

# Assessment of farmers' perception of organic fertilizer usage in Ondo State, Nigeria

Aanuoluwapo Oladipupo Opayinka\*, Akinloye Jimoh Farinde

Department of Agricultural Extension and Rural Development, Faculty of Agriculture, Obafemi Awolowo University, Ile-Ife, Nigeria

**Abstract:** The use of organic fertilizer can keep soil health and fertility sustainable. This use of organic fertilizer can be determined by farmers' perception of organic fertilizer usage. This study therefore assessed the perception of organic fertilizer usage among farmers in Ondo State, Nigeria. Multistage sampling procedure was used to select 250 farmers and interview schedule was used to elicit information from the farmers on their demographic and social characteristics; awareness of organic fertilizer benefits; and perception of organic fertilizer usage. Data collected were analysed using descriptive and inferential statistics. The results show that 67.2 percent of the farmers had high awareness level of organic fertilizer benefits while 56.8 percent of the farmers had a favourable perception of organic fertilizer usage. The study also revealed that ethnicity ( $\chi^2 = 38.174$ ) and family type ( $\chi^2 = 11.679$ ) were associated with farmers' perception of organic fertilizer usage. Also, age of farmers ( $\beta = -0.110$ ) and farmers' awareness of organic fertilizer benefits ( $\beta = 0.686$ ) were determinants of farmers' perception of organic fertilizer usage at  $P \leq 0.05$ . The study concluded that farmers had favourable perception of organic fertilizer usage and recommended that extension agents should make farmers aware of the benefits of organic fertilizer.

**Keywords:** Organic fertilizer; usage; benefit, perception and awareness

## 1. Introduction

According to World Food Programme (2021), the Sustainable Development Goal (SDG) 2 which is Zero Hunger encompasses food security, improvement in nutrition and promotion of sustainable agriculture. Sustainable agriculture therefore plays a significant role in achieving the goal 2 of the SDG. Sustainable agriculture integrates three main goals: environmental health, economic profitability, and social and economic equity. Those who practise sustainable agriculture believe that a "healthy" soil is a key component of sustainability since a healthy soil will produce healthy crop plants that have optimum vigour and are less susceptible to pests (Ćwiek, 2008). Organic fertilizer plays a major role in keeping the soil healthy. According to McCausland (2013), organic fertilizer rejuvenates poor soils, and retains nutrients until feeder roots need

them. The release of potential pollutants into the water bodies and the atmosphere is thereby curtailed making the environment healthy. According to Dubey and Dubey (2013), organic farming/products are becoming very necessary in today's world to control ecosystem health and to impart related human health benefit. There is therefore a growing demand for organic produce the world over.

The use of organic fertilizer in farming helps avoid and sequester Green House Gases (GHG) including carbon dioxide, nitrous oxide and methane which inorganic fertilizer releases into the air (Kotschi and Müller-Samann, 2004) by significantly reducing carbon dioxide emissions; offering permanent cropping systems with sustainable productivity; increasing oxidation of methane through the promotion of aerobic micro organisms and high biological activities in soils; and effective reducing the release of nitrous oxides thereby

\* Corresponding author:  
Email: [aanytreasure@gmail.com](mailto:aanytreasure@gmail.com)



clearly limiting the total nitrogen amount and reducing emissions caused during the energy demanding process of inorganic fertilizer synthesis (International Federation of Organic Agriculture Movements (IFOAM), 2006; Small Planet Institute, 2008 and Gaynor, 2009).

Ondo state possesses a commercial organic fertilizer producing industry and has several organic materials that can be used to replenish the soil's fertility. Notable among these organic materials are cocoa pod husks (CPH) since cocoa is one of the major tree crops produced in the state. CPH has been found to compares favourably with NPK fertilizer as a useful source of organic fertilizer whether burnt, old, fresh, composted, dried or rotten (Ogunlade, Agbeniyi & Oluyole, 2010). Despite these, according to Daramola et al. (2010), the soil and natural vegetation in most parts of Ondo state have been very much degraded over the years, as a result of human activities, the major of which is based on the rotation of bush fallow system. Ogunbadewa (2012) also reported that intensively cultivated land with annual crops has gained the highest area coverage (74.78%) in Ondo state, has maximum land degradation and is poorly managed due to overuse. These are pointers to the fact that the use of organic fertilizer is not popular in the state. This therefore necessitate this study to give insight into the farmers' perception of organic fertilizer usage in the state. This is because except farmers in Ondo state have a favourable perception towards the use of organic fertilizer, they may not use it.

