

## Assessment of Soil Fertility Management among the Arable Crop Farmers in Ondo Southwestern Nigeria

Ayeni Leye Samuel and Akinbani, A.S

Department of Agricultural Science, Adeyemi College of Education, PMB 520, Ondo, Ondo State, Nigeria

Corresponding Author e- mail: leye\_sam@yahoo.com

### Abstract

Field survey was carried out to assess soil fertility management among the arable crop farmers in six selected towns and villages in Ondo southwestern Nigeria in 2014. Data was collected from 240 arable crop farmers with the aid of questionnaire and interview schedule. Data collected were analyzed using both descriptive and inferential statistics. Forty farmers were randomly selected to give a total number of 240 respondents. Out of the two hundred and forty farmers interviewed, 80% were male while 40% were female; twenty two (22) were between the age of 21 -30, twenty eight (28) were within the age of 31 – 40, 38 were in the range of 41-50 while 32 were within the range of 50 years and above. Majority of the farmers hold less than 10 acres of land. One hundred and ninety two farmers practiced mixed cropping while only 48 farmers practiced monocropping. 84 farmers had no formal education, 72 had primary education, 50 farmers attained secondary education while 38 attained beyond secondary education. 49% farmers engaged in complete burning, 19% controlled burning, 24% packed refuse after land clearing while 12% applied herbicides. 88% applied fertilizer and among the three types of fertilizers 42% applied mineral fertilizer of which 49% used broadcasting method which was highest among the methods. The use of organic and organomineral fertilizers were not significant. Mound making with hand held hoe was significant compared with the seven tillage techniques assessed. Farmers are encouraged to integrate legumes with other crops on rotational basis as well as the use of organic and organomineral fertilizers.

{**Citation:** Ayeni Leye Samuel, Akinbani, A.S. Assessment of soil fertility management among the Arable Crop Farmers in Ondo Southwestern Nigeria. American Journal of Research Communication, 2015: 3(2): 25-34} [www.usa-journals.com](http://www.usa-journals.com), ISSN: 2325-4076.

## Introduction

Of the projected increase in world population of about 3 billion between 2008 and 2050, about half of it may occur in Africa where soil resources are already under great stress. The agrarian stagnation, plaguing food security in sub-Saharan Africa (SSA) since the early 1970s, may exacerbate with the projected climate change along with the attendant increase in risks of soil and environmental degradation Birte et al., 2008. For example, the Nigerian population has increased from 115 million in 1991 to 140 million in 2006 (Federal Republic of Nigeria 2007). It is better for the farmers to concentrate on soil conservation methods that would increase the land productive capacity rather than the methods that would increase crop productivity within a short time and thereafter causes havoc to the soil. In the olden days, shifting cultivation and bush fallowing systems were the best methods of conserving soil fertility as a result of vast land available for crop production. Shifting cultivation is fast dwindling especially in southwestern Nigeria as result of different ways in which the lands are being used. road constructing, land excavation for different purposes and yearly cultivation of land without rest are various ways in which nutrients are being mined with little attention in replacing the nutrients mined. There are different ways in which farmers till the lands. Some of the methods include selective and total felling of trees, controlled and uncontrolled bush burning, conventional and manual tillage, different planting and harvesting methods and judicious and injudicious application of fertilizers (FAO,2013). The stated methods and hosts of others not mentioned either adds nutrients to the soil or cause soil degradation. The problem of land scarcity for food crop production is aggravated by rapid urbanization, conversion to nonagricultural uses, and severe soil degradation (Birte et al., 2008) Overuse of soils causes acidification, salinization or other chemical soil contamination. Soil Scientists need to adapt a positive approach to natural resources management. The soils need to be preserved to avert future hunger strike. The problem of land

scarcity for food crop production is aggravated by rapid urbanization, conversion to nonagricultural uses, and severe soil degradation.

