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Economic costs and returns from organic farming in Oyo state, Nigeria

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Abstract

The study evaluated the costs and returns of organic farming using the farmers in Akinyele Local Government of Oyo state, Nigeria as case study. An interview schedule was administered to the respondents to elicit useful information. The analysis was based on input and output data collected from one hundred and eighty farmers selected at random from the area from which eighty-eight used organic farming, fifty-eight used non-organic farming and thirty-four used both farming systems. The data were analysed using descriptive statistics, Duncan Multiple Range Test (DMRT), t-test group statistics and gross margin analysis. Results of the analysis indicated that 57.8% of the respondents were male, 66.1% were married and all the respondents had formal education either at primary, secondary or tertiary level. Furthermore, 48.9% of the respondents adopted organic farming system, 32.2% adopted non-organic farming system while 18.9% adopted both organic and non-organic farming systems. From the gross margin analysis done, both organic and non-organic farming are profitable. However, it is more profitable to produce vegetable and maize organically. Costs related to fertiliser and the post-harvest preservation and sales was higher in non-organic farming, whereas the cost of crude farm implements and labour was higher in organic farming. There should be an intensified awareness to improve the level of participation of farmers in organic farming, recommendation of organic products to people, and government policies that encourage farmers to go into organic farming, especially by making their products readily disposable in already prepared market at encouraging prices.

Keywords: benefits, constraints, conventional farming, environmental effects, cost of production, product damage.

Introduction

The adoption of non-organic farming by farmers over time can be traced to solving the problem of insufficient food to meet the growing world population. This system of farming is a shift from the traditional means of farming. It was done to fast track growth and enhance rapid crop development, check the effect of pest threat to crop production and reduce or prevent competition of crops with unwanted plants. This method of production was widely accepted by farmers either at a small scale or large scale level of production because to an extent, it made farming activities break even depending on the size of production, and it also met the timely requirement of food for the growing population. Over time, it was realized that the effects of the chemicals used in the course of farming have lots of negative effects on both the environment and health of man, hence the need to discourage such practice and encourage the other alternative, organic farming (Kutama *et al*., 2013).

The United States Department of Agriculture (USDA) defines organic farming as a farming system which avoids or largely excludes the use of synthetically compounded fertilizers, pesticides, growth regulators and livestock feed additives to the maximum extent feasible, or the farming system that relies on crop rotations, residues, animal manure, legumes, green manure, off-farm organic wastes, and the aspects of biological pest control measures, soil productivity and tilt, to supply plant nutrients and to control insects, weeds and other pests (Alvares *et al*., 1999). According to the Organic Organization (HDRA, 1998), organic farming involves using techniques to achieve good crop yields without harming the natural environment or the people who live and work in it. Organic farming works in harmony with nature rather than against it. It keeps and builds good soil structure and fertility as well as controls pests, diseases and weeds. Organic farming also involves careful use of water resources and good animal husbandry.

According to the International Federation of Organic Agriculture Movements (IFOAM, 2006), organic farming is a production system that sustains the health of soils, ecosystems and people. Its production systems are based on specific and precise standards of production which is based on the goal of

achieving optimal agro-ecosystems which are socially, ecologically and economically sustainable to our existence. Organic farming combines tradition, innovation and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved.

Organic farming does not mean going back to traditional methods of farming, though some of the farming methods used in the past is still useful today. It takes the best of the traditional methods and combines them with modern scientific knowledge. Organic farmers do not leave their farms to be taken over by nature; they use all the knowledge, techniques and materials available to work with nature, hence creating a healthy balance between nature and farming. Through this, the farmer strikes a balance between nature and farming where crops and animals can grow and thrive, meeting the time requirement (HDRA, 1998).

