OPEN ACCESS Journal of Organics, 3(1), 2016

# Comparative analysis of the use of organic and inorganic fertilizers by arable crop farmers in Ondo State, Nigeria

**Oluwatosin O. Fasina**

Department of Agricultural Extension and Communication Technology,
Federal University of Technology, Akure, Ondo State, Nigeria
email: royalambfuta@gmail.com

## Abstract

This study compares the level of use of commercial organic and inorganic fertilizers by farmers in Ondo State, Nigeria. A multistage sampling technique, using the Agricultural Development Programme (ADP) structure was used to select 160 farmers for the study. Data on socioeconomic characteristics and fertilizer usage of respondents were collected with the aid of a questionnaire. Data were analysed using frequency tables, percentages, charts, regression analysis and the t-test. Respondents were mostly males (90%), married (84%) with a mean age of 48 years, and the mean household size was 8 persons. Most respondents (54%) farmed on less than 2 hectares. An average of 255kg of inorganic and 66kg of organic fertilizers were used within the farming season (significantly different at $p \leq 0.05$). The quantity of inorganic fertilizer used varied significantly according to household size, farm size, price of inorganic fertilizer, availability of inorganic fertilizer, and membership of social organization. The quantity of organic fertilizer used varied significantly according to age, gender, household size, and extension contact. The study concluded that the greater use of commercial inorganic fertilizers compared to commercial organic fertilizers calls for greater awareness, promotion and ready availability of commercial organic fertilizers, outcomes which could be facilitated by greater engagement with extension services.

Keywords: Food security, extension services, organic farming, fertilisers, Africa.

## Introduction

Agriculture is important in the economy of Nigeria with crops of cocoa, oil palm, maize, rubber, yam and cassava produced for food and foreign exchange earnings, and providing employment for over 66% of the population (IFAD, 2014). Agriculture remains a significant sector despite the discovery and exploitation of crude oil which contributes about 40% of the country's GDP (IFAD, 2014). Even though agriculture is a leading earner of foreign exchange (Adesoji & Farinde, 2006), Nigeria is a major importer of food to supplement domestic production and consumption (Doreo Partners, 2014).

A contributing factor to insufficient food production is the low soil organic matter content, and consequently, the inherent infertility of soils in Nigeria and in sub-Saharan Africa

(Shiyam & Binang, 2013). As a result, small scale farmers, who produce the bulk of food in Nigeria, have to embrace fertilizer application – organic and inorganic – in order to increase yield (IFPRI, 2011; FAO, 2013).

According to IFPRI (2011), the production efficiency of farmers for most crops is low. Druilhe & Barreiro-Hurlé (2012) asserted that among the problems hampering arable crop yield is availability and affordability of inorganic fertilizers. However, Shiyam & Binang (2013) argued that inorganic fertilizer may increase yield in the short term but may be both uneconomical and environmentally unsound. They stated that organic fertilizer, unlike the inorganic options, is environmentally sustainable and able to achieve increased agricultural productivity. Current trends of intensive cultivation (compounding soil infertility due to faster depletion of soil nutrients), low capital base of farmers, scarcity of inorganic fertilizers, and the increasing demand for food, necessitate the identification of type and factors affecting the quantity of fertilizer being used to achieve optimum yields for small-scale farmers, who bear the burden of providing food for over 150 million Nigerians.

This study compared organic and inorganic fertilizer use among arable crop farmers in Ondo State, Nigeria, with a view to determining factors of use. The study focused primarily on the use of the Ondo State government commercially manufactured organic fertilizer, thus excluding other self-produced organic fertilizers. The null hypothesis tested in the study was that there is no significant difference between the quantity of organic and inorganic fertilizer used by farmers.

## Review of Literature

There has been much advocacy in global circles of the benefits of organic agriculture. There are long term detrimental effects of inorganic fertilisers (Shiyam & Binang, 2013). However, this has been given little attention in the developing world due to the poor resources of the majority of farmers (Ozowa, 1997). Although organic products are more costly to consumers, they can attract more gain to producers (Fox News, 2012). However, there is very low awareness in poor populations of the developing world of the benefits of eating organically produced foods (IFPRI, 2011). This trend may continue for some time until poverty is alleviated.

The availability and the cost of fertilisers to resource-poor farmers constrain the use of fertilizers to a large extent (Fasina, 2013). The utilization of fertilizer and the productivity of arable crop farmers is influenced by a multitude of factors including ecological zone, farmers' age, education, access to credit, purpose of crop production, distance to market, price, club membership, and extension contact (Fawole & Fasina, 2005; Adesoji & Farinde, 2006; Akpan-Idiok, 2012). IFPRI (2012) reported that the intensity of inorganic fertilizer use among Nigerian farmers is low and has dropped due to the prevailing level of poverty. Crop yields under an organic farming system are reported as comparable to those under a chemical system, and greenhouse gas emissions from organic farming are 36% lower than a chemical system of crop production (Yadav. et al., 2013).

