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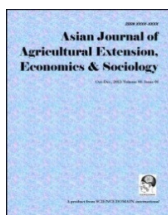
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## **Organic and Inorganic Manure Use among Vegetable Farmers in Owerri Municipal of Imo State, Nigeria: A Comparative Approach**

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### **Authors' contributions**

*This work was carried out in collaboration between all authors. Author AHU designed the study. Author JSO wrote the protocol and supervised the work. Authors IJU and IOO carried out all laboratories work and performed the statistical analysis. Author AI managed the analyses of the study. Author AHU wrote the first draft of the manuscript. Author JSO managed the literature searches and edited the manuscript. All authors read and approved the final manuscript.*

### **Article Information**

DOI: 10.9734/AJAEES/2015/13068

#### Editor(s):

(1) Anthony N. Rezitis, Department Business Administration of Food and Agricultural Products, University of Western Greece, 2. G. Seferi Str., Agrinio 30 100, Greece.

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(3) Anonymous, University of Kragujevac, Serbia.

Complete Peer review History: <http://www.sciencedomain.org/review-history.php?id=710&id=25&aid=6876>

**Original Research Article**

**Received 1<sup>st</sup> August 2014  
Accepted 4<sup>th</sup> October 2014  
Published 6<sup>th</sup> November 2014**

### **ABSTRACT**

The study compared the use of organic and inorganic manure among vegetable (*Telfairia occidentalis*) farmers in Owerri Municipal of Imo State. Random sampling technique was adopted to select six organic manure users as well as six inorganic manure users from each of the five randomly selected communities making a total of 60 vegetable farmers in the area. The sampling frame was obtained from the Agricultural Development Programme (ADP) extension agent in the area. The analytical tools used were descriptive statistics and net return model. Results show that both organic and inorganic manure use were profitable but inorganic manure use among vegetable farmers was more profitable. It was recommended that farmers be enlightened and encouraged to use inorganic manure.

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**Keywords:** Organic manure; inorganic manure; vegetable production; comparative approach.

## 1. INTRODUCTION

Nigeria is a vast agricultural country, endowed with substantial natural resources which enable the country to produce a wide variety of crops and livestock, forestry and fisheries products [1]. According to [2] agriculture is the sector accounting for the dominant share of gross domestic product (GDP), employment, export earnings and food supply. It carries a great deal of the economic burden and contains much of the potential of many African countries. The soil is one of the most valuable and natural resources on earth. It not only supports plant growth, but also provides us with the food we eat. The soil provides plants with nutrients, water, minerals and a medium to grow on. Without the soil, plant eating animals including humans would not survive thus proper management of the soil is needed to maintain healthy food supply.

The frequent use of the land in the study area has led to the depletion of reserved soil nutrients hence the need to improve the fertility of the soil via application of manure. Manure contributes to the fertility of the soil by adding organic matter and nutrients such as nitrogen that are trapped by bacteria in the soil. Manure can be classified as organic or inorganic manure. Organic manure is a product obtained after decomposition of organic matter like cow dung and pig-slurry which replenishes the soil with essential elements and adds humus to the soil [3]. Inorganic manure also known as synthetic fertilizer consists of those mineral substances which are added to the soil in order to supply the earthy and saline matters which are required by soil to render them suitable for the growth of certain plants. Vegetables are the edible portion of a herbaceous annual or perennial crop which could either be served raw or fresh [4]. Vegetables are becoming more common in the diets of Africans and their cultivation has increased in line with their popularity. A review of species of vegetables by [5] showed that indigenous and traditional vegetables could make a significant contribution to world's food production because they are well adapted to adverse environmental conditions and are generally resistant to diseases. Vegetables (leafy and fruits) are widely cultivated in most parts of sub-Sahara Africa, as a cheap and reliable source of protein, vitamins, zinc and iron. They constitute between 30% and 50% of iron and vitamins A in diets. *Telfairia occidentalis* also

known as fluted pumpkin is one of the most important vegetables grown in Southern Nigeria. It is generally regarded as a leaf and seed vegetable. The leaves and young shoot are edible. The leaf has a high nutritional, medicinal and industrial values being rich in protein (29%), fat (18%) and minerals and vitamins (20%). Apart from the leaves, the seeds, which can be cooked /roasted and eaten, or ground and added in soup contained 20.5, 45, 23, 2.2 and 4.8g / 100g protein, fat, carbohydrate, fibre and total ash, respectively [6]. The oil in the seeds is non-drying and is useful in soap making and in cooking [7]. It has been discovered to be blood purifiers [8] and could therefore be useful in maintenance of good health most especially among poor resource ruralites in developing countries.