Organic farming is one a promising option in meeting the challenges of alleviating poverty, increasing incomes and enhancing trade, while at the same time protecting the environment. It is a promising trade, sustainable development opportunity, and a powerful tool for achieving the Millennium Development Goals (MDGs), particularly those related to poverty reduction and the environment. On an organic farm, each technique would not normally be used on its own; the farmer would use a range of organic methods at the same time to allow them to work together for maximum benefit. For example the use of green manure and careful cultivation, together provide better control of weeds than if the techniques were used on their own.

Organic farmers often diversify their businesses by growing several crops at one time, often having both livestock and field crops, and sometimes value-added enterprises as well. The diversification reduces economic risk. Also, enterprise diversification makes it easier for farms to be more self-sufficient in terms of nutrients, livestock feed, soil organic matter and energy. According to Kutama *et al*. (2013), many experienced organic farmers have crop yields as high as, or higher than, the average conventional yields. However, the average organic crop yields are often lower than the average conventional yields. Differences between average yields reflect not only different farming systems but the differences in experience.

Kutama *et al*. (2013) also revealed that the most challenging time is the transition period as farmers switch from conventional to organic agriculture. During this period, the price premium is absent and yields are low. Sometimes farmers can receive a minor price premium for transitional production, with a price higher than conventional prices, but lower than the certified organic prices. During the early stages of conversion, some farmers have reported drops in yields of up to 30%. Later, yields tend to increase with the number of years under organic management as farmers gain experience and the soil improves. Some farmers find that the yields rebound within just a few years; this is most likely to happen with farmers who were using only minimal inputs. Other farmers, who were very dependent on herbicides, fertilizers and pesticides, find that it takes up longer for their yields to recover.

Duffy *et al*. (2002) revealed that organic agriculture has become a major industry in the last decade, driven by increasing consumer demand, price premiums, and improving market opportunities. From the research done on growing certain crops with both the organic and non-organic farming system, it was observed that non-organic farming reduced the soil's pH while organic farming kept it at the optimum range. Also, the yields through organic farming were higher than the conventional non-organic farming system.

With reference to the Nigerian situation, research done on organic and non-organic Vegetable Farming in Benue Valley of North Central Nigeria by Agbulu and Idu (2008)revealed that about 98% of the organic vegetable farmers used plant and animal refuse as compost, about 99% agreed that these manures are produced through locally fabricated biodigester, 96% attested to the fact that fabrication of biodigester requires high level of skills and endogenous knowledge and through this, about 98% of the farmers agreed that there is continuous supplies of vegetables to the open market. About 93% of non-organic vegetable farmers utilized chemical fertilizers only. These farmers have no input or control in the manufacturing of these fertilizers as attested by 97% of them. Because of their inability to control supply of these fertilizers, about 82% asserted that there is inconsistency in the supply of vegetables to the open market. About 81% of these farmers agreed that they do not require special skills to be proficient in the utilization of chemical fertilizers since manual guides explain the methods of application.

There are studies detailing the effects and side effects of pesticides upon the health of farm workers (McCauley *et al*., 2006). Through these studies, organophosphate pesticides have become associated with acute health problems such as abdominal pain, dizziness, headaches, nausea, vomiting, as well

as skin and eye problems (Echobichon, 1996). In addition, it has been found that pesticide exposure is associated with more severe health problems such as respiratory problems, memory disorders, dermatologic conditions, cancer, depression, neurological deficits, miscarriages, and birth defects (Engel *et al.,* 2000).

Having followed the trend of how organic farming has been introduced to farmers over time, there is a need to encourage the farming system ahead of the non-organic one in order to enhance good health of consumers, both in the long and short run; and promote a sustainable agricultural system which by definition meets the needs of the present generation without jeopardizing the needs of future generations. As revealed by Duffy *et al*. (2002), organic agriculture has become a major industry driven by increasing consumer demand. If organic farming is to be promoted more among farmers, the need to look into its economic feasibility to enhance a farming system that is economically sustainable, both to the farmers and to the society as a whole, is of paramount importance. The analysis of the costs and returns to organic farming is hence the focus of this study.