The agronomic effectiveness and the cost effectiveness of the use of organic fertilisers have been reported (Hassan et al., 2014: Naikwade, 2014). The beneficial impact of the use of organic fertilisers on microbial counts in soil have been shown (Chhogyel, 2015). Organic fertilisers can be coupled with inorganic fertilisers for effective production for

small scale farmers (Olowoake, 2014). There is an ongoing need for breeding programs to identify varieties suited for organic production (Vanaja et al, 2015).

## Study area and research design

The study was carried out in Ondo State, located in the Southwestern part of Nigeria. It lies in between longitude $4^0$ 30' and $6^0$ East, and latitude $5^0$ 45' and $8^0$ 15' North. The people are predominantly peasant farmers, cultivating mainly yam, cassava, plantain, banana, maize and cocoyam for market and family consumption.

Farming is usually carried out with simple implements such as the cutlass and hoe. The Ondo State Government produces Sunshine Organic Fertilizer by the aerobic method of compost production from organic waste recovered from markets, poultry farms and dumpsites. In 2007, about 241 tons of organic wastes were recovered and processed into 124 tons off compost fertilizer. Since then production tonnage has been declining.

The present research adopted a multistage sampling technique, using the Agricultural Development Programme (ADP) structure which has stratified the state into two agricultural zones, Zone I and Zone II. Zone I comprises eight blocks while zone II comprises ten blocks. In the first stage (Table 1) two blocks were purposively selected from each zone namely, Ifon and Owo (Zone I); Owena and Igbaraoke Zone (II). This selection was done based on the presence of large numbers of arable crop farmers in the areas. The blocks are further divided into cells/villages. A random selection of five cells from the four blocks was done which gives 20 cells, namely: Idase, Iyere, Upenme, Obasoto, Eyinogbe, Okeluse, Ido-ani, Elegbeka, Imoru, Ifon, Ijare, Isarun, Igbaraoke, Owena, Ibule, Bajare, Wowa, Ofosu, Owena Bridge, and Idanre. In each cell eight arable crop farmers were selected, making a total of 40 respondents per block and 160 respondents altogether.

Primary data was collected using a structured questionnaire and secondary data sources included journals and textbooks. To analyse data obtained, multiple regression and the t-test were employed.

Regression model (stepwise): This was used to determine the factors influencing use of organic and inorganic fertilizers by the respondents. The implicit form of the model is:

$Y = f(x_1, x_2, x_3 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots, x_{10})$
$Y = b_0 + b_1x_1 + b_2x_2 + b_3x_3 \ldots\ldots\ldots\ldots\ldots\ldots b_{10}x_{10} + e$
Where Y = quantity of organic and inorganic fertilizer used (₦)
$b_o$ = constant,
$b_1 = b_{10}$ = regression coefficients
$x_1$ = age (measured in years)
$x_2$ = gender (dummy variable: '1' for male, '0' for female)
$x_3$= education (years spent in formal education)
$x_4$ = household size (number of people living and feeding together)
$x_5$ = farming experience ( in years)
$x_6$ = farm size (hectares)
$x_7$ = social organization membership (dummy variable: '1' for membership, '0' for non-membership)
$x_8$ = extension contact (number of frequent visit to farmers by extension agent in a year )
$x_9$ = price of organic / inorganic fertilizer (in Naira)
$x_{10}$ = availability of inorganic fertilizer (dummy variable: '1' for available, '0' for unavailable)
e = error term.

# Results

## *Socioeconomic characteristics of respondents*

**Table 1: Socioeconomic characteristics of respondents.**

| Characteristics | f (n=160) | Percentage (%) |
|---|---|---|
| **GENDER** | | |
| Male | 144 | 90 |
| Female | 16 | 10 |
| **AGE** | | |
| 21-30 | 12 | 7.5 |
| 31-40 | 26 | 16.3 |
| 41-50 | 71 | 44.4 |
| 51-60 | 34 | 21.3 |
| 61-70 | 15 | 9.4 |
| >71 | 2 | 1.3 |
| **MARITAL STATUS** | | |
| Married | 134 | 83.8 |
| Widowed | 18 | 11.2 |
| Single | 8 | 5.0 |
| **EDUCATION** | | |
| Primary | 60 | 37.5 |
| Secondary | 56 | 35.0 |
| Tertiary | 19 | 11.9 |
| None | 25 | 15.6 |
| **MAJOR OCCUPATION** | | |
| Farming | 104 | 65.0 |
| Civil Service | 11 | 6.9 |
| Other | 45 | 28.1 |
| **HOUSEHOLD SIZE** | | |
| <5 | 4 | 2.5 |
| 5-7 | 58 | 36.3 |
| 8 and above | 98 | 61.3 |
| **FARMING EXPERIENCE (in years)** | | |
| 1-5 | 3 | 1.9 |
| 6-10 | 38 | 23.8 |
| 11-15 | 33 | 20.6 |
| 16-20 | 26 | 16.3 |
| 21 and above | 60 | 37.5 |
| **MEANS OF FARMLAND ACQUISITION** | | |
| Through inheritance | 64 | 40.0 |
| Through share farming | 55 | 34.4 |
| Through rent/lease | 41 | 25.6 |
| **FARM SIZE** | | |
| < 2Ha | 87 | 54.4 |
| 2- 5Ha | 39 | 24.4 |
| >5Ha | 34 | 21.2 |