Soil conservation is a combination of all methods of management and land use that safeguard the soil against depletion or deterioration by natural or man-induced factors (Acton et al., 2013). One of the main causes of soil degradation identified in various parts of Africa by the Food and Agriculture Organization of the United Nations (FAO) is the practice of inappropriate methods of soil preparation and tillage. The soil naturally replenishes itself when used properly.

In an attempt to maintain optimum crop productivity, farmers are encouraged to adopt different production technologies that would conserve the soil. There is no known research that assesses the cropping practices that affect soil fertility especially in Ondo southwestern Nigeria. Hence, the objective of this study was to assess the current different cropping practices adopted by the arable farmers in the study area and probably proffer solutions where necessary.

## Materials and Methods

Ondo is about 300 kilometers northeast of Lagos. It is situated in a forest region of Nigeria. Ondo is about 290 metres above sea level, located in the damp tropic within the tropical rain forest and the southeasterly wind blows through the region throughout the better part of the year. The cooler dry continental air from the north abounds during the months of December - February of the year. Ondo people are great farmers. They cultivate food crops such as yams, cassava, maize, cocoyam, rice and beans (Kwedee, 2014)

A total of two hundred and forty farmers was randomly selected and interviewed in six villages in Ondo West local government area of Ondo state. An interview schedule designed to measure relevant indicators was developed and used for data collection. Ballot paper was used to select the towns in each of the local government. The questionnaire was self-administered to non-literate farmers. The literate farmers were however allowed to fill the questionnaire themselves. Village extension agents were also involved in the exercise to collect useful information where appropriate. Both primary and secondary data were employed to collect information from farmers. Twenty farmers were randomly selected from each village making a

total of one hundred and twenty respondents. The sampled area comprised Sopotosepete, Bagbe, Litaye, Laosho, Asantan and Oke ogun. The analytical and interpretational tools used include frequency tables, percentages, and histograms