It is good to know that organic agriculture is both beneficial to the producer as well as to the consumer. inorganic fertilisers may be easy to use and may result in high yield but they pose some dangers to the soil, the environment and the consumer. As revealed by Willer and Kilcher (2009), organic farming is beneficial to the producers in the following ways; better income (premium price on organic produce), reduced cost of production on long term (as synthetic pesticides, herbicides and fertilizer are not used), good health (safe for farmers' household including children and pregnant women), and enhance the resistance of the crops against pests and climate change. The desire to consume organic products is also as a result of the benefits to consumers and the environment, hence there is high tendency of making good sales from organic products.

This study therefore analyses the cost incurred in the course of organic farming, taking into account the commonly produced and prominently grown crops with organic farming and also the returns from investment in the production of these crops through organic farming. Specifically, the study examined the practice of organic farming by farmers in the study area, determined the costs and returns to organic farming and hence the profitability, and compared organic farming system to non-organic farming system in terms of profitability to the farmers.

Materials and methods

The study area is Akinyele Local Government Area of Oyo State and it is one of the eleven local governments that make up Ibadan metropolis. It was created in 1976 with its administrative headquarters in Moniya, though most of the administrative staff reside in the interior of Ibadan metropolis. The Local Government is the second largest local government in Ibadan and it shares boundaries with Afijio Local Government Area to the north, Lagelu Local Government Area to the east, Ido Local Government Area to the west and Ibadan North Local Government Area to the south. It occupies a land area of 464.892 square kilometers with a population density of 516 persons per square kilometer. It lies on latitude 7.7°N and longitude 3.8°E of the equator.

The predominant vegetation zone in Akinyele Local Government area is rain forest with a loamy soil type. Using 3.2% growth rate from 2006 census figures, the 2011 estimated population for the Local Government is 247,417 persons. Places of great significance in the Local Government include Federal School of Statistics, Amuludun FM, Adekunle Fajuyi Barracks (Odogbo cantonment), National Institute of Social and Economic Research (NISER), International Institute for Tropical Agriculture (IITA) among others. The locations and villages under Akinyele Local Government Area include: Ajibode, Orogun, Sasa, Ojo, Idi-Ose, Moniya, Igbo-Oloyin, Gbanda, Akinyele, Ijaiye, Olorisa-Oko, Jarija, Onidundun, Saw-Mill, Tose, Isale-Awero, Eni-Osa, Arulogun, Alabata, Ikereku, Laniba, Ojo-Emo, Ajibade, Aroro, Oboda, Labode, Onidundu, Isabiyi, Irepodun, Elekuru, Ojedeji, Okegbemi, Mele, Amosun, Iwokoto, Talonta, Idi-Oro, Aroro and others.

The Local Government Area is dominated by farmers though some of the residents are into petty trading, transport business, local engineering, teaching, blacksmithing, and so on. Although the area is dominated by the Yorubas among other resident tribes, there are also some expatriate farmers from neighbouring African countries such as Benin Republic and Togo who have come to take advantage of the fertile agricultural land. The Local Government area is dominated by illiterates or semi-literates, and the villagers are of Christianity, Islamic and Traditional religion background. The Local Government is endowed with land suitable for the cultivation of crops like cassava, maize, yam, palm oil and so on. Also fruits and vegetables like orange, mango, banana, pineapple, tomatoes, and

etcetera are also doing well in the area. Most of the rural farmers transport their farm produce to the central markets of Ibadan for sales, either with the aid of middle-men or directly by themselves.

One hundred and eighty farmers were randomly selected from the study area for the purpose of this study. Data were collected through the use of a structured questionnaire which is divided into three sections. The first section sought information on socio-economic characteristics of the farmers while the second section dealt with farmers level of involvement in organic farming taking cognizance of how long the farmer has adopted organic farming and his/her knowledge about the environmental effects of both organic and non-organic farming. The third section sought information on the expenses incurred in the production and the returns accrued from investment in organic or non-organic farming, as the case may be.