Table 1 shows that men constituted 90.0% of the total respondents. Only 7.5% of the respondents were aged 21-30 years, 16.3% were in the 31-40 years age range; 44.4% were aged 41-50 years, respondents aged 51-60 years accounted for 21.3% of the sample, 9.4% were aged 61-70 years, and 1.3% were 71 years and above. The majority of respondents (83.8%) were married, 11.2% were widowed, and 5.0% were single.

The majority of respondent households (61.3%) had 8 persons or more, 2.5% of the respondents had a household size of less than 5 persons, and 36.3% had 5-7 persons. The mean household size was 8 persons per household. Most respondents (65.0%) reported farming as their major occupation, 6.9% were civil servants, and 28.1% were engaged in other occupation types.

Many (37.5%) of the respondents had 21 and more years of farming experience, only a few (1.9%) had 1-5 years of farming experience. About 23.8% had 6-10 years of farming experience, 20.6% had 11-15 years, and 16.3% had 16-20 years of farming experience. The mean years of farming experience was 20.1 years. Majority (40.0%) farmed on inherited land, 34.4% practiced share farming, while 25.6% farmed on rented or leased land.

Most of the respondents (54.4%) farmed on land less than 2 ha. These are considered the small-scale farmers. About 24.4% had farm size of 2-5 ha and are considered medium-scale farmers. Only 21.2% had farm size of 5 ha and above. These are considered the large scale farmers.

### *Crops cultivated*

Figure 1 shows the distribution of major arable crops cultivated by the respondents. These include yam (86.3%), maize (84.8%), cassava (83.8%), pepper (41.9%), tomatoes (33.8%), okro (23.1%), 'ugwu' (13.1%), green vegetables (lettuce) (10.0%), and rice (1.9%). The quantity of fertilizer used usually varies with different types of crop and this will help determine the quantity to be used per hectare. Also, the time of application varies with type of crop cultivated.

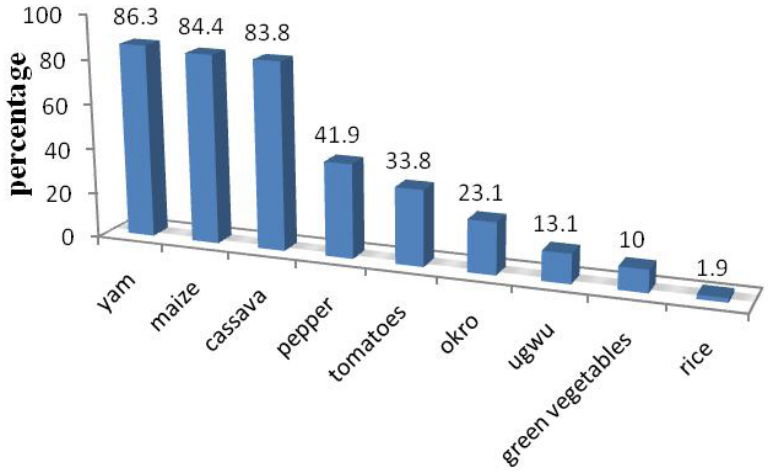



**Figure 1: Distribution of crops propagated.**

### *Quantity of fertilizer used by farmers*

An average of 255 kg of inorganic fertilizer was applied per hectare of land. Many (43.1%) of the inorganic fertilizer users applied less than 50 kg of fertilizer per hectare, 37.5% of the respondents used 50 - 100 kg/ha, 11.3% used 101 - 150 kg/ha, 6.3% used 156 -– 200 kg/ha, while 1.9% used 201 - 250 kg/ha on their farm (Fig. 2).

An average of 66kg organic fertilizer was being applied per hectare of land. A quarter (26.3%) of the organic fertilizer users applied 101 - 150 kg/ha, 21.1% applied 201 - 250 kg/ha and above 300 kg/ha respectively. While 15.8% of the respondents applied 251 - 300 kg/ ha, about 10.5% applied 50 - 100 kg/ha and 5.3% of the respondents applied 151 - 200 kg/ha. (Fig. 2).

