

Influence of Organic Agricultural Practices on Environmental Sustainability in Emohua Local Government Area of Rivers State, Nigeria

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Abstract

The study examined the influence of organic agricultural practices on environmental sustainability in Emohua Local Government Area of Rivers State. The study adopted a descriptive survey research design. A total of 350 respondents (farmers) constituted the sample of study. 25 farmers each were randomly selected from fourteen out of thirty nine communities that make up Emohua Local Government area. Data were collected using a structured questionnaire designed in the pattern of Likert 4-point rating scale. Data were analyzed using percentage and mean, while Chi square, Pearson Product Moment Correlation and Z test were also used to test the hypotheses. The results showed that majority of the farmers were males while majority (42.85%) of them had secondary education and 8.58% had no formal education. About 46.29% had a household number consisted of 6-10 persons, and 28.57% of the farmers engaged the services of a combination of family and hired labour for their organic agricultural practice. The results also showed that majority of the farmers were highly aware of organic agricultural practices and as measures of sustainable environment. Finding also shows that the null hypotheses generated for this study were rejected while the alternate hypotheses were retained. It is therefore concluded that, there is a significant relationship between socio economic characteristics and farmers adoption of organic agricultural practices and a significant relationship between organic agricultural practices and environmental sustainability at $X^2 38.3, P = 0.05$ and Z cal 17.93, $P = 0.05$ respectively. Enlightenment campaign in order to increase the awareness on the use of alley cropping and taungya system for environmental sustainability among others were recommended.

Keyword: organic, agriculture, practices, sustainability, environment.

Introduction

Agriculture serves as the economic mainstay of the majority rural households in Nigeria, despite the significant role played by the oil sector (Amaza, 2000; Udoh, 2000 and Obisesan et al 2013). Agriculture was practiced over the years without the use of synthetic substance (Wikipedia, 2011; Helga et al, 2013). The agricultural practices that relied on chemical substances were the result of modern technology and it played significant role in improving food productivity (Bhandari, 2014). However, the use of these chemical substances have

serious long term side effects, such as land degradation, environmental pollution and health issues relating to toxins introduced into the food (Stinner, 2007). An attempt to counterbalance the adverse effect while still maintaining increased productivity gave rise to an alternative agricultural practice that is wholly focused on organic methods (Paul, 2011, Vogt, G. 2007). Farmers made serious observations which resulted from the usage of chemical substances and requested for an alternative farming method (Stive, 1999). Paul et al (2016) reported that organic agriculture originated in the early 20th century as an alternative to rapidly changing farming practices.

Conserved Energy Future (2016) defines organic agriculture as the method which involves the cultivation of plants and the rearing of animals in natural ways. The ways include; the use of biological materials, avoiding synthetic substances to preserve the fertility of the soil and ecological balances which reduces the effects of pollution and wastage. International Federation of Organic Agriculture Movement (IFOAM), an international organization established in 1972 for organic farming defines organic agriculture as agricultural practices that sustain the health of soils, ecosystem, biodiversity, and the people in an environment. Organic agriculture combines traditions with scientific innovations to benefit the entire environment, ensures high quality of life and promote balanced relationships for all involved. Organic agriculture depends on materials of organic origin such as compost manure, green manure, farm yard manure and bone meal. It lays emphasis on the methods such as crop rotation, companion planting, biological pest control, mixed cropping and fostering of insect predators (USDA 2016). These techniques use the natural environment to enhance productivity.

The environmental benefits of organic agriculture cannot be overemphasised. Organic agriculture aims at producing food while establishing an ecological balance that protects the soil from losing its fertility. Organic agriculture combines practices such as crop rotation, intercropping and organic manuring among others that encourage the growth of micro fauna and flora, improves soil formation; texture and structure to build healthy soil. Organic agriculture contributes to mitigating the greenhouse effect and global warming through its carbon sequestration ability (FAO 2016). It reduces non-renewable sources of energy by decreasing the use of agrochemical responsible for the emission of greenhouse gasses. Organic agriculture encourages crop diversity as it helps the environment thrive and protect species from going extinction (Wikipedia, 2013). Organic agriculture plays significant roles in erosion control, reduction of pollution of ground water, caused by the use of synthetic fertilizers, pesticides and herbicides. A study published by Primental and Colleagues confirmed that crop rotation, cover cropping and green manuring are typical organic agricultural practices that reduce soil erosion, pest infestation and use of synthetic pesticides (Primental et al,2015).