Descriptive statistics were used to describe the socio-economic characteristics of the respondents, assess the level of involvement of farmers in organic farming, assess the postharvest activities attached to either of the farming systems adopted and also to extract information about the farmers' perceived benefits and constraints for either farming system. Duncan's Multiple Range Test (DMRT) was used in the analysis of means of expenses incurred in the production and the returns accrued from investments. T-test group statistics was used to analyse the farmers' profitability with respect to their various adopted method of production and also to make comparison between the level of profitability of organic and non-organic system of farming.

Gross Margin analysis in the study was carried out using the farmers' total revenue recorded from produce sales and total costs incurred from production, GM = TR – TC, where GM = Gross Margin, TR = Total Revenue and TC = Total Cost. Results are given in Nigerian Naira, where USD1 equals about ₦200.

Results and discussion

Socio-economic characteristics of farmers

Table 1 shows that out of the 180 respondents 57.8% were male while 42.2% were female. This implies that the larger percentage of the respondents were males, hence the level of participation of males in crop farming was more than the level of participation of females. Table 1 also shows that 33.3% were in the age range of 20–30 years, 50.6% were in the age range of 31–40 years, while 16.1% were older than 40 years. This means that more (83.9%) of the farmers were in the very active working age, that is, between ages 20 and 40. This may have effect on the productivity, hence influencing profitability. About 26% of the respondents were single, 66.1% were married, 5.6% were divorced, while 2.2% were widowed. The high percentage of married respondents means that the farmers with their families were settled for farm work. For education level, 14.3% of the respondents had primary school education, 32.2% had secondary education, and 53.3% had tertiary education. The respondents were literate, with the highest percentage of them having tertiary education. This may have an effect on the respondents' awareness of the effect of farming materials on their environment; hence this may affect the farming method adopted. About two-thirds were Christians, one third were Muslims, while only 2.2% belonged to African Traditional Religions. This shows that Christianity and Islam are predominant in the study area.

In terms of main occupation, 4.4% of the respondents were civil servants, 73.3% were farmers, 5.6% were fishermen, 6.7% were students, 2.2% were tailors, while 7.8% were teachers (Table 1). This affirms the fact that most of the residents of the study are into farming as main occupation. About 2% of the respondents earned less than ₦10,000 monthly, the majority (50%) earned between ₦10,001 – ₦20,000 monthly, 16.7% earned between ₦20,001 – ₦30,000 monthly, 18.3% earned between ₦30,001 – ₦40,000 monthly, while 2.8% earned between ₦40,001 – ₦50,000 monthly. Also, 10% of the farmers earned more than ₦50,000. From the results, 65% of the respondents cultivated between 0.4 and 1.0 hectares of land, 32.8% cultivated between 1.1 and 2.0 hectares of land, while 2.2% cultivated more than 2 hectares of land. The analysis reveals that the highest percentage of the respondents cultivated the lowest acres of land; this might be because most of the farmers are into farming because of household food security.

Table 1. Distribution of respondents by socio-economic characteristics.

Variable	Frequency	Percentage	Cumulative percentage
Gender			
Male	104	57.8	57.8
Female	76	42.2	100.0
Age (years)			
20-30	60	33.3	33.3
31-40	91	50.6	83.9
>40	29	16.1	100
Marital status			
Single	47	26.1	26.1
Married	119	66.1	92.2
Divorced	10	5.6	97.8
Widowed	4	2.2	100.0
Level of education			
Primary	26	14.4	14.4
Secondary	58	32.3	46.7
Tertiary	96	53.3	100.0
Religion			
Christianity	120	66.7	66.7
Islam	56	31.1	97.8
Traditionalist	4	2.2	100.0
Major occupation			
Civil Servant	4	2.2	2.2
Clerk	4	2.2	4.4
Farming	132	73.3	77.8
Fishing	10	5.6	83.3
Student	12	6.7	90.0
Tailoring	4	2.2	92.2
Teaching	14	7.8	100.0
Average monthly income (₦)			
< 10, 000	4	2.2	2.2
10, 001 - 20, 000	90	50.0	52.2
20, 001 - 30, 000	30	16.7	68.9
30, 001 - 40, 000	33	18.3	87.2
40, 001 - 50, 000	5	2.8	90.0
> 50,000	18	10.0	100.0
Total land area cultivated (ha)			
0.4 – 1.0	117	65.0	65.0
1.1 - 2.0	59	32.8	97.8
> 2.0	4	2.2	100.0