Respondents stated that due to the high cost of inorganic fertilizer they buy the little they can afford and mix it with sand so that it can be extended. The quantities of inorganic fertilizer used are more than that of commercial organic fertilizer. The majority of the farmers are small scale farmers and rely on the inorganic fertilizers being concentrated while the organic fertilizers may require greater quantities to ensure effectiveness.

The use of self made organic fertilizers, including compost, green manures and animal manures, were not captured by the study as the study was focused on the commercially available fertilizers.

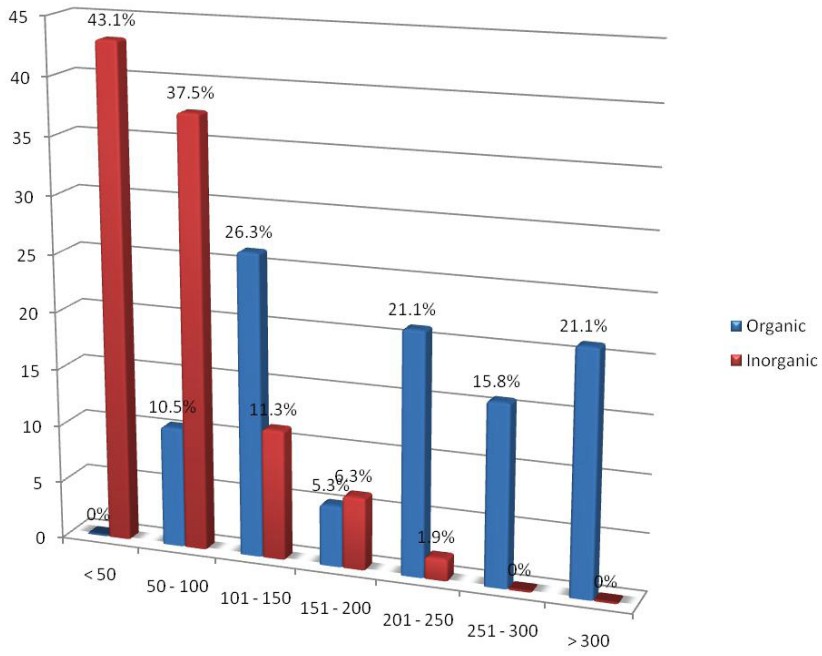
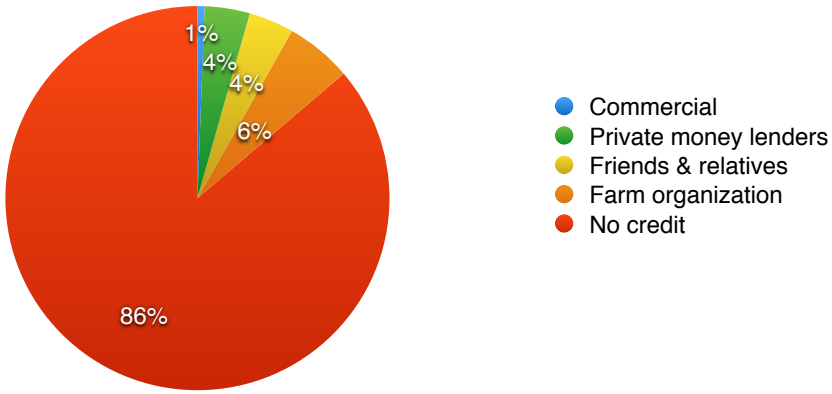



**Figure 2: Percentage distribution of respondents by quantity of commercial fertilizer applied (kg/ha) (for users of organic and users of inorganic fertilizers).**

### *Source of credit for fertilizer purchase*

Figure 3 shows that the overwhelming majority (86.3%) do not have access to any form of credit. About 5.6% sourced from farm organizations; 3.8% from private money lenders, while a meagre 0.6% obtained credit from commercial sources. This will definitely limit fertilizer purchase and even the type of fertilizer to be used owing to the fact that the




respondents are poor resource farmers.

**Figure 3: Distribution of respondents based on source of credit for fertilizer purchase.**

### *Fertilizer availability*

Of the 160 respondents, 59.4% agreed that inorganic fertilizer is readily available while 40.6% agreed that it is not readily available (Table 2). Only 10% of respondents agreed that organic fertilizer is readily available while most stated that it is not readily available. This availability has to do with the organic fertilizer being present and ready for purchase when required by farmers. This reveals that despite the activity of government to make fertilizer available to farmers, there are still various constraints and this may impact on the food security status of the citizenry. Since small scale farmers are often limited by credit in pursuing their economic activity, they may likely resort to self made bio-fertilizers.

