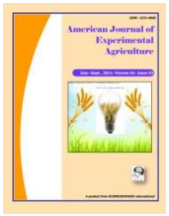

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Assessment of the use of Soil Improvement Management Practices among Arable Farmers in Egbedore Local Government Area, Osun State, Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Author AOA designed the study, wrote the protocol and wrote the first draft of the manuscript. Author RAO reviewed the experimental design and all drafts of the manuscript. Authors AOA and OJY managed the analyses of the study. Author OJY identified the plants. Authors AOA and ROA performed the statistical analysis. All authors read and approved the final manuscript.

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ABSTRACT

The study assessed the use of soil improvement practices among arable crop farmers in Egbedore Local Government Area of Osun State, Nigeria. Primary data were collected from one hundred and twenty farmers randomly from six communities through the use of structured interview schedule. Data were analysed using descriptive statistics and correlation analysis. The results show that most of the farmers were between the ages of 21 and 60 years with mean age of 43.5. The large

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household size of respondents indicates that farmers depended more on family members for labour. The soil improvement practices which were mainly used by the respondents were: bush fallowing, mixed cropping, mulching, animal droppings and application of NPK fertilizer. The use of compost, superphosphates were not common among the arable crop farmers in the study area. Majority (72.5%) of the respondents preferred using planting systems as soil improvement practices. The .result of the correlation analysis shows that there was significant relationship between respondents' farming experience, level of education and the use of soil improvement practices at $P \leq 0.05$ and $P \leq 0.01$ respectively. The numbers of soil improvement practices used was determined by the years of formal education and years of farming experience. There was a significant relationship between the level of skill and knowledge of respondents in any soil improvement practice ($r = 0.772$; $P \leq 0.01$). This implies that the use of any of the soil improvement practice is determined by the level of knowledge and skill of the farmer on that practice. It was recommended that farmers should be trained enhancing skills and improving knowledge of different planting systems, preparation of organic practices and proper use of both organic and inorganic fertilizers.

Keywords: Assessment; improvement; practices; arable; farmers.

1. INTRODUCTION

Agriculture plays a major role in the sustenance and existence of man. Food is first and most important necessity of life of the basic needs of man [1]. All animals, as well as human beings, depend mainly on plant products for the nutrients necessary for their growth and development. There has been an increase in human and animal population, the persistent situation which increases the demand for arable crops on a daily basis. With this development, there is a serious competition for arable crops like maize, cassava, yam (etc) between man and livestock. Thus, there is the need to increase food production in order to meet the demands of teeming population [2].

In addition, food produced by cultivating the same piece of land is exposed to gradual decrease in yield. It has been established by [3] [4], and [5], that when a piece of land is cultivated continually for a few consecutive years, the soil gradually loses its fertility and so the yields decrease. [6] further asserted that non-replacement of nutrients continually removed from the soil by the crop oxidation of organic matter and erosion reduces crop yields. This yields decrease as a result leads to reduction in the total food available for consumption. [7] submitted that depletion of soil fertility is a major biophysical cause of low per capital food production in Africa. In the past, when the population was still lower and the world was not as civilized as it is now, the farmers used to practice shifting cultivation or bush fallowing. The practice involves the cultivation of land for a few years, after which it is left to fallow in order to replenish itself naturally while the farmer uses another piece of land for farming. However, civilization and increase in population has led to decrease in the amount of land available for crop production. Industries, buildings and other structures have taken a lot of the land that should have been available for arable farming. Due to the reduction in the available land, the land used for production is being used season after season, year after year. As this happens, the soil nutrients are depleted gradually. Weeds also contribute to drawing nutrients from the soil thereby reducing the soil fertility further. [7] posited that problem of weeds also add to the setback exhibited by the per capita food production in Africa. Another problem is the incidence of water erosion, leaching, excessive heat etc. According to [8], soil erosion and land degradation are severe problems in Africa leading to yield reductions. These wash away soil nutrients off the top soil or down beyond the reach of plant roots and also destroy the soil structure, soil texture and soil aggregation. There is therefore a need to improve the soil fertility so that the soil can increase production despite the pressure exerted on it. The above has led to the introduction of quite a number of practices to improve the soil. According to [9], farmers apply a variety of measures to maintain soil fertility. Such measures are the use of inorganic fertilizers, agroforestry, mulching, manuring, nitrogen fixing plants etc.