The study therefore was carried out to investigate farmers' perception of organic fertilizer usage in Ondo State, Nigeria. The specific objectives were to describe the socio-demographic characteristics of the farmers; investigate awareness of organic fertilizer benefits; and evaluate farmers' perception of organic fertilizer usage. The study also tested hypothesis to verify the demographic and social characteristics of the farmers that were predictors of farmers' perception of organic fertilizer usage. Furthermore, the study tested the hypothesis to know if farmers' awareness of organic fertilizer benefit was a predictor of farmers' perception of organic fertilizer usage.

## 2. Materials and methods

The study was conducted in Ondo State, Nigeria. A multi-stage sampling procedure was used to select respondents for the study. At the first stage, five Local Government Areas (25%) were proportionately selected from each of the two Agricultural Development Programme (ADP) zones. At the second stage, 5 farming rural communities were purposively selected from each of the LGAs and

10 respondents were selected from the communities using Simple Random Sampling Technique. In all, 250 farmers were selected for the study.

Information relevant to the demographic and social characteristics of the farmers; awareness of organic fertilizer benefits; and perception of organic fertilizer usage were collected from the farmers using interview schedule. The measurement of the variables are as follows:

- Age of farmers: Each respondent was asked of his/her age. This was recorded as given and grouped for easy analysis. The groups were as follows:  $\leq 30$ , 30- 60 and  $>60$ .
- Sex: Male was coded 1 and Female 2.
- Religious affiliation: The options of religion given were Christianity, Islam and Traditional religion and they were coded 1, 2 and 3 respectively.
- Marital status: The options single, married, divorce, separated, and widow were given and coded 1,2,3,4 and 5 respectively.
- Family type: Monogamy was coded 1 and polygamy was coded 2
- Household size: This was recorded as given and grouped for descriptive purposes as follows: 1-5, 6-10,  $>10$ . The mean and standard deviation was also derived.
- Ethnic group: The options given were coded thus: Yoruba - 1, Hausa - 2, Ibo - 3 and others - 4
- The dependent variable was farmers' perception of organic fertilizer usage. This was assessed by asking the respondents to indicate their opinion on 16 positive and negative perception statements. Their responses were coded on a five-point likert scale of SA (Strongly Agreed), A (Agreed), I (Indifferent), D (Disagreed), SD (Strongly Disagreed), which were scored 5, 4, 3, 2, and 1, respectively, for positive statements, and 1, 2, 3, 4, and 5, respectively, for negative statements. The highest score obtainable for this variable was 80 and the lowest score obtainable was 16. Equal interval approach was used to classify farmers' perception to favourable (59 – 80), indifferent (37 – 58) and unfavourable perceptions (16 – 36). The mean score and standard deviation were also calculated.
- To measure awareness of organic fertilizer benefits, factual statements on organic fertilizer benefits to which the respondents were to answer yes or no were provided. Yes was scored 1 while No was scored 0. The weighted mean

scores were obtained and used to determine the benefits of organic fertilizer that farmers were aware of (mean of approximately 1) and the ones they were not aware of (mean of approximately 0). The aggregate score on awareness were also calculated and used to categorize farmers' awareness of organic fertilizer benefits into high (7 – 14) and low (scores less than 7) levels of awareness groups.

Descriptive statistical techniques such as frequency counts, percentages, mean score and standard deviation were used to analyse the data collected. Furthermore, to determine the relationship between dependent variable and independent variables, chi square, correlation and multiple regression were used.

### 3. Results

#### 3.1. Demographic and social characteristics of respondents

Results in Table 1 show that 69.6 percent of the respondents were between the ages of 30 and 60 years, 22.4 percent were above 60 years of age, 8.0 percent of the respondents were less than 30 years of age. The mean age of the respondents was  $50.30 \pm 15.45$ . This implies that majority (69.6%) of the respondents were adults and within the active ages of 30 and 60 years. The findings reported above implied that majority (69.6%) of the respondents were adults and within the active ages of 30 and 60 years. This finding is similar to the findings of Solomon (2008) and Oyesola and