**Table 2: Distribution of respondents by fertilizer users (n=160). All respondents used inorganic, 19 used both).**

| Fertilizer type | Readily available | | Not readily available | |
|---|---|---|---|---|
| | Freq | Percentage (%) | Freq | Percentage (%) |
| Organic | 16 | 10.0 | 144 | 90.0 |
| Inorganic | 95 | 59.4 | 65 | 40.6 |

Most (63.2%) of the respondents claimed that commercial organic fertilizer costs ₦1500 per 25kg bag; 10.5% claimed it costs ₦ 1600 while 26.3% claimed it costs ₦1800. Table 3 reveals that majority (65.0%) claimed that inorganic fertilizer costs between ₦ 2600 and ₦ 5000 per 50kg bag. About 29.4% claimed it costs ₦2500 while a few (5.6%) claimed it costs above ₦5000. This disparity in the cost of fertilizers is likely due to middle men in the supply chain, vis a vis the location of the respondents. Thus government effort at making fertilizer available directly to farmers through the Growth Enhancement Scheme (GES) is a welcomed development in the country. Though the inorganic fertilizers may more output per unit input and are recommended in so called 'green revolution' programmes, they are not environmental friendly. The bulkiness of the organic products

vis a vis required amounts to be used makes the use of organic fertilizers discouraging to farmers.

**Table 3: Distribution of respondents by cost of fertilizer (n=160).**

| Cost of fertilizer type (₦) Organic (25 kg bags) | Percentage (%) |
|---|---|
| 1500 | 63.2 |
| 1600 | 10.5 |
| 1800 | 26.3 |
| **Cost of fertilizer type (₦) Inorganic (50 kg bags)** | **Percentage (%)** |
| 2500 | 29.4 |
| 2600-5000 | 65.0 |
| >5000 | 5.6 |

### *Method of fertilizer application*

Most (84.2%) of the respondents (Figure 4) broadcast their organic fertilizer while 15.8% used a dig and cover method. To apply inorganic fertilizer, most (82.5%) of the respondents used dig and cover, 13.1% broadcasted, while 4.4% used both methods of application on their farms. This finding may be related to the type of crops cultivated by the farmers. Majority cultivated tuber and cereal crops which are usually intercropped. The most sensible way to take advantage of the costly and limited inorganic fertilizers minimizing waste is to apply at the base of the crops grown. The organic fertilizers are however mostly broadcasted due to their bulkiness and because they are used mostly for vegetable production therefore they are broadcast and ploughed into the soil

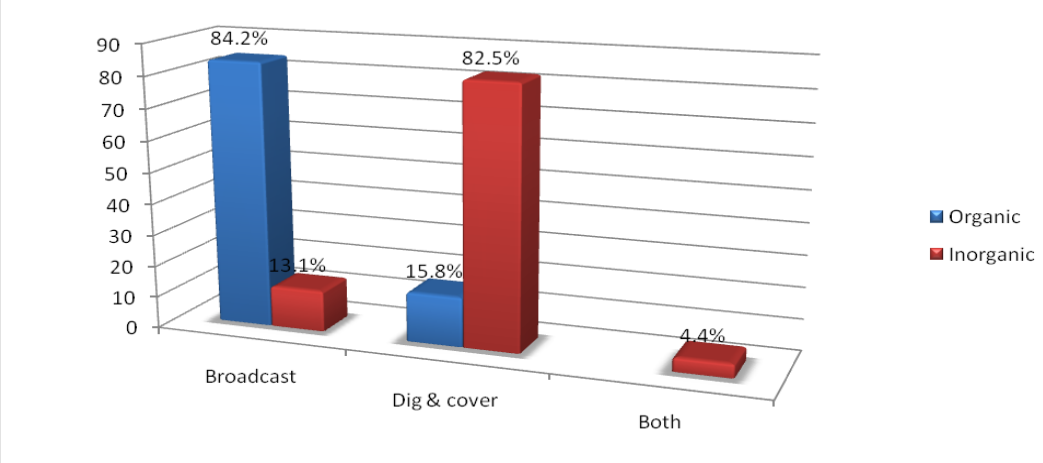



**Figure 4: Distribution of respondents by method of fertilizer application.**

### *Respondents contact with extension agents*

Most of the respondents (66.9%) had never had any personal contact with extension agents (Figure 5). About 14.4% were visited quarterly and 11.9% were visited fortnightly. About 3.1% were visited twice a year, and the same goes for those visited thrice a year. Only 0.6% was visited monthly. This reveals an inadequacy in the extension system usually due to lack of manpower. This assertion is supported by Ozowa (2012) showing a lack of knowledge likely affects the use of organic fertilizers.