Similarly, many measures have been taken by the Nigerian government and farmers to improve the quality of the soil. [10] submitted that in the past 40 years several technologies to improve the productivity capacity of Nigerian soil have been devised. These include importation of inorganic fertilizers by the government, use of agro-forestry practice, mulching, use of compost,

organic manure, mixed farming, mixed cropping among others. Each of these technologies has merits and demerits and account for disparity in the use of soil improvement practice. Inorganic fertilizer may increase yield of crops faster than other practices because it releases nutrients to soil faster, but it is not readily available to farmers simply because the distribution all over the country has always been politicized and farmers too at times do not know the right quantity for the type of soil available for specific crop production. The farmers may even not know the right time to apply these fertilizers. Organic manure are said to be slow in releasing nutrients but preferred to other practices because famers believed that it is more health friendly. However there is a constraint as to how to prepare these various types of organic manures. Based on the foregoing, there is the need to assess the soil improvement practices used by farmers in Egbedore Local Government Area of Osun State. The choice of the Local. Government Area (LGA) was informed by farming being the predominant occupation in area.

1.1 Objectives of the Study

The main objective of the study is to assess the soil improvement practices used by farmers in Egbedore Local Government Area of Osun State, Nigeria.

The specific objectives are to:

- identify the type of soil improvement practices used by arable crop farmers in the study area;
- identify the soil improvement practices preferred by arable crop farmers in the area and;
- determine factors influencing the choice of soil improvement practices in the study area

1.2 Hypothesis

- There is no significant relationship between farmer's socio-economic characteristics and the use of soil improvement practices
- There is no significant relationship between knowledge and skill of arable crop farmers and their use of soil improvement practices.

2. METHODOLOGY

The study was conducted in Egbedore Local Government Area of Osun State, Nigeria. Egbedore Local Government Area of Osun State which was the study area is situated to the West by Ejigbo Local Government Area, to the South by Ede North Local Government Area and to the East by Irepodun Local Government Area. The Local Government Area (LGA) has an estimated population of 4,137,627 [11]. The inhabitants of this area are mainly Yorubas. Other ethnic groups are Tivs, Ibos, few Hausas but the Yorubas who are indigenes of the Local Government Area engaged primarily in arable crop production. They grow wide range of crops such as maize, cassava, yam, melons, soybean, and cocoyam. Some parts of the local government area also grow cocoa, kolanut, banana and some inhabitants also engage in other activities such as trading, carpentry, bricklaying etc. [12].

The target population for the study was small scale farmers. Farmers in all the community in the LGA grow arable crops where in six communities were randomly selected and twenty farmers were randomly selected from each of the communities selected. The communities selected for the study are Ikotun, Ojo, Iwoye, Aro, Alaasan and Awo. A total of 120 farmers were selected for the interview. A well-structured interview schedule was used to collect data for the study. Data were analyzed using descriptive techniques such as frequency counts, percentages, mean and standard deviation. Correlation analysis was used to make inferential deductions from the hypotheses set for the study.

3. RESULTS AND DISCUSSION

3.1 Socio Economic Characteristics of Farmers

3.1.1 Age

Most (74.2%) of the farmers were between ages 21 and 60 years with mean age of 43.5 and standard deviation of 15.7. This shows that the majority of the arable crop farmers in the study area were in their active and productive ages.

3.1.2 Household size

About 31.6 percent had between 2 and 5 household members while 36.7 per cent had between 6 and 10 household members with mean household size of 7.4 with standard deviation of 4.6.Analysis shows that the large family size (6 and above) indicates that farmers depended more on family members to provide labour for them on their farms.

3.1.3 Educational Status

Majority (77.5%) of the respondents were literate with only about 22.5 percent of them who had no formal education. The mean of the number of years of education of respondents was 9.41. This corresponded with the mean years of formal education of arable farmers in Osun State stated as 9 years by [13]. The standard deviation was 5.32 which contradicted the one stated as 0.76 by [13].

3.1.4 Farming experience

From the results in Table1 also, 33