**Table 1:** Distribution of respondents according to their socio-economic characteristics

Variables	Frequency	Percentage	
Age (years)			
Below 30	20	8.0	Mean = 50.30 Standard deviation = 15.45
30 - 60	174	69.6	
Above 60	56	22.4	
Sex			
Male	197	78.8	
Female	53	21.2	
Religion			
Christianity	200	80.0	
Islam	50	20.0	
Marital status			
Single	15	6.0	
Married	228	91.2	
Widowed	7	2.8	
Ethnicity			
Yoruba	185	74.0	
Hausa	1	0.4	
Igbo	15	6.0	
Others	94	19.6	
Family type			
Not applicable	15	6.0	
Monogamy	175	70.0	
Polygamy	60	24.0	
Household Size			
No answer	1	0.4	Mean = 7 Standard deviation = 3.87
1-5	91	36.4	
6-10	135	54	
>10	23	9.2	

Source: Field survey

Obabire (2011) that the mean age of farmers using organic fertilizer was 53.8 in Imo state and 51 in Ekiti state respectively. However, the finding is in contrasts with the submission of Omotesho, Fakayode and Tariya (2010) that the mean age of farmers using organic fertilizer was 36 years in Bauchi, Nigeria. The mean age reported by this study implies that organic fertilizer was used more by adults than youths. Results in Table 1 show that 78.8 percent of the respondents were males while the remaining 21.2 percent were females. This implies that majority of the respondents were males. This finding agrees with the findings of Dipeolu, Bello and Akinbode (2006), Solomon (2008) and Oyesola and Obabire (2011) that organic fertilizer was mostly used by the male gender in Ogun, Imo and Ekiti states, Nigeria. The fact that most respondents were male might have been because cultivation of crops was seen mostly as a role meant for the male gender in the study area. Some of the respondents left their wives at home while going to farm camps. This finding may have a positive effect on the use of organic fertilizer since males are strong enough to handle the laborious activities that might be involved with the preparation of some types of organic fertilizer like compost.

Results in Table 1 show that 80 percent of the respondents were Christians while 20 percent practised Islam. Results in Table 1 show that 91.2 percent of the respondents were married, 6 percent were single while 2.8 percent were widow(er)s. As regard marriage, majority of the respondents were married. This is in agreement with Oyesola and Obabire (2011) that most organic farmers were married. This implies that the respondents could source for help from their spouses in carrying out activities related to the use of organic fertilizer and the perception of these spouses about organic fertilizer use might be positively influenced so that they also could use organic fertilizer in their personal farms (if they had). Results in Table 1 show that 74 percent of the respondents were natives of Yoruba land although, not necessarily from the study area. Respondents from other states like Benue, Delta, Edo, Kogi, Calabar, Cross River and outside Nigeria were 19.6 percent, 6 percent were from Igbo land while 0.4 percent were Hausa. The results also show that majority of the respondents were Yorubas, although some of them are from other states outside the study area and have migrated into the study area in search of 'greener pasture'. Results in Table 1 show that of the 94 percent of respondents who were married, 70 percent practised monogamy and 24

percent practised polygamy. The fact that majority of the respondents had only one life partner might reduce the number of dependants of the farmer thereby making it possible for the farmer to be able to have more money to reinvest into farming.

Results in Table 1 show that 54 percent had a household size of between 6 and 10 persons, 36.4 percent had a household size of between 1 and 5 persons and 9.2 percent had household size of more than 10 persons. The remaining 0.4 percent of the respondents gave no response.

### 3.2. Farmers' awareness of organic fertilizer benefits

The results in Table 2 show the mean awareness scores for farmers' awareness of organic fertilizer benefits. The results show that the statement 'organic fertilizer helps soil to retain soil nutrient and minerals for plant uptake' had the highest mean score (0.800) while the statement 'organic fertilizer is commercially available ranked lowest (0.168). It could be deduced from the results that farmers were more aware of the benefits of organic fertilizer to the soil, crops and soil microorganisms. The results also show that farmers were not aware that materials that could be used as organic fertilizer were readily available within their environment. Neither were farmers aware that organic fertilizer could be preserved, could prevent erosion or was commercially available. Farmers were not even aware of the production of bagged compost in the state which was supposed to give organic fertilizer portability competitiveness with inorganic fertilizer. The fact that many of the respondents were aware of many of the benefits that could be derived from organic fertilizer usage might enhance farmers' perception of organic fertilizer usage.