Producers' involvement in organic farming

Table 2 shows that 49% of the respondents adopted organic farming system in the last planting season, 32% adopted non-organic farming system, while 19% adopted both organic and non-organic farming systems. Table 2 further shows that 72.8% of the respondents indicated that they engaged in farming because of household food security, 63.9% because of profit making, and 27.2% because of achievement of a particular level of income. From the result of the analysis, majority of the farmers were concerned about making food available for their families, hence reducing the cost of family maintenance especially with food provision, this might result in the adoption of organic farming because of the health benefit of organic farming materials on humans. On the other hand, those concerned about making profit might be motivated in adopting non-organic farming since this method of farming is less stressful for farmers.

Table 2 reveals that 98% of the respondents were aware that there is improvement and conservation of the soil's structure through the use of organic materials for farming; 91% were aware that there is enhancement of growth of soil's biological components; 51.7% were aware that there is little or no damage to the environment water system; and 78% were aware that maintenance and increase of the long term fertility of the soil can be achieved through the use of organic materials. The results imply that large percentages of the respondents were aware of the environmental effects of the use of organic farming materials on the soil and the environment water system and this might be responsible for the high acceptance of organic farming in the study area.

About 54% of the respondents indicated that they were aware that there is contamination of neighbouring water bodies in case of erosion through the use of inorganic materials for farming; 46.1% were aware of successive disruption of soil structure; 41.7% were aware of the health hazards on the farmers and the consumers; and 39.4% were aware of the contamination of food products. The analysis revealed that most of the farmers were not fully aware of the environmental implications of the use of inorganic materials for farming and this might be responsible for the continuous use of non-organic farming by the farmers.

Table 2. Producers' level of involvement in organic farming.

Variable	Frequency	Percentage
The farming system adopted in the last planting season		
Organic	88	48.9
Non-organic	58	32.2
Both	34	18.9
Reasons for farming		
Farming for household food security	131	72.8
Farming for profit making	115	63.9
Farming to achieve a particular level of income	49	27.2
Awareness of the environmental effect of organic materials		
Improvement and conservation of the soil structure	176	97.8
Enhancement of the growth of the soil biological component	164	91.1
Little or no damage to the environment water system	93	51.7
Maintenance and increase of the long term fertility of the soil	141	78.3
Awareness of the environmental effect of inorganic materials		
Contamination of the neighbouring water bodies in case of erosion	97	53.9
Successive disruption of soil structure	83	46.1
Health hazards on the farmers and the consumers	75	41.7
Contamination of the food products	71	39.4

Different crops were grown in the previous planting season, and this was done individually for organic and non-organic farming. The distribution of farmers based on the crops is shown in Table 3. The table reveals that through organic farming, 5.0% of the respondents cultivated cassava, 41.7% cultivated maize, 20.0% cultivated vegetables, and 4.4% cultivated yam. However through non-organic farming, 13.9% cultivated cassava, 20.5% cultivated maize, 7.8% cultivated vegetable, 2.8% each cultivated banana, pepper, and plantain, and 2.2% cultivated yam.

Table 3. Distribution of farmers by major crops grown in the last planting season and the respective farming system used for their cultivation.