Increased vegetable production not only improves family diets but also increases family incomes especially the income of women who often grow, preserve and sell vegetables [9][10]. At present, greater proportion of vegetables are grown in home gardens and lowland irrigable areas. However, recent report indicated that exotic vegetables production generate higher profit, provides employment and income to the farmers than those of indigenous vegetables. As a result of over use of the land, farmers experience a low output of vegetable production which in turn adversely affects the revenue income they generate and despite governments' intervention through the establishment of agencies to help improve the production of telfairia, production still remains low. In respect to these, the study seeks to address the following objectives: to determine the socio-economic characteristics of farmers in the area, and to determine the net returns earned by both farmers using organic and inorganic manure in the study area.

## 2. MATERIALS AND METHODS

The study was conducted in Owerri, the capital of Imo state, Nigeria. Owerri municipal is made up of one community and comprising five villages which include Amawom, Umuoyime, Umuodu, Umuororonjo, and Umuonyeoche. The sample frame comprises the list of all registered vegetable farmers in Owerri municipal council area, collected from the extension personnel of the Imo state Agricultural Development Project. From this list, 12 vegetable farmers (6 from each

group of farmers) were selected randomly from each of the five villages making a sample size of 60. For the purpose of the study, only income realized from vegetables (*Telfairia occidentalis*) was considered.

Primary data were collected through the use of structured questionnaire administered to the 60 farmers. Secondary information was obtained from journals and other relevant articles.

The data collected were analyzed using analytical statistical tools such as descriptive tools and Budgetary analysis. This is mathematically specified as follows:

$$TC = TFC + TVC \quad (1)$$

$$NR = TR - TC$$

$$GM = TR - TVC$$

Where,

NR= Net Return

TR=Total Revenue

GM = Gross margin

TC= Total Cost

TVC= Total Variable Cost

TFC= Total Fixed Cost

### 3. RESULTS AND DISCUSSION

Table 1 revealed that the mean age of both organic and inorganic manure vegetable farmers fell within the productive age range of 45 years and 44 years respectively. This implies that the farmers are middle aged and were still active and open to trying out new innovations. Table 1 also revealed that farmers using inorganic manure

were more educated compared to the farmers using organic manure. This is evident in their respective mean levels of education of 6 and 12 years. This was likely to have contributed to the adoption behaviour of the inorganic manure users positively which was reflected in their yield and income subsequently. The mean household size was 8 and 6 organic and inorganic manure users respectively which implies that family labour was available for the farmers. This is in agreement with [11] who observed that larger household size is beneficial as it serves as a source of family labour. Farmers using organic manure and farmers using inorganic manure have mean farming experience of 13 years and 15 years respectively. This corroborates the findings of [12] that higher farming experience enhances productivity. Their average farm sizes were 0.53 hectares and 0.51 hectares respectively indicating that they are small scale farmers. The table also revealed that women participate more in the cultivation of *Telfairia occidentalis* than their male counterparts.

From Table 2, the total revenue for organic manure users was ₦21700, and ₦290000 for inorganic manure users while incurring the total cost of ₦54500 per hectare and ₦62500 per hectare respectively. The net-income of organic manure users was ₦162500 and ₦227500 for inorganic manure users. This implies that both organic and inorganic manure use is profitable but inorganic manure users had higher returns per hectare compared to organic manure users. The B/C ratio is 3.98:1 for organic manure users and 4.64:1 for inorganic manure users which imply that for every ₦1 invested, ₦2.98 is gained for organic manure users and ₦3.64 for inorganic manure users in the study area.