The results in Table 3 show that 67.2 percent of the respondents had a high level of awareness, 22.0 percent of the respondents had low level of awareness while 10.8 percent had moderate level of awareness. This implies that many (67.2%) of the farmers were highly aware of the benefits that they could derive from organic fertilizer and this might enhance their perception of organic fertilizer usage. They were aware of the fact that organic fertilizer had many benefits to offer to the crops, human health, soil and the environment. The respondents seemed to be aware that organic fertilizer was generally very beneficial, had minimal side effect and had so many relative advantages over inorganic fertilizer.



### 3.3. Farmers' perception of organic fertilizer usage

Results in Table 4 show the perception statements and the mean scores. Farmers favourably perceived the necessity of soil organic matter in sustainable soil fertility and production of good crop yield. The farmers perceived that crops grown using organic fertilizer were more nourishing to the human body and had a longer shelf life after it has been harvested. The farmers specifically mentioned that vegetables grown with organic fertilizer were preferred to vegetables grown with inorganic fertilizer because the former remained consumable (raw or cooked) for a longer period under normal atmospheric condition and had no negative health implication on the consumer. This may encourage farmers to use organic fertilizer more, especially for cultivating vegetables. Farmers were of the opinion that organic fertilizer usage had no negative impact on the environment. Instead, it eliminates the menace that inorganic fertilizer could cause in the environment.

**Table 2:** Farmers' awareness of organic fertilizer benefits and the weighted mean

Statement*	Mean	Remark
Organic fertilizer helps soil to retain soil nutrients and minerals for plant uptake	0.800	Aware
Organic fertilizer improves soil quality	0.792	Aware
Organic fertilizer replenishes soil nutrients	0.784	Aware
Organic fertilizer can restore degraded soil	0.776	Aware
Organic fertilizer releases nutrients steadily	0.760	Aware
Organic fertilizer gives in profitable crop production	0.732	Aware
Organic fertilizer can help soil control water more efficiently	0.724	Aware
Organic fertilizer can reduce leaching	0.668	Aware
Organic fertilizer supplies food to soil microorganism	0.664	Aware
Organic fertilizer suppresses crop pests and diseases	0.652	Aware
Materials for organic fertilizer are readily available to farmers	0.392	Not aware
Organic fertilizer can be preserved	0.348	Not aware
Organic fertilizer prevents erosion	0.284	Not aware
Organic fertilizer is commercially available	0.168	Not aware

Source: Field survey

Note: \* - Multiple choices

**Table 3:** Distribution of farmers based on their level of awareness of organic fertilizer benefit

Awareness score	Frequency	Percentage	Remark
Less than 5	55	22.0	Low level
5 - 9	27	10.8	Moderate level
More than 10	168	67.2	High level

Source: Field survey

**Table 4:** Perception statements on organic fertilizer usage and the mean scores

Perception statements	Mean score	Remark
Soil organic matter is essential for sustainable good crop yields	4.10	Favourable
Organic fertilizer results in more nourishing produce	4.08	Favourable
Organic fertilizer is environmentally friendly	4.07	Favourable
Soil organic matter is essential for sustainable soil fertility	4.06	Favourable
Organic fertilizer indirectly prevents diseases in man	3.99	Favourable
Organic fertilizer reduces crop yield	3.99	Favourable
Organic products are more durable	3.98	Favourable
Organic fertilizer usage is cost effective	3.83	Favourable
Soil organic matter has very little impact upon soil fertility	3.81	Favourable
Organic fertilizer usage is just a total waste of time	3.80	Favourable
Organic fertilizer causes disease and insect infestation on crops	3.66	Favourable
Inorganic fertilizer is a good alternative to organic fertilizer	3.55	Favourable
Organic fertilizer feeds the soil	3.44	Indifferent
Organic fertilizer cannot be used for commercial farming	3.30	Indifferent
Preparation of farm yard manure is labour intensive	3.10	Indifferent
Organic fertilizer is only needed by degraded soils	2.56	Unfavourable