Crops	Organic farming		Non-organic farming	
	Frequency	Percentage	Frequency	Percentage
No response			85	47.2
Cassava	9	5.0	25	13.9
Maize	75	41.7	37	20.5
Vegetable	36	20.0	14	7.8
Banana	-	-	5	2.8
Pepper	-	-	5	2.8
Plantain	-	-	5	2.8
Yam	8	4.4	4	2.2
Total	180	100	180	100

Costs and returns on production

For this analysis, costs and returns were grouped into three based on the crops grown; maize, vegetables and other crops. This is because the percentage of farmers that cultivate maize and vegetable through organic means were high. From the earlier analysis, the farming means employed by respondents can be categorized into three; organic, non-organic and both (that is organic and non-organic). The means of expenses incurred in production and the returns that accrued from investment in the three categories are shown in Table 4. Non-organic farming system had significantly higher mean of total cost of non-organic pesticides and fertilizer than that of organic farming system and those that engaged in both farming systems ($P<0.05$). However, there is no significant difference in total cost of pesticide and fertilizer between those that engaged in both farming systems and total cost of fertilizers in organic farming system ($P<0.05$).

Also, there was no significant difference in the mean total cost of crude farm implements of respondents that engaged in organic, non-organic and those that engaged in both farming systems (P<0.05). Organic farming system was significantly higher in the mean labour cost in the course of production than others (P<0.05). However, there was no significant difference in labour cost in the course of production between non-organic farming system and those that engaged in both farming systems (P<0.05).

Organic farming system was significantly higher in the total revenue generated from vegetables than that of non-organic farming system (P<0.05). However, there was no significant difference in total revenue generated from vegetables between organic farming system and those that engaged in both farming systems (P<0.05). Also, organic farming system was significantly higher in the total revenue generated from maize than that of non-organic farming system (P<0.05). However, there was no significant difference in total revenue generated from maize between organic farming system and those that engaged in both farming systems (P<0.05).

Additionally, non-organic farming system was significantly higher in the total revenue generated from other crops than others (P<0.05). However, there was no significant difference in total revenue generated from other crops between organic farming system and those that engaged in both farming systems (P<0.05). Finally, respondents that engaged in both farming systems significantly had higher average after production cost attached to preservation and sales than others (P <.05). However, there was no significant difference in average after production cost attached to preservation and sales between organic farming system and non-organic farming system (P<0.05).

Table 4: Means of expenses incurred in the production and the returns accrued from investment in the three categories of farming system.

Statistics	Mean (± standard deviation)[1]		
	Organic	Non-organic	Both
Total cost of organic fertilizer/inorganic pesticides and fertilizer (₦)	6,452 (± 5,208)[b]	11,551 (± 4,316)[a]	6,600 (± 2291)[b]
Total cost of crude farm implements (₦)	5,503 (± 5,149)[a]	5,352 (± 2,409)[a]	4,412 (± 1,041)[a]
Average labour cost in the course of production (₦)	26,400 (± 16,321)[a]	17,400 (± 11,860)[b]	10,000 (± 1,372)[b]
Total revenue generated from vegetable (₦)	25,778 (± 16,865)[a]	15,298 (± 5,286)[b]	31034 (± 1,290)[a]
Total revenue generated from maize (₦)	42,437 (± 31,843)[a]	26,316 (± 8,570)[b]	36,667 (± 17,856)[a]
Total revenue generated from other crops (₦)	145,800 (± 67,804)[b]	238,429 (± 304,293)[a]	91666.67 (± 62,812)[b]
What is the average after production cost attached to preservation and sales (₦)?	13,758 (± 13,021)[b]	18,295 (± 8,823)[b]	30833.33 (± 23,390)[a]

[1] Means with same letter across the row are not significantly different (DMRT at P<0.05)

On the other hand, Table 5 shows a t-test comparison between organic and non-organic farming systems based on the expenses incurred in production and returns that accrued from investment. Table 5 shows that respondents who engaged in non-organic farming system had significantly higher total cost of pesticides and fertilizer (P<0.001). Also, respondents who engaged in organic farming system had higher total revenue generated from vegetables (P<0.001). In addition, respondents who engaged in organic farming system had higher total revenue generated from maize (P<0.001). Further, respondents who engaged in non-organic farming system had higher total revenue generated from other crops (P<0.05). Finally, respondents who engaged in non-organic farming system had higher average after production cost attached to preservation and sales (P<0.05).