Organic agriculture relies on traditional farm tools which aims at minimizing the use of fossil fuel for sustainability (Ramaraji et al, 2015). Such practice suppresses weeds rather than elimination by boosting crop competition and phototoxic effects on weeds (Kathleen et al, 2003).

According to Hole et al (2005), Organic agriculture is a core principle of conservation of natural resources and biodiversity. It encourages a natural balance within the ecosystem and helps preserve domination of particular specie over the others (FAO 2011). Multiple cropping practices in organic farming boast biodiversity, enhance resilience and contribute to a healthy farming system (CEF 2016). A Recent report on A Meta analyses of 766 scientific papers

concluded that organic farming produces more biodiversity than the other farming system (FAO 2016).

A major characteristic of organic agriculture is the refusal of genetically modified organisms (GMOs). Participants at the IFOAM's 12th scientific conference held on 19th October, 1998 issued a Mar del Plata Declaration as they voted collectively to prohibit the use of genetically modified organisms in food production and agriculture (Luis et al, 2001). According to the 2015 meta-analysis of studies carried out across five (5) continents, organic agriculture is between 22 and 35% more profitable for farmers than conventional methods globally (Crowder et al, 2015).

The principles of organic agriculture according to (IFOAM) as cited in Sijuwade et al (2014) are:

1. Principles of health: - Organic agriculture should sustain and improve the health of soil, plants, animals, humans and the earth by providing nutritious food items that is free from poisons for human consumption.
2. Principles of fairness: organic agriculture should build a relationship between the humans and living organisms in the ecological system, thereby ensuring the judicious use of natural resources and its preservation for the future generation.
3. Principles of care: organic agriculture should involve technique that benefits the present and future generations and the environment.
4. Principles of ecological balance: organic agricultural practices must fit the ecological balances and cycle in nature for sustainability.

According to FAO (2010), sustainable agriculture means an integrated system of plant and animal production practice, having site specific application that will last over time while satisfying human food and fibre needs. It also improves the quality of environmental and natural resources, upon which agricultural economy depends and makes maximum use of non – renewable resources. Sustainability according to Wikipedia (2013) rests on the principles that must meet the needs of the present without compromising the ability of future generation to meet their own. Sustainability integrates three main goals-environmental health, economic profitability and social and economic quality. However, environmental sustainability is defined as responsible interactions with the environment to avoid depletion or degradation of natural resources and allow for long term environmental quality [Free encyclopedia.com]. These practices help to ensure that the needs of today's populations are met without destroying the needs of future generations.

In Nigeria, majority of the farmers live in the rural area and these people depend solely on the proceeds of the environment to sustain their livelihood. However, agricultural production has continued to witness a downward decline in relation to environmental issues occasioned by the use of synthetic substances. This could be traced to lack of recognition or awareness and value of organic agricultural practices as a measure of sustainable environment. It is against this background that the researcher sought to investigate organic agricultural practices employed by rural farmers in the study area and its implications for environmental sustainability.

Purpose of the study

The purpose of the study was to examine the effect of organic agricultural practices on environmental sustainability in Emohua Local Government Area of Rivers State

Specifically, it intends to;

- (1) Identify the socio economic characteristics of organic agricultural farmers in the study area;
- (2) Ascertain farmers' level of awareness of organic agricultural practices;
- (3) Identify the types of organic agriculture practiced by the farmers in the study area;
- (4) Identify the benefits of organic agricultural practices in sustaining the environment.

Research questions

The study was guided by the following research questions ;

- (1) What are the socio economic characteristics of the farmers in Emohua local government area?
- (2) To what extent are the farmers aware of organic agricultural practices?
- (3) What are the types of organic agriculture practiced by the farmers in the study area?
- (4) What are the benefits of organic agricultural practices in sustaining the environment?