Source: Field survey

Farmers believed that food is medicine and therefore supported the notion that continuous consumption of nourishing organic food could act as a preventive measure against diseases. To this end, some of the farmers, even in their old age, personally cultivated the crops to be consumed by their household so that they could ensure that it was

organically produced. They also believed that the usage of organic fertilizer had no negative impact on the crops' health either on the field or during storage. The farmers were confident that organic fertilizer had a significant impact on soil and would not reduce their crop yield. The farmers were of the opinion that organic fertilizer use was more effective than inorganic fertilizer and could not be substituted for by inorganic fertilizer use. Neither did they see organic fertilizer usage as a mere waste of time. They believed that it was a rewarding practice. Farmers had an indifferent reaction towards the following statements 'Organic fertilizer feeds the soil', 'Organic fertilizer cannot be used for commercial farming', and 'Preparation of farm yard manure is labour intensive. They did not see the soil as an element which needed to be fed. Farmers were also of the opinion that organic fertilizer usage is only feasible on small scale farming and not large scale farming. Their concern was how they could source for enough organic fertilizer for large scale farming. This might be as a result of their unawareness of bagged compost and organo-mineral fertilizer which were commercially available. Large scale farmers usually practised shifting cultivation and bush fallowing which led to the destruction of more forest lands. Furthermore, farmers were indecisive of their view about the labour needed in preparing farm yard manure.

Farmers had an unfavourable disposition to the statement 'Organic fertilizer is only needed by degraded soils'. The notion that only degraded or degrading soils needed organic fertilizer was supported. Many of the respondents believed that applying organic fertilizer to virgin lands (believed to have high inherent fertility) could cause dislodge of tree crops and make arable crops more vegetative than reproductive. Therefore, the respondents were of the opinion that organic fertilizer was meant for degrading or degraded soils only and not for fertile soils. This view showed that the farmers had experience on the use of organic fertilizer on different types of soil, fertile and degrading, and had learnt over time that virgin lands did not need any type of fertilizer until it had been subjected to cultivation for a season or two when the need then arises to gradually manage its fertility so that it can remain productive even in cases of continuous cropping.

Results in Table 5 show respondents' total score on their perception of organic fertilizer usage. According to the results 56.8 percent of the respondents, with scores greater than 58 had a favourable perception of organic fertilizer usage, 42.8 percent, with scores between 38 and 58 were indifferent in perception towards organic fertilizer usage while 0.4 percent scored less than 38 and were therefore classified

as having an unfavourably perception of organic fertilizer usage. The mean score was  $59.31 \pm 9.71$ . In summary, many of the farmers had a favourable perception of organic fertilizer usage. This report is in harmony with that of Dipeolu et al. (2006), Obinne, Ogbanje and Saror (2008), Umar and Ibrahim (2011), Oyesola and Obabire (2011), Nnamonu and Ali (2013) and Fasina (2013) conducted in Ogun, Benue, Nasarawa, Ekiti, Benue and Oyo state respectively. All these works reported that farmers had a good and positive perception of organic fertilizer usage. This is pointing towards a consensus that farmers in Nigeria have a positive perception of organic fertilizer usage. This forms a good platform for organic fertilizer usage in Nigeria to stand on.

**Table 5:** Distribution of respondents by the total perception score on organic fertilizer usage

Score category	Frequency	Percentage	Remark
Less than 38	1	0.4	Unfavourable
38 - 58	107	42.8	Indifferent
More than 58	142	56.8	Favourable
			Mean = 59.31
			Standard deviation = 9.71

Source: Field survey

### 3.4. Association between nominal personal and socio-economic characteristics and farmers' perception of organic fertilizer usage

Chi-square analysis results in Table 6 show the association between nominal and ordinal farmers' demographic and social characteristics and farmers' perception of organic fertilizer usage. The characteristics were sex, religion, marital status, family type and ethnicity. The results show that sex ( $\chi^2 = 0.579$ ,  $C = 0.048$ ), religion ( $\chi^2 = 0.275$ ,  $C = 0.033$ ) and marital status ( $\chi^2 = 0.784$ ,  $C = 0.056$ ) had no association with farmers' perception of organic fertilizer within the significance level of  $P \leq 0.05$ . On the other hand, family type ( $\chi^2 = 11.679$ ,  $C = 0.211$ ) and ethnicity ( $\chi^2 = 3.357$ ,  $C = 0.038$ ) were associated with farmers' perception of organic fertilizer usage at a significance level of  $P \leq 0.05$ .

With a contingency coefficient (C) of 0.211, family type had a weak association with farmers' perception of organic fertilizer. Table 1 showed that majority of the respondents practised monogamy, therefore it can be said that farmers who had only one life partners tended

towards having a more favourable perception of organic fertilizer usage than farmers who practised polygamy. Also, ethnicity was significantly associated at  $p \leq 0.05$ , its association with farmers' perception of organic fertilizer usage was not due to chance.