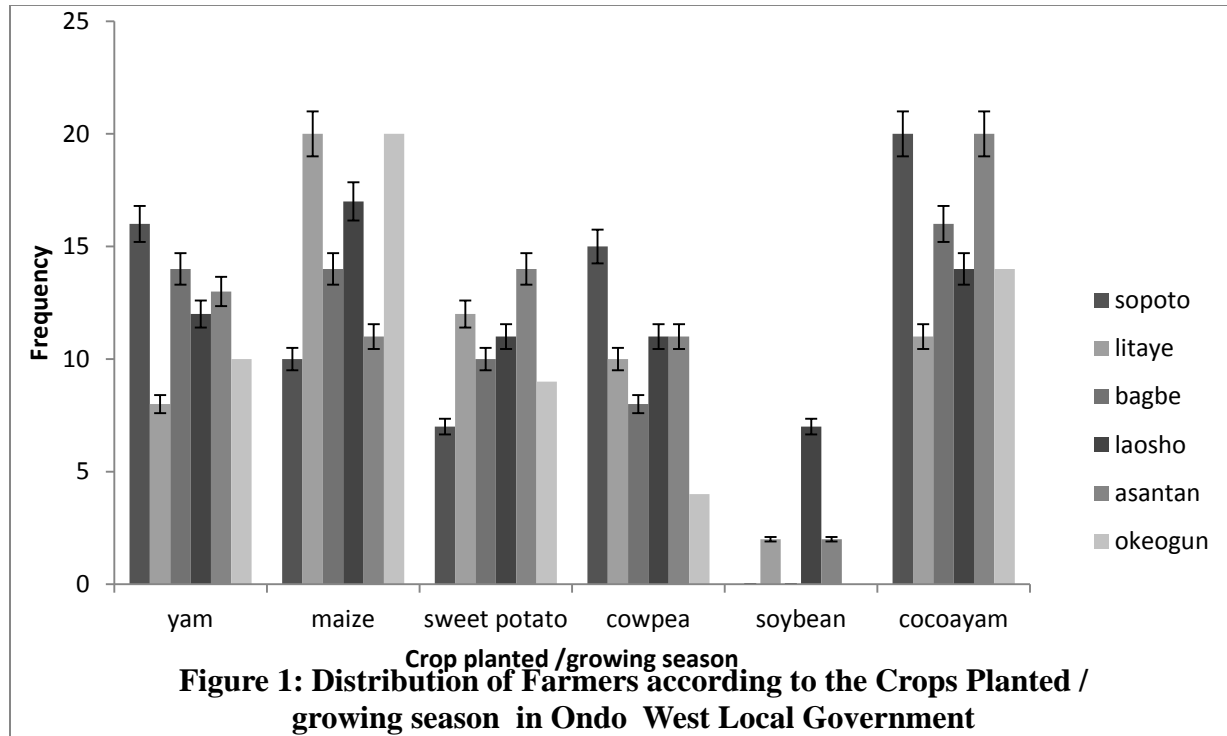
## Result and Discussion

Out of the two hundred and forty farmers interviewed, 80% were male while 40% were female; twenty two (22) were between the age of 21 -30, twenty eight (28) fall within the age of 31 – 40, 38 were in the range of 41-50 while 32 were within the range of 50 years and above. From the field survey, male participated more than female in arable crop production in Ondo west local government. . Although women are also involved but their level of involvement when compared with men might be minimal

The respondents who were between 41 – 50 years recorded the highest frequency followed by the people above 50 years of age. This is likely to have influence on the farming practices that the farmers would adopt in soil fertility management due to their long farming experience. The older people participated in farming than the youth in sampled areas.

Data collected on educational background of the respondents showed that 84 farmers had no formal education, 72 had primary education, 50 farmers attained secondary education while 38 attained beyond secondary education. Lack of education is likely to affect how the farmers manage their soils. New technologies might be difficult to adopt as most of the respondents were illiterates

In the Figure 1, there was no soybean farmer in Sopoto Sepete, Litaye and Oke-ogun farm settlement while Laosho recorded the highest frequency in soybean production. Soybean and cowpea are leguminous crops which add nutrients to the soil. They fix nitrogen. The farmers in SopotoSepete might require additional nitrogen from external source.