Hypotheses

The hypotheses of the study were;

- (1) There is no significant relationship between the farmers' socio economic characteristics and their adoption of organic agricultural practices.
- (2) There is no significant relationship between organic agricultural practices and environmental sustainability.

Methodology

The study was conducted in Emohua Local Government Area of Rivers State, Nigeria. The choice of Emohua Local Government Area for this research was due to its notable agricultural activities in the State. The Local Government is located at latitude 40 53' 0'' N, 60 52' 0'' E and longitude 4.883330 N, 6,866670 E. It has an area of 831 km² (321 sq m) and a population of 201,901 according the 2006 census (NIPOST 2016). The study was a descriptive survey design. Twenty five (25) farmers each were randomly selected from fourteen out of thirty nine (39) communities that make up Emohua Local Government area, to give a total sample size of 350 respondents (male and female) for the study. Data were collected using structured questionnaire designed in the pattern of Likert 4 – point rating scale showing the degree and strength of responses ranging from 1-4points. Data were analyzed using descriptive statistical tools of frequency, percentage and mean. Inferential statistical stools of chi square, PPMC and Z- test were also used to analyze the hypotheses. The criterion mean of 2.5 was used to ascertain whether the respondent agreed or disagreed with the questionnaire items. A mean above 2.5 indicates acceptance while a mean below indicates rejection.

Results and Discussion

Research question 1: What are the socio economic characteristics of the respondents?

Table 1: Distribution of respondents according to their Socio economic characteristic

Variables	Frequency (n=350)	Percentage (%)
Sex		
Male	250	71.43
Female	100	28.5

Age (Years)		
30-39	70	20.00
40-49	130	37.14
50-59	100	28.57
60 and above	50	14.29
Marital Status		
Single	80	22.86
Married	150	42.86
Divorced/separated	70	20.00
Widowed	50	14.29
Educational Background		
No formal education	30	8.58
Primary education	100	28.57
Secondary education	150	42.85
Tertiary education	70	20.00
Sources of Labour		
Family labour	90	25.71
Hired labour	50	14.29
Group labour	60	17.14
Family and hired labour	100	28.57
Hired and group labour	50	14.29
Income per month N'000		
None	18	5.14
1,000-10,000	24	6.86
11,000-20,000	31	8.86
21,000-30,000	80	22.86
Above 30,000	197	56.29
Livelihood Activity		
Self employed	58	16.57
Salaried work	74	21.14
Farming	218	62.29
Number of household		
1-5 people	113	32.29
6-10 people	162	46.29
11 and above	75	21.43
Membership Organisations		
Religious	167	47.71
Social	37	10.57
Professional	51	14.57
Cultural	43	12.29
Political	52	14.86

Source: Field Data 2016

Data in table 1 showed that out of 350 respondents, 250 were male while 100 respondents were females at the 71.43% and 28.57% respectively indicating that males were more involved in organic agriculture in the study area. Table 1 also showed that majority of the respondents 130 (37.17%) falls within the age of 40-49, 100 (28.57%) within the age of 50-59yrs, 70 (20.00%) falls within the age of 30-39yrs and 50 (14.29%) were within the age of 60 and above. This corroborates the findings of Oluwasusi (2014) that farmers are usually middle aged, in their economically active stage. In respect to marital status, 150 (42.86%)

