mainly ferralitic and hydromorphic, together with a relatively more fertile lithosols in the escarpment zone. Like those of the rest of South Eastern Nigeria, the soils rank amongst the poorest Nigerian soils because of their low natural fertility. Furthermore, they are highly leached and are therefore suited to only a limited range of crops, chief among which is cassava. Though, the soils are light and easily worked, they are incapable of supporting the high-density rural and urban populations under rudimentary techniques of cultivation [7].

The state had a population of about 3, 257, 298 persons as at 2006 [8] and estimated at over 3.8 million in 2012 [9]. The predominant agricultural practice in the state is crop farming, however, animals are reared in all parts of the State, though in small numbers. Food crops grown include yam, cassava, maize, melon, vegetables, sweet potatoe, cocoyam, groundnut, and cowpea. Among the perennial tree crops grown are oil palm, *citrus spp*, mango, pears and cashew [7-10].

## 2.2. Data Collection

Multi stage random sampling technique was used in selecting the respondents. Enugu State is delineated into six major agricultural zones [11]. In each of the six agricultural zones, one local government was purposively selected for the study as a result of their role and prominence in tomatoes production, making a total of 6 local government areas. In each of the local government areas selected, a farming community was selected purposively, hence a total of 6 farming communities. In each of the 6 farming communities, 20 respondents were selected; each for those that used organic manure only and those that combined organic manure with chemical fertilizers; making a total of 120 respondents that used organic manure only and 120 for those that combined organic manure with chemical fertilizers. The data were collected from February 2018 – November 2018. The data collected centered on the costs and returns in the production of tomatoes for the two farmer groups.

## 2.3. Data Analysis

Gross margin (GM) was used to measure the contribution of tomato enterprise to the total farm profit. Gross margin is the difference between the total value of production (returns) and the variable costs of production (costs). Cost items include land clearing, amount paid to labour, weed control and harvesting; capital inputs (seeds, seedlings, price of organic manure, price of chemical fertilizers, cost of pesticides, transportation costs (₦). The item on returns includes output/kg/₦. The average prevailing price of inputs was used to derive the monetary values of inputs (costs).

$$GM = TR - TVC$$

where

$$GM = \text{Gross Margin (₦)}$$

$$TR = \text{Total Revenue (₦)}$$

$$TVC = \text{Total Variable Cost (₦)}$$

Z – test was used to determine the significance of the difference observed between two means with large sample size ( $n_1, n_2 \geq 30$ ). In this study, it was employed to determine the difference in income for users of organic waste only and users of both organic and inorganic manure.

$$Z = \frac{\bar{X}_1 - \bar{X}_2}{\frac{SD_1}{\sqrt{n_1}} + \frac{SD_2}{\sqrt{n_2}}} \sim N(0, 1)$$

Where

$\bar{X}_1$  = Mean income of farmers that used organic waste only.

$\bar{X}_2$  = Mean income of farmers that used both organic waste and chemical fertilizers.

$SD_1$  = Standard deviation of income realized by farmers that used organic waste only.

$SD_2$  = Standard deviation of income realized by farmers that used both organic waste and chemical fertilizers.

$n_1$  = Number of farmers that used organic waste only.

$n_2$  = Number of farmers that used both organic waste and chemical fertilizers.

## 3. RESULTS AND DISCUSSION

### 3.1. Gross Margin for Tomatoes Enterprise for the Two Farmer Groups

Gross margin for the two farmer groups, i.e. those that used organic waste (poultry manure) only and those that combined organic waste (poultry manure) with chemical fertilizers were presented in Table 1 and Table 2. The z-test result for the two farmer groups was presented in Table 3.

**Table-1.** Costs and returns result on per hectare of tomatoes enterprise for users of organic waste (poultry manure) only.

Items	Units	Quantity/ha	Price/unit	Total
			₦	Value ₦
<b>Revenue</b>				
Output	Kg	5639.96	100	563996
Total Revenue (TR)				420,000
<b>Cost</b>				
Labour:				
Land clearing	Mandays	13.3	1500	20,000
Cultivation	Mandays	28.6	1500	20,000
Weeding	Mandays	46.6	1500	7,000
Harvesting	Mandays	22	1500	33,000
Planting Materials	Nursery Basket (40 stands)	33.3	300	10,000
Poultry manure	Kg	3096.8	15.5	48,000
Pesticides	Litres	16.7	600	10,000
Transportation	Km	-	-	25,000
Total Variable Cost (TVC)				173,000

Note: GM (TR-TVC) = ₦563996 - ₦173,000 = ₦390,996 (1074.1 USD) 1 USD = ₦364.

**Table-2.** Costs and returns result on per hectare of tomatoes enterprise for users of both organic waste (poultry manure) and chemical fertilizers.

Items	Units	Quantity/ha	Price/	Total
			Unit ₦	Value ₦
<b>Revenue</b>				
Output	Kg	5,270	100	527,000
Total Revenue (TR)				527,000
<b>Cost</b>				
Labour:				
Land clearing	Mandays	12	1500	18,000
Cultivation	Mandays	24.6	1500	20,000
Weeding	Mandays	3.3	1500	5,000
Harvesting	Mandays	18	1500	27,000
Planting materials	Nursery basket (40 stands)	33.33	300	10,000
Poultry manure	Kg	1548.4	15.5	24,000
Pesticides	Litres	16.7	600	10,000
Chemical fertilizer	Kg	458.5	139.6	64,000
Transportation	Km	-	-	25,000
Total Variable Cost (TVC)				203,000

Note: GM (TR-TVC) = ₦527,000 - ₦203,000 = ₦324,000 (890.1 USD) 1 USD = ₦364.

**Table-3.** Z-test result for the two tomatoes farmer groups.

Variable	N	Mean ₦	Std Dev. ₦	Z	2-tailed
Poultry manure only	120	390,996	52983.6	8.05	0.05
Both poultry and chemical fertilizers	120	324,000	38133.5		

From the analysis, the average gross margin per hectare of tomatoes enterprise in table 1 was ₦390,996 (1074.1 USD) for users of poultry manure only and ₦324,000 (890.1 USD) for combined use of poultry manure and inorganic fertilizers Table 2. The above two incomes from the two farmer groups, when divided by a production cycle of 12 months, yielded a monthly income of ₦32,583 (89.51 USD) for users of organic waste only and ₦27,000 (74.17 USD) for use of both organic waste and chemical fertilizers. This implied that tomatoes enterprise was profitable in the study area; since the amount got from organic waste use only, was more than the ₦30,000 (82.5 USD) minimum wage rate per month in Nigeria while ₦27,000 (74.28 USD) got from the combined use of organic

waste and chemical fertilizers was close to the ₦30,000 (82.5 USD) minimum wage rate. The z-test result in table 3 showed that there was significant difference in the income of the two farmer groups, since z-calculated of 8.05 was greater than z-tab of 1.96.

#### 4. CONCLUSION

Gross margin result indicated that tomatoes farming was generally profitable; however, using organic manure only was more profitable than the combined use of both organic and chemical fertilizers. The z-test result showed that, there was significant difference in the mean income of the two farmer groups under study. It is therefore recommend that tomato farmers should dwell more in the use organic manure that is cheap, readily available and environmental friendlier; following the profitability index in using organic manure only as against the use of chemical fertilizers with organic manure.

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