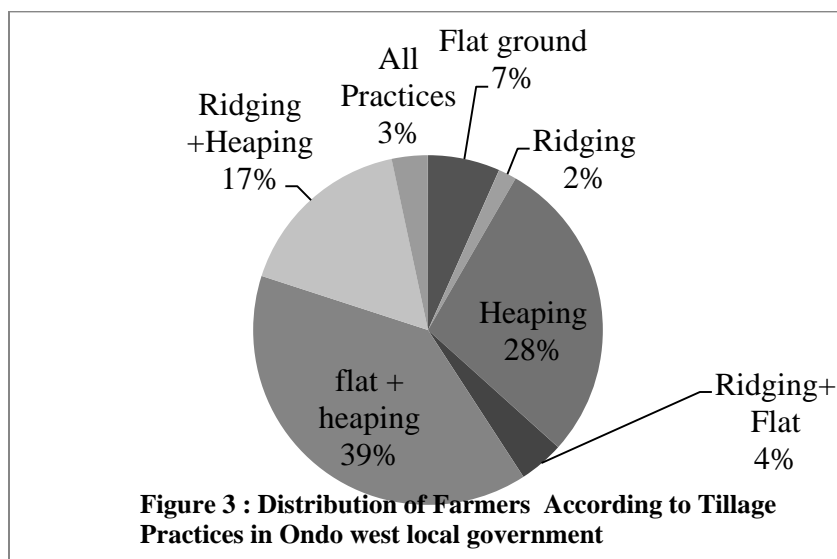
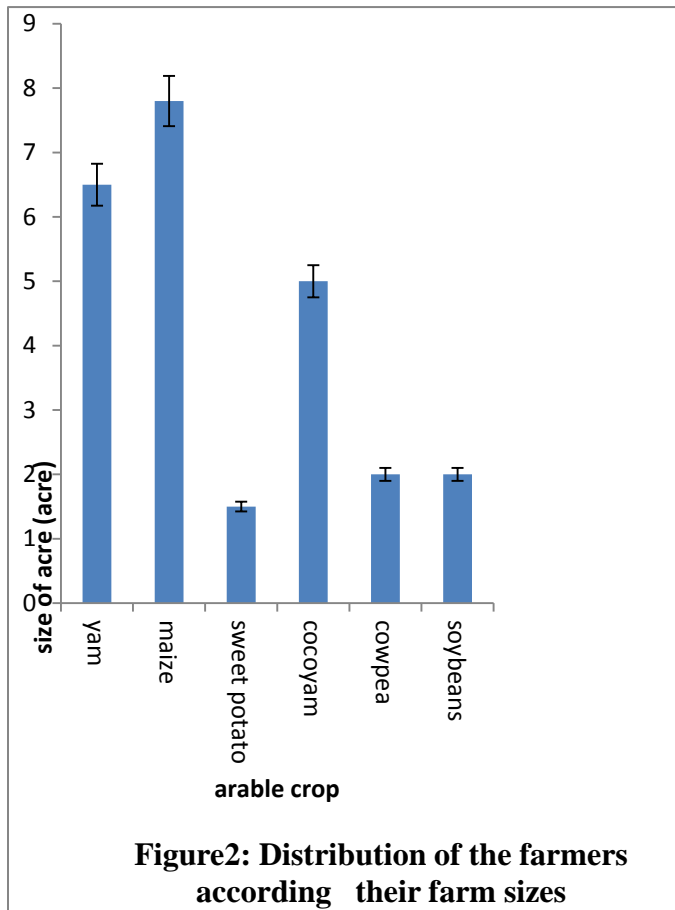


The data collected from the field showed that 192 farmers practiced mixed cropping while only 48 farmers practiced monocropping. Planting of different crops on a piece of land remove more nutrients from the soil than sole cropping as a result of overpopulation.

Figure 2 shows that maize farmers hold between 7 - 8 acres of land and cocoyam of then holds between 6 acres of land while yam hold 5 acres of land. This is a clear indication that majority of the farmers i.e. (7.8 + 6 + 5 = 18.8) hold more than 15 acres of land ( big farm holders) while only soybean, cowpea and sweet potato farmers hold less than 10 acres hence only a few of them could employ mechanized system of agricultural due to relatively small size of farm.

Figure 3 shows the distribution of farmers according to tillage practices among the farmers in the study area. The tillage techniques also contributes to soil fertility and crop production (Lal,2009). More farmers use two tillage techniques to plant different crops i.e. than planting on either flat ground or heap alone. The farmers planting on flat ground might be using zero tillage. The farmers embarked on ridging might be using tractor. Minimum pulverizing of the soils is more preferable to mechanized tillage in terms of their effects on soil structure. Heaping entails using of hand held hoe signifying the farmers are subsistent. Continue use of hand held

hoes, have limited access to new information, and lack institutions supporting smallholder agriculture (Gowing and Palmer 2008; Nkala et al. 2011).



The field survey showed that 140 arable farmers applied fertilizers to their crop while 100 farmers did not apply fertilizer showing their soils are could not sustain crop production without adding fertilizers. The low fertility status of the soils might be as a result of continuous use of the lands for cropping or mismanagement of the land. Among the fertilizers used by the farmers, mineral fertilizers are the commonest (Table 1). Researches have shown that continuous use of mineral fertilizers has adverse effect of the physical properties of the soil. Few people use organic manure compared with mineral fertilizers. Farmers use more organomineral fertilizers than organic manures. This might be as a result of the closeness of the factory that manufactured the organomineral fertilizers to the farmers or little knowledge of the farmers about the importance of organic manures in increasing soil fertility. The organ of the Ministry of Agriculture that manufactured the fertilizer is very close to the study area. Organomineral fertilizers are a new product that exhibits the characteristics of both mineral and organic fertilizers. Awareness of the usefulness of organomineral fertilizers might have been created by the Extension Department of the Ministry of Agriculture.