**Table 6:** Chi-square analysis between socio-economic characteristics and perception of organic fertilizer usage

Variables	$\chi^2$ value	Degree of freedom	Contingency coefficient (C)	Significance
Sex	0.579	2	0.048	0.749
Religion	0.275	2	0.033	0.871
Marital status	0.784	4	0.056	0.941
Family type**	11.679	4	0.211	0.020
Ethnicity**	38.174	14	0.364	0.000

\*\* - Significant at  $P \leq 0.05$  level

Source: Field survey

### 3.5. Relationships with farmers' perception of organic fertilizer usage

The results in Table 7 show that age, household size and awareness of organic fertilizer benefits were significantly related with farmers' perception of organic fertilizer. Awareness of organic fertilizer benefits is positively and strongly related (0.676) with farmers' perception of organic fertilizer while household size had a positive but weak relationship (0.146) with farmers' perception of organic fertilizer usage at  $P \leq 0.05$ . Also, age has a negative and weak relationship with farmers' perception of organic fertilizer usage. The findings agree with the discovery of Farouque and Takeya (2007) that household size had a significant relationship with farmers' perception of organic fertilizer usage.

**Table 7:** Result of correlation analysis

Variables	r	Sig.
Age	-.118**	0.031
Household size	.146**	0.010
Years of formal education	.010	0.439
Awareness of organic fertilizer benefits	.696**	0.000

\*\* - Significant at  $P \leq 0.05$  level

Source: Field survey

The variables that had a significant correlation with farmers' perception of organic fertilizer usage were further subjected to regression analysis. The results in Table 8 also show that age is significantly related to farmers' perception of organic fertilizer usage ( $\beta = -0.110$  at  $P \leq 0.05$ ). This means that if the

age of farmers was increased by one unit, farmers' perception of organic fertilizer usage would decrease by 0.110 unit while holding the awareness of organic fertilizer benefits constant. Also, the results in Table 8 show farmers' awareness of organic fertilizer benefits had a significant relationship with farmers' perception of organic fertilizer usage ( $\beta = 0.686$  at  $P \leq 0.05$ ). This implies that if farmers' awareness of organic fertilizer increases by one unit, farmers' perception of organic fertilizer usage will increase by 0.686 unit while holding farmers' age constant. It can therefore be inferred that younger farmers that are aware of the benefits of organic fertilizer will have favourable perception of organic fertilizer usage and this might translate to the actual usage of organic fertilizer.

**Table 8:** Result of multiple regression analysis

Model	B	Std. Error	Beta	t	Sig.
(Constant)	49.733	1.769		28.119	.000
Age**	-.069	.029	-.110	-2.405	.017
Household size	.150	.116	.060	1.292	.198
Awareness of organic fertilizer benefits **	1.397	.093	.686	15.004	.000

Multiple R-value = 0.707

R<sup>2</sup> value = 0.500

Adjusted R<sup>2</sup> = 0.494

F value = 81.813 at  $P \leq 0.05$

\*\* - Significant at  $P \leq 0.05$  level

Source: Field survey

## 4. Conclusion and recommendation

From the results above, it could be concluded that farmers had a high aware level of organic fertilizer benefits and had a favourable perception of organic fertilizer usage. Also, ethnicity and family type were associated with farmers' perception of organic fertilizer usage. Furthermore, age of farmers and farmers' awareness of organic fertilizer benefits were determinants of farmers' perception of organic fertilizer usage. The study concluded that farmers had favourable perception of organic fertilizer usage. This favourable perception of organic fertilizer should lead to a corresponding increase in the use of organic fertilizer thereby reversing the land degradation trend in the state and making agriculture in the state more sustainable. It is recommended that extension agents should make farmers, especially the young ones, aware of the benefits that can be derived from organic fertilizer so as to improve farmers' perception of organic fertilizer usage and the actual use of organic fertilizer.