were married, 50 (14.29%) were single, 70(20.00%) were either divorced or separated, 80(22.86%) were widowed. This implies that married people were more engaged in farming using assistance from their companion to perform some of the farming activities. As regards educational qualification the results showed that majority of the respondent 42.84% had secondary education, 28.57% had primary education, and 20.00% attended tertiary institution, while 8.57% had no formal education. This implies that educated people are involved in farming. The result also shows that majority of the farmers use a combination of family and hired labour. This result corroborates with the view of FAO (2005) and Edeoghon et al (2008) that family labour is the most commonly used labour sources in agricultural production in developing countries. The result in Table 1 also shows that some of the respondents (6.86%) earned between (1,000-10,000) monthly, while majority earned up to 30,000 and above. On livelihood activities, 58(16.5%) were self employed, 74 (21.14%) were salaried workers, while 218 (62.29%) were into farming. The findings shows that majority of the rural people are into farming which is their major source of income for sustainable livelihood. Findings also revealed that majority 162 (46.29%) had household size of 6 to 11persons. This means that many families take an added advantage of large household size for labour input to increase production and to maximize profit for their farming venture. This corroborates the findings of Onyenweaku and Nwaru(2005) that large household size reduce labour difficulty which bring about increase in production.

Table 2: Respondents awareness of organic agricultural practices

Variables	Mean	Decision
Mixed cropping	3.14	VHE
Cover cropping	2.91	HE
Composting	2.80	HE
Intercropping	2.71	HE
Bush fallowing	3.14	VHE
Green manure	2.60	HE
Alley cropping	1.86	VLE
Crop rotation	2.64	HE
Minimum tillage	2.90	HE
Mulching	2.87	HE
Animal manure	2.89	HE
Biological pest control	1.91	VLE
Taungya system	1.49	VLE
Improved seedling	2.84	HE

Source: Field Data 2016

VHE= very high extent, HE= high extent, LE= low extent and VLE= very low extent

Table 2 showed the respondents extent of awareness of organic agricultural practices in the study area. The study showed that majority of the respondents were highly aware of bush fallowing (3.14), mixed cropping (3.14) minimum tillage (2.90) animal manuring (2.89) and intercropping (2.80). Also the respondents were highly aware of crop rotation, mulching, improved seed varieties among others. This result agreed with the finding of Edeoghon et al (2008) that many farmers are highly aware of cover cropping and mixed cropping while only few were aware of alley cropping.

Table 3: Forms of organic agriculture practiced by the respondents Distribution of respondents based the Organic Agricultural Practices

Organic Agricultural Practices	Mean	Decision
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Bush fallowing	3.24	Agree
Mixed cropping	3.11	Agree
Crop rotation	2.57	Agree
Minimum tillage	2.83	Agree
Use of green manure	2.61	Agree
Alley cropping	1.76	Disagree
Mulching	2.70	Agree
Handing picking of insect's pests	2.65	Agree
Intercropping	2.85	Agree
Manual weeding	3.24	Agree
Use of animal manure	2.63	Agree
Cover cropping	2.77	Agree
Taungya system	1.79	Disagree
Companion planting	2.56	Agree

Source: Field Data 2016

Table 3 shows the mean responses of use of organic agricultural practices. The result reveals that out of the fourteen organic agricultural practices identified, item no 6 and 13 were not usually practiced by the farmers. The result also shows that farmers in the study area practice a wide range of organic agriculture. Majority of them were practices inherited as their traditional methods of farming pass on from their progenitors.

Table 4: Respondents opinion of benefits of organic farming and Environmental sustainability

Sustainable Environment	Mean	Decision
Organic farming reduces soil erosion	2.86	Agree
Builds healthy soils	3.05	Agree
Minimizes the use of fossils fuel for sustainability	2.89	Agree
Encourages crop diversity	2.86	Agree
Help conserve biodiversity	2.80	Agree
Contributes to mitigating the greenhouse effect and global Warming	2.87	Agree
Reduces the risk of ground water pollution	2.87	Agree
Discourages algae blooms	2.63	Agree
Discourages environmental exposure to agrochemicals	3.10	Agree
Supports animal health and wellbeing	2.77	Agree
Promotes weed suppression rather than weed elimination by synthetic herbicides	2.77	Agree
Ensures ecological balance	2.74	Agree
Encourages the development of vigorous population of soil microbes	2.94	Agree