Table 5. T-test comparison between organic and non-organic farming systems based on the expenses incurred in production and returns accruing from investment.

Parameters	Farming system	Mean ± SD[1]	*P*
Total cost of organic fertilizer/inorganic pesticides and fertilizer (₦)	Organic	6,452 (± 5,208)	
	Non-organic	11,551 (± 4,316)	<0.001
Total revenue generated from vegetable (₦)	Organic	25,778 (±16,865)	
	Non-organic	15,298 (± 5,286)	<0.001
Total revenue generated from maize (₦)	Organic	42,437 (± 3,1843)	
	Non-organic	26,316 (± 8,570)	<0.001
Total revenue generated from other crops (₦)	Organic	145,800 (± 67,804)	
	Non-organic	238,429 (±304,293)	<0.05
Average income after production costs for preservation and sales (₦)?	Organic	13,758 (± 13,021)	
	Non-organic	18,295 (± 8,823)	<0.05

[1] SD = standard deviation

Gross margin analysis

Table 6 indicates that it is more profitable to produce vegetable and maize organically, while it is more profitable to produce other crops non-organically. Likewise, cost of fertilizer and the after production cost attached to preservation and sales was higher in non-organic farming, whereas the cost of crude farm implements and labour was higher in organic farming. Using the figures in Table 6, the gross margin for organic farming (n = 88) was ₦88,392.00 per farmer per growing season, and ₦177,562.00 per farmer per growing season for non-organic farming (n = 58). Both organic and non-organic farming are profitable, although the gross margin for organic farming was about half that of the non-organic farming.

Table 6. Table of the total expenses incurred in the production and the total returns accrued from investment in both organic and non-organic farming systems.

Statistics	Organic	Non-organic
Total cost of organic fertilizer/inorganic pesticides and fertilizer (₦)	200,000	566,000
Total cost of crude farm implements (₦)	407,200	310,400
Average labour cost in the course of production (₦)	1,320,000	435,000
Total revenue generated from vegetable (₦)	719,000	232,000
Total revenue generated from maize (₦)	2,673,500	500,000
Total revenue generated from other crops (₦)	7,290,000	11,683,000
Average income after production costs for preservation and sales (₦)	976,800	805,000

Postharvest miscellaneous issues

Table 7 shows that 19.9% of the respondents recorded little product damage in organic farming system, while 22.6% of respondents recorded little product damage in non-organic farming system. Moreover, attitude of farmers and pre-harvest activities were not responsible for product damage in organic farming system. Meanwhile, 2.7% of the farmers indicated post-harvest activities, rodent attack (8.2%), and weather conditions (8.9%) as factors responsible for product damage. Also, 3.4% of the respondents indicated that attitude of farmers, post-harvest activities (2.7%), pre-harvest activities (6.8%) and weather condition (6.2%) could be responsible for product change in non-organic farming system. Finally, rodent check and accurate weather forecast can help check product damage in organic farming system. However, product damage could be checked through good storage and accurate weather forecast in non-organic farming system. Also, proper handling of products after harvest, proper soil care and management of soil texture are important.

Table 7. Questions on product damage.