**Table 1. Socio-economic characteristics of vegetable farmers using organic and inorganic manure**

Variables	Organic manure		Inorganic manure	
	Frequency	Percentage (%)	Frequency	Percentage (%)
<b>Age</b>				
21-30	4	13.33	3	10
31-40	5	16.67	7	23.33
41-50	8	26.67	12	40
51-60	12	40	6	20
60-70	1	3.33	2	6.67
<b>Mean</b>	<b>45</b>		<b>44</b>	
<b>Household size</b>				
1-5	4	13.33	16	53.33
6-10	25	83.33	12	40.00
11-15	1	3.33	2	6.67
<b>Mean</b>	<b>8</b>		<b>6</b>	
<b>Level of education(years)</b>				

Variables	Organic manure		Inorganic manure	
	Frequency	Percentage (%)	Frequency	Percentage (%)
0	3	10	16	53.3
1-6	5	16.67	8	26.67
7-12	10	33.3	5	16.67
13 above	12	40	1	3.3
<b>Mean</b>	<b>6</b>		<b>12</b>	
<b>Farming experience (years)</b>				
1-10	14	46.67	13	43.3
11-20	10	33.3	9	30
21-30	4	13.3	4	13.3
31-40	2	6.67	4	13.3
<b>Mean</b>	<b>13</b>		<b>15</b>	
<b>Sex</b>				
Male	4	13.3	4	13.3
Female	26	86.67	26	86.67
<b>Farm size (ha)</b>				
0.1-0.5	15	50	16	53.3
0.6-1.0	12	40	11	36.67
1.1 above	3	10	3	10
<b>Mean</b>	<b>0.6</b>		<b>0.6</b>	
<b>Occupation</b>				
Farming	13	43.3	28	93.3
Non-farming	17	56.67	2	6.67
<b>Marital status</b>				
Married	22	73.3	17	56.67
Single	8	26.67	13	43.3
<b>Total</b>	<b>30</b>	<b>100</b>	<b>30</b>	<b>100</b>

Source: Field Survey (2013)

Table 2. Net Income per hectare for organic and inorganic manure users among vegetable farmers

Revenue	Qty (Kg)	Unit price (₦)	Total	Qty (Kg)	Unit price (₦)	Total
Vegetable	145 kg	1000	145000	200bundles	1000	200000
Pod	150 kg	600	72000	150pods	600	90000
<b>Total revenue</b>			<b>290000</b>			<b>290000</b>
<b>Variable cost</b>						
Labour	7man/days	2000	14000	8man/days	2000	16000
Planting material	50 kg	600	30000	60pods	600	36000
Fertilizer/manure	40bags	500	20000	4bags	6000	22000
Agrochemical	1litre	1000	1000	1litre	1000	1000
<b>Total variable cost</b>			<b>51000</b>			<b>59000</b>
<b>Fixed cost</b>						
Rent on land			3500			3500
Total fixed cost			<b>3500</b>			<b>3500</b>
<b>Total cost</b>			<b>54500</b>			<b>62500</b>
<b>Gross margin</b>			166000			231000
<b>Net income</b>			162500			227500
B/C ratio			3.98:1			4.64 :1

Source: Field Survey (2013), 1US Dollar = N160.00

#### 4. CONCLUSION AND RECOMMENDATION

Based on the result of the study, both group of farmers were young, reasonably educated with considerable years of experience in farming.

However, both had small farms. Moreso, both organic and inorganic manure use by vegetable farmers in Owerri Municipal was profitable. It was however more profitable for farmers using inorganic manure who had a higher Benefit-Cost ratio.

Organic manure users should be encouraged to use inorganic manure. Extension agents should enlighten them on the benefits of using inorganic manure while teaching them new skills on manure application. Farmers in the study area should be encouraged by government to participate in production of *Telfairia occidentalis* by creating awareness about the importance of this vegetable and through distribution of agricultural products like seedlings, fertilizer at subsidized rates.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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