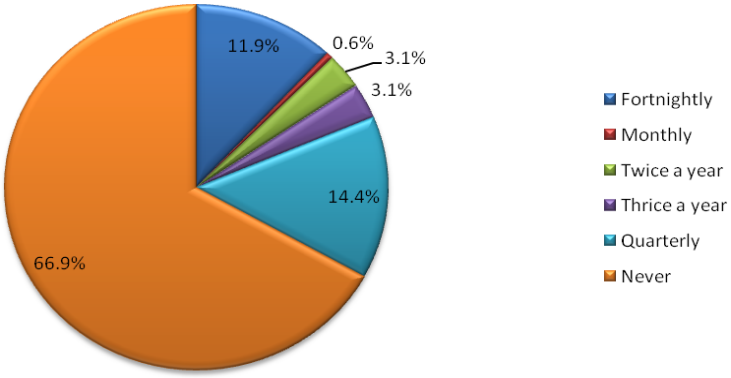



**Figure 5: Distribution of respondents based on extension contact frequency.**

### *Factors influencing the use of organic fertilizers*

In Table 4, the regression analysis shows that the significant variables (age, gender, household size and extension contact), contributed 79.9% of the variations in quantity of organic fertilizer usage. The negative sign of the parameter of age (b = -217.14), implies that the quantity of organic fertilizer used decreases with increase in age. Thus younger farmers may be more prone to organic fertilizer usage than older farmers. This is likely due to its bulkiness, which their physical strength may not permit them to handle as will the younger farmers with more vigour. Usage of organic fertilizers will require handling more bags relative to that which will be required when using inorganic fertilizers. Thus younger farmers would be relatively disposed to such tasks as they possess the strength for conveying the bags of organic fertilizer. Males are likely to use more organic fertilizers than female farmers as the sign of the parameter for gender was negative (b = -11728.40). Household size (b = 721.56) and extension visit (b = 209.27) had positive parameters implying that higher household size and more frequent extension contact will encourage greater organic fertilizer use. Larger household size helps to provide free family (unpaid) labour for transporting the fertilizer from their various settlements to their farms as well as the required labour for applying it due to its bulky nature. Greater extension contact facilitates farmers' enlightenment and use of organic fertilizer. This brings to the fore the findings of Yadav et. al., (2013) that grassroots extension workers need to be trained on relevant technologies in organic farming to aid knowledge transfer to farmers and achieve desired outcomes.

**Table 4: Regression analysis of estimates of the influence of selected variables on the use of organic fertilizer by arable crop farmers in Ondo State using Linear Function (stepwise).**

| Variables | B | Std. error | T | p-value |
|---|---|---|---|---|
| (Constant) | 22855.170 | 4572.44 | 4.998 | 0.000 |
| Age (x6) | -217.14 | 87.71 | -2.47 | 0.027 |
| Gender (x2) | -11728.4 | 1672.72 | -7.01 | 0.000 |
| Household size (x4) | 721.56 | 151.35 | 4.77 | 0.000 |
| Extension contract (x8) | 209.27 | 64.74 | 2.23 | 0.006 |

Significant level at 5% level.
$R^2$ = 0.799.
F = 13.89 (significant level of 0.00).
Source: Computed from field survey, 2012.