**Table 1: Distribution of respondents on application of fertilizers**

<b>FERTILIZERS</b>	<b>FREQUENCY</b>
Organic fertilizer	80
Mineral fertilizer	100
Organic fertilizer + Mineral fertilizer	60
Total	240

The method of applying fertilizers has significant roles in soil fertility. In table 2, farmers who engage in broadcasting method of fertilizer application top the list followed by the ring method. Broadcasting method might cause excessive growth of weeds that might cause competition for air, water and nutrients with the growing crops but at the end the weeds would serve as sources of organic matter to the soil. The major adverse effect of broadcasting method is that excessive addition of mineral fertilizers to the soil might cause nutrient imbalance or nutrient antagonism.

**Table 2: Different method of fertilizer application**

<b>FERTILIZER APPLICATION</b>	<b>FREQUENCY</b>
Broadcasting	118
Put at the base of the crop	12
Ring method	60
Spray round the crop	20
None	30
<b>TOTAL</b>	<b>240</b>

The farmers who engage in total or clean clearing of the land had the highest frequency (Table 3) followed by the farmers, who carry out slashing, pack debris together and set fire. These later set of farmers used the land that had been previously cultivated for another crop harvested. Though, some could not wait for the debris to dry before heaping yet they pack them aside. Few people use herbicides to clear the land. This might be as a result of high cost of fertilizer that poor resource farmers could not afford to buy. Bush burning has both positive and adverse effects on soil fertility. It increases cations in the soil, serves as liming materials as well as controlling weeds. Burning could also cause caking of the soil, burning beneficial organisms in the soil and increasing soil temperature. Tillage researchers advocate for controlled burning and spreading the ash on the farm to serve as fertilizer as well as liming material (Ayeni. 2011). From the results, most of the farmers do not practice conservation agriculture because majority of them still engage in total burning of their farm residues that are supposed to act as covers.

**Table 3: Distribution of farmers on how the farmers clear their farmland**

<b>CLEARING OF FARM LAND</b>	<b>FREQUENCY</b>
herbicides	28
Remove all weeds and burn	118
Clearing without burning	58
Controlled burning	46
<b>TOTAL</b>	<b>240</b>



Field survey showed that 146 out of 240 farmers practiced crop rotation while 94 farmers engage in continuous cropping on the same piece of land for several years due to unavailability of land and ignorance in crop rotation. It is true that more farmers practice crop rotation but the types of crop rotated need to be considered. Leguminous crop is expected to follow cereal crop, shallow rooted crops need to follow deep rooted crops. Farmers on the study area need to be trained on the best crop to follow each other. Continuous use of crops in the same family for crop rotation would cause more havoc to the soil as the soil would be exposed to nutrient mining and also prone to disease infestation. There are three major principles on conservation agriculture: minimal soil disturbance, permanent soil cover and crop rotations (FAO, 2007)

## Conclusion

Field survey was carried out to assess the soil fertility management of arable farmers in Ondo southwestern Nigeria. From the findings, it could be seen that the major soil fertility management practices among arable crop farmers in the sampled areas include fertilizer application, mulching, cover cropping, mixed cropping, bush burning. The findings showed that farmers plant many crops on the same plot of land which decrease soil fertility. Farmers apply mineral fertilizers more than organic manures. Many farmers grow cereal and tuber crops than leguminous crops and the method of fertilizer application adopted by the farmers is not proper. Farmers are advised to apply organic manure on their farm to enhance crop performance as well as planting leguminous crops.

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