Questions	Organic		Non-organic	
	Frequency	Percentage	Frequency	Percentage
Was there any record of product damage?				
Yes	37	25.3	42	28.8
No	51	34.9	16	11.0
If yes, how much product was damaged				
Little	29	19.9	33	22.6
Much	0	0.0	5	3.4
No response	59	40.4	20	13.7
What could be responsible for the damage?				
Attitude of farmers, weather and rodent attack	0	0.0	5	3.4
Postharvest activities	4	2.7	4	2.7
Pre-harvest activities	0	0.0	10	6.8
Rodent attack	12	8.2	0	0.0
Weather conditions	13	8.9	9	6.2
No response	59	40.4	30	20.5
How can the product damage be checked?				
Accurate weather forecast	5	3.4	9	6.2
Good storage	0	0.0	10	6.8
Proper handling of products after harvest	4	2.7	4	2.7
Proper soil care and rodent check	4	2.7	0	0.0
Proper weather forecast	0	0.0	5	3.4
Rodent check	8	5.5	0	0.0
Soil texture	4	2.7	0	0.0
No response	63	43.1	30	20.5
Total	88	60.3	58	39.7

Perceived benefits and constraints of organic farming

Table 8 shows that 27.8% of the respondents perceived that organic farming (produce) enhances healthy body system, little or no chemical in food and soil preservation (5.6% each), soil sustainability (4.4%), land sustainability (2.8%), and good harvest (2.2%). Results also show that 11.0% of the respondents perceived that organic farming is stressful. And it is energy and time consuming (2.2%), also, maintenance from weed (31.7%) and insufficient fund (7.8%) constrain organic farming.

Table 8. Benefits and constraints of organic farming.

Questions	Frequency	Percentage
What are the perceived benefits of organic farming?		
Enhance healthy body system	50	27.8
Good robust harvest	4	2.2
Human health and soil sustainability	8	4.4
Land sustainability	5	2.8
Little or no chemicals on food	10	5.6
Soil preservation	10	5.6
What are the perceived constraints of organic farming?		
Cultivation stressful	20	11.0
Energy and time consuming	4	2.2
Insufficient fund	14	7.8
Maintenance from weed	57	31.7
No response	85	55.0

Perceived benefits and constraints of non-organic farming

About 2.2% of the respondents indicated that one of the perceived benefits of non-organic farming is crop suitability, 7.2% indicated that there is no cultivation stress, 7.8% indicated that it is time saving (Table 9). About 8% of the respondents indicated that a perceived constraints of non-organic farming is the lack of funds, 2.2% indicated inadequate machinery, and 2.8% noted the occurrence of water pollution.

Table 9. Benefits and constraints of non-organic farming.

Questions	Frequency	Percentage

What are the perceived benefits of non-organic farming?		
Crop suitability	4	2.2
No cultivation stress	13	7.2
Time saving	14	7.8
No response	149	82.8
What are the perceived constraints of non-organic farming?		
Lack of fund	14	7.8
Lack of knowledge of the effect on health	8	4.4
Inadequate machineries	4	2.2
Water pollution	5	2.8
No response	149	82.8
Total	180	100

Conclusion

Large percentages of the respondents were aware of the environmental effects of the use of organic farming materials on the soil and the environment water system hence this might be responsible for the high acceptance of organic farming in the study area. From the study, it can be concluded that respondents perceived organic farming to be more beneficial to the environment and for human consumption compared to non-organic farming whose farming inputs have negative externalities on both the environment and human (producers and consumers). Hence, organic farming systems are used by the farmers despite the constraints of the system which discourage farmers, especially when crop production is carried out primarily for making an income.

According to the findings of the research work, the following recommendations are made:
1. There should be an intensified awareness to improve the level of participation of farmers in organic farming.
2. The government should also support the awareness campaign and recommend consumption of organic products to people.
3. There is need for government policies that encourage farmers to adopt organic farming practices, especially by making their products readily disposable in already prepared markets with premium prices.
4. Farmers should ensure that organic production is quality driven, hence they should adopt good production and management practices that are not in diluted with the use of chemicals, so as to increase organic market share.
5. It is also advisable that intending organic producers should consider starting with the production of vegetable and maize since it has the highest market potential compared to non-organic farming. This will encourage these intending producers to produce more using organic system since they will be economically motivated and not discouraged.

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