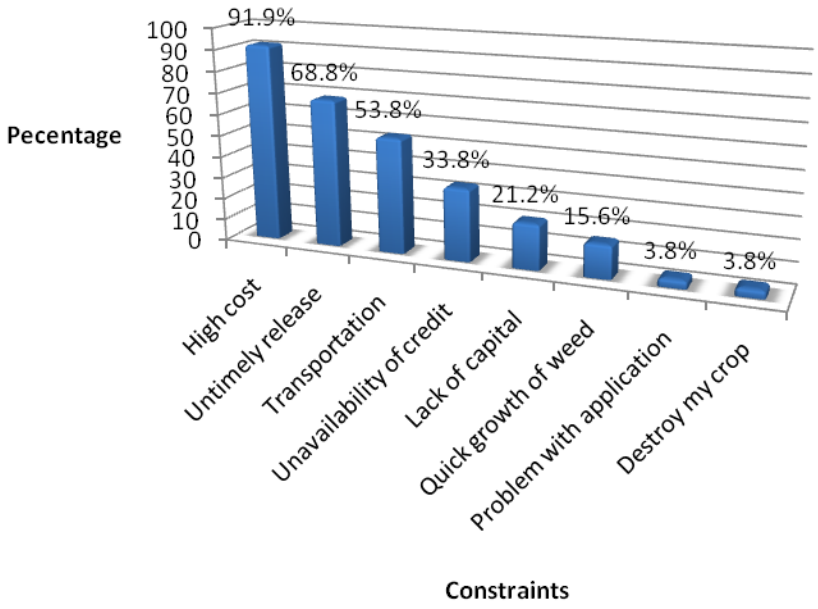



**Figure 6: Distribution of respondents by constraints to fertilizer use.**

### *Factors influencing the use of inorganic fertilizers*

Table 5 shows the result of the regression analysis for inorganic fertilizers and the following variables significantly contributed 45.4% variation in the quantity of inorganic fertilizer used by the respondents; household size (X4), farm size (X6), social organization membership (X7), price of inorganic fertilizer (X9), and availability of inorganic fertilizer (X10). Farmers with larger household size will have access to free family (unpaid) labour for applying the fertilizer. Farmers with larger farm size will use more inorganic fertilizer than farmers with small farm size. Social organization membership aids credit access for the purchase of the right quantity of fertilizer needed on farms. Also, the more readily available inorganic fertilizers are, the more farmers will buy and consequently, use. All these variables are also dependent on the price of the organic fertilizer, as the price will determine the quantity to be purchased.

**Table 5: Regression Analysis of estimates of the influence of selected variables on the use of inorganic fertilizer by arable crop farmers in Ondo State using Linear Function (stepwise).**

| Variables | B | Std. error | T | Significance |
|---|---|---|---|---|
| (Constant) | -8990.58 | 1628.54 | -5.521 | 0.000 |
| Household size (x4) | 442.44 | 89.51 | 4.94 | 0.000 |
| Farm size (x6) | 350.82 | 79.27 | 4.43 | 0.000 |
| Social organisation membership (x7) | 1948.04 | 781.75 | 2.49 | 0.014 |
| Price of inorganic (x9) | 2.56 | 0.323 | 7.91 | 0.000 |
| Availability of inorganic (x10) | 2375.61 | 806.07 | 2.95 | 0.004 |

Significant level at 5% level.
$R^2$ = 0.454.
F = 25.64 (significant level of 0.00).
Source: Computed from field survey, 2012 Constraints to farmers' use of fertilizer.

As shown in Figure 6, respondents ranked the high cost of fertilizers as the greatest challenge to fertilizer use by the majority (91.9%) of the respondents. This is followed by the untimely release of fertilisers (68.8%). This is because often times farmers do not have access to the fertilizers as at when due, due to bureaucratic bottlenecks and thus they are not able to apply it at the appropriate time required and difficulty in transporting fertilizers (53.8%) due to long distance.

***Organic versus inorganic fertilizer usage***

The result of the t – test (presented in Table 6) shows that there is a mean difference of 189kg between the quantity of organic and inorganic fertilizer used by farmers which is significant at 0.05 level of significance. In this study the quantity of inorganic fertilizer used by the farmers is significantly greater than the quantity of organic fertilizer.

**Table 6: t – test of difference analysis between the quantity of organic and inorganic fertilizer used by farmers.**

| N = 160 | Mean quantity used | Difference in quantity used | Std. deviation | t | d.f | Sig. |
|---|---|---|---|---|---|---|
| Organic fertilizer | 66 kg | 189 kg | 3.06 | -6.37 | 159 | 0.00 |
| Inorganic fertilizer | 255 kg | | | | | |

## Discussion and conclusion

The present study identifies that, despite the fact that an organic fertilizer plant has been in existence in Ondo State since 2006, the usage of commercial organic fertilizer is less than that of inorganic fertilizer. This may be as a result of lack of awareness as many farmers do not have extension contact. It may be due to lack of availability as reported. It may also be due to issues not explored in the present study, such as the actual or perceived quality control, the consistency and the effectiveness of commercial organic fertilizers on offer.

Inorganic fertilizer was used in greater quantities by respondents. The study revealed that some socio-economic characteristics influenced the use of organic fertilizers (age, gender, household size, and extension contact) while others influenced the use of in-organic fertilisers (household size, farm size, availability of inorganic fertilizers, price of inorganic fertilizers, and membership of social organizations). The frequency of agricultural extension contacts with respondents was low and this is expected to influence the usage of organic fertilizers. General constraints to the use of commercial fertilizers included price, the timeliness of access, and the transportation issues.

Although the potential is great, the African continent is not well represented with certified organic agricultural production (Paull & Hennig, 2013). A greater uptake of organic fertilizers in particular, and organic agricultural practices in general, can facilitate the migration of farming to certified organic status.

There is an opportunity to create more awareness on the availability and ecological and health benefits of organic fertilizers, in the quest for organic agriculture. While efforts are progressing on the commercial production of organic fertilizers, the government might

consider making fertilizers more readily available and at a cheaper rate while concurrently encouraging farmers to engage in mixed farming so that animal manure will also be available for crop production. The work of the Nigerian government under the Growth Enhancement Support Scheme (GES) could be further strengthened to enhance the food security of the nation.