Source: Field Data 2016

Table 4: Shows the mean rating of respondents on the benefits of organic agricultural practice on the environment. Among these benefits include; buildings of healthy soil. (3.05) discourages environmental exposure to pesticides and chemicals (3.11) mitigates greenhouse effect and global warning (2.83) and minimizes the use of fossil fuel for sustainability (2.89). It also includes; prevention of soil erosion (2.86) reduction in the risk of ground water contamination (2.87) promotes weed suppression (2.77) supports animals health (3.14) and encourages ecological balance (2.74). Others include; biodiversity conservation, discourage

algae bloom and encourages crop diversity with the mean values of 2.80, 2.63 and 2.86 respectively. The result shows that all the items had mean value above 2.5; this implies that organic agriculture is practically good for a sustainable environment. These findings corroborated those of (Bengtsson et al (2005): Hole et al, (2005) that organic agriculture reduces pesticides use and can increase species abundance and richness. Leifeld and Fuhre (2010), it increase soil fertility, Siegrist et al (1998), that organic agriculture reduces soil erosion for sustainability.

TEST OF HYPOTHESIS I

Relationship between Respondents' socio economic characteristics and adoption of organic agricultural practices

Table 5 Chi square result of socio economic characteristics of farmers and their adoption of organic agricultural practices

Variable				N	DF	Calculated X ²	Critical X ²	P-Value	Remark
Socio-economic characteristics									
Vs				350	4	38.03	9.49	0.05	significant
Adoption of organic agricultural practices									

X² Cal.Value=38.03>Crit.X² value=9.49,df=4 P value=0.05

Table 5 above shows that there is a significant relationship between socio economic characteristics and the respondents' adoption of organic agricultural practices. This is because the calculated X² value of 38.3 is greater than the critical table X² value of 9.49 at P value (0.05). This implies that age, gender, marital status, educational level, sources of labour, among others are envisaging factors for positive adoption of organic agricultural practices. This also means that level of education did not influence the adoption of new technologies instead the farmers contained with the organic agricultural practices which they believe is the heritage of their tradition. So the null hypothesis is rejected and the alternate accepted.

Test of hypotheses II

There is no significant relationship between organic agricultural practices and environmental sustainability.

Table 6 Pearson Product Moment Correlation and Z test result of organic agricultural practices and environmental sustainability.

Variables				N	∑x ²	∑y ²	∑xy	r-value	Z cal	Z crit	Remarks
Organic agricultural practices (x)											
Vs											
Sustainable environment (y)				350	5.5184	5.0114	5.088	0.97	17.93	1.960	Significant

R-value 0.97, Zcal 17.93, Zcrit 1.960, p=0.05

Table 6 presents the analysis on the relationship between organic agricultural practices and environmental sustainability. The result shows that there is a positive relationship between organic agricultural practices and environmental sustainability at r -value = 0.97. However, to determine if the relationship is indeed significant, a Z test was used. The result therefore reveals that Z calculated value of 17.93 is greater than Z critical at table value of 1.960 at 0.05 alpha level of significance. As a result, the null hypothesis which states that there is no significant relationship between organic agricultural practices and environmental sustainability is therefore rejected. This implies that organic agricultural practices have significant influence on sustainable environment.

Conclusion

From the findings, the study concludes that more males rather than females are into agriculture and majority of them were very active and energetic and were within the age range of 40-49 years, make use of family hands and hired labour to carry out their activities. The farmers had good knowledge of organic agriculture except very few methods such as alley cropping and taungya system and had been practicing organic agriculture as a tradition. The farmers, majority of them could identify the benefits of organic agricultural practices in relation to sustainable environment.

Recommendations

Based on the findings the following recommendations are made;

1. There should be an enlightenment campaign by government and its agencies such as ADPs and Ministries of Agriculture aim at increasing awareness on the use of alley cropping and taungya system in the study area.
2. There is need for the governments (Federal, State and Local) to establish an organic farm centre where organic agricultural inputs such as organic fertilizers, herbicides and improved seeds would be sold at subsidized rate to the farmers. This would encourage more participants and improve productivity.
3. Farmers should be encouraged to appreciate the benefits of organic agriculture. This is especially as it is an environmentally friendly approach and offers opportunity to maximize production in a local environment.

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