## References

- Ćwiek, M. (2008) The perceptions of farmers concerning agriculture sustainability. [http://bioethics.agrocampus-ouest.eu/infogluueDeliverLive/digitalAssets/41402\\_agriculture\\_sustainability\\_r.pdf](http://bioethics.agrocampus-ouest.eu/infogluueDeliverLive/digitalAssets/41402_agriculture_sustainability_r.pdf).
- Dipeolu, A. O., Bello, K. A. & Akinbode, S. O. (2006) Comparative economic analysis of organic and inorganic vegetable production in Ogun State, Nigeria. Proceedings of the 2nd National Conference on Organic Agriculture, University of Ibadan, Ibadan, Nigeria. 24.
- Dubey, A., & Dubey, D. K. (2013) Evaluation of cost effective organic fertilizers. Research and Development Centre, Kilpest India Ltd., Govindpura, Bhopal, 462023, (M.P), India. <http://orgprints.org/17043>
- Fasina, O. O. (2013) Determinants of perceived effectiveness of organic fertilizer used by farmers in Oyo State, Nigeria. *Journal of Agricultura Tropica et Subtropica*, 46(1), 23-28. DOI: 10.2478/ats-2013-0004.
- Farouque, G., & Takeya, H. (2007) Farmers' perception of integrated soil fertility and nutrient management for sustainable crop production: a study of rural areas in Bangladesh, *Journal of Agricultural Education*, 48(30), 111 – 122. DOI: 10.5032/jae.2007.03111
- Gaynor, B (2009) Advantages and Disadvantages of Organic Farming. <http://www.boozle.com>.
- International Federation of Organic Agriculture Movements (2006) Organic agriculture can help stabilize global climate change. Organic Consumers Association. [www.ifoam.org](http://www.ifoam.org).
- Kotschi, J., & Müller-Sämman, K (2004) The Role of Organic Agriculture in Mitigating Climate Change. IFOAM. Bonn. 64. [http://www.ifoam.org/orgagri/ClimateStudy\\_IFOAM](http://www.ifoam.org/orgagri/ClimateStudy_IFOAM).
- McCausland, J. (2013) Good earth: When and how to amend garden soil <http://www.sunset.com/garden/garden-basics/good-earth-00400000018234/>
- Nnamonu, L. A & Ali A. E. (2013) Perception of agrochemical use and organic farming in Makurdi, Benue State. *International Journal of Environmental Protection*, 3(8), 48-52.
- Obinne, C. P. O., Ogbanje E. C. & Saror, S. (2008) Classification and utilization of organic farming practices in Otukpo and Ohimini Local Government Areas of Benue State. Proceedings of 4th Annual international Conference of Nigerian Society of Indigenous Knowledge and development. Kogi State University Anyigba. 5th - 8th November, 68.
- Ogunbadewa, E. Y. (2012) Developing natural resources database with Nigeriasat-1 Satellite Data and Geographical Information Systems. *The Egyptian Journal of Remote Sensing and Space Sciences*, 15, 207–214.
- Ogunlade M. O., Agbeniyi S. O. & Oluyole K. A. (2010) An Assessment of the Perception of Farmers on Cocoa Pod Husk Fertilizer in Cross River State, Nigeria.
- Omotesho, O. A., Fakayode, S. B., & Tariya, Y. (2010) Curtailing fertilizer scarcity and climate change; an appraisal of factors affecting organic materials use option in Nigeria's Agriculture. Joint 3rd African Association of Agricultural Economists (AAAE) and 48th Agricultural Economists Association of South Africa (AEASA) Conference, Cape Town, South Africa.
- Oyesola, O. B & Obabire, I. E. (2011) Farmers' perceptions of organic farming in selected Local Government Areas of Ekiti State, Nigeria. *Journal of Organic Systems*, 6(1).
- Small Planet Institute (2008) Take a bit out of Climate Change. An Interview with Timothy
- LaSalle – Q&A with Anna Lappé April 15th, 2008. <http://www.takeabite.cc/organic-farming-and-carbon-offsets/#>
- Solomon, O. (2008) Small scale oil palm farmers' perception of organic agriculture in Imo State, Nigeria, *Journal of Environmental Extension*, 7, 67-71.
- Umar H. S. & Ibrahim, H. Y. (2011) Mitigating climate change through organic agriculture: A case study of farmers' participation in organic farming practices in Nasarawa State, Nigeria. *Journal of Life and Physical Sciences, actaSATECH*, 4(1), 44-52. [http://www.actasatech.com/php\\_fil/journal-124.pdf](http://www.actasatech.com/php_fil/journal-124.pdf).
- World Food Programme (2021). Zero hunger. <https://www.wfp.org/zero-hunger>