## Acknowledgements

The Author gratefully acknowledges Miss Folakemi Agboola for her assistance in collecting data for this study, and Mrs Oluwatosin Ishola for her editorial work on the paper.

## References

Adesoji, S.A. & Farinde, A.J. (2006) Socio-economic factors influencing yield of arable crop in Osun State, Nigeria. Asian Journal of Plant Sciences, 5:630-634

Akpan-Idiok, A.O. (2012) Physicochemical properties, degradation rate and vulnerability potential of soils formed on coastal plain sands in Southeast, Nigeria. International Journal of Agricultural Research, 7: 358-366.

Chhogyel, N., Zamora, O. B., & Espiritu, B. M. (2015). Soil microbial counts and performance of lowland rice (Oryza sativa L) under two water regimes and organic soil amendments. Journal of Organics, 2( 1), 33-48.

Doreo Partners (2014) Alarming food importation rate, http://www.doreopartners.com/alarming-food-importation-rate/ (Viewed 30 June, 2014)

Druilhe, Z. & Barreiro-Hurlé, J. (2012) Fertilizer subsidies in sub-Saharan Africa. ESA Working paper No. 12-04. Rome, FAO.

FAO. (2013) Status and Challenges of Soil Management in Nigeria, Food Agriculture Organisation (FAO),http://www.fao.org/fileadmin/user_upload/GSP/docs/WS_managinglivingsoils/Status_Soil_Management_Nigeria_Ojuola.pdf (Viewed 30 June, 2014)

Fasina, O.O. (2013) Determinants of perceived effectiveness of organic fertilizer used by farmers in Oyo State, Nigeria. Agricultura Tropica et Subtropica, 46(1):23-28

Fawole, O. P. & Fasina O.O. (2005). Factors predisposing farmers to organic fertilizer use in Oyo State, Nigeria. Journal of Rural Economics and Development, 14: 81-89

Fox News (2012) 10 reasons organic food is so expensive, www.foxnews.com/leisure/2012/03/11/10-reasons-organic-food-is-so-expensive/ (Viewed 15 August, 2014)

Hassan, A. E., Bhiah, K. M., & Al-Zurfya, M. T. H. (2014). Effect of organic extracts on the growth and flowering of marigold plants (Calendula officinalis L.). Journal of Organics, 1(1), 22-30.

IFAD. (2014) Rural poverty in Nigeria. International Fund for Agricultural Development (IFAD) http://www.ruralpovertyportal.org/country/home/tags/nigeria (Viewed 30 June, 2014)

IFPRI. (2011) A Review of Literature on Agricultural Productivity, Social Capital and Food Security in Nigeria. International Food Policy Research Institute (IFPRI), NSSP Working Paper 21.

Naikwade, P. V. (2014). Response of fodder maize to the application of various organic manures prepared from Ipomoea muricata weed. Journal of Organics, 1(1), 31-38.

Olowoake, A. A. (2014). Influence of organic, mineral and organomineral fertilizers on growth, yield, and soil properties in grain amaranth (Amaranthus cruentus. L). Journal of Organics, 1(1), 39-47.

Ozowa, N.V. (1997) Information needs of small scale farmers in Africa: The Nigerian example. "http://www.worldbank.org/html/cgiar/newsletter/june97/9nigeria.html" http://www.worldbank.org/html/cgiar/newsletter/june97/9nigeria.html (Viewed 30 June, 2014)

Paull, J., & Hennig, B. (2013). The World of Organic Agriculture - Density-equalizing map. In H. Willer, J. Lernoud, & L. Kilcher (Eds.), The World of Organic Agriculture: Statistics and Emerging Trends 2013 (pp. 129): Frick, Switzerland: Research Institute of Organic Agriculture (FiBL) & Bonn: International Federation of Organic Agriculture Movements (IFOAM).

Shiyam J.O. & Binang, W.B. (2013) Effect of poultry manure and plant population on productivity of fluted pumpkin (Telfaiaria occidentalis hook f.) in Calabar, Nigeria. Journal of Organic Systems. 8 (2), 29-35.

Vanaja, T., Neema, V., Mammootty, K. P., Balakrishnan, P. C., & Jayaprakash Naik, B. (2015). The first high-yielding saline tolerant rice variety suited to the Kaipad tidal farming ecosystem of Kerala, India, and suited for flood prone and water scarce environments: 'Ezhome-1'. Journal of Organics, 2(1), 21-32.

Yadav, S. K., Babu, S., Yadav, M. K., Singh, K., G. S. Yadav, & Pal, S. (2013) A Review of organic farming for sustainable agriculture in Northern India. International Journal of Agronomy, Volume 2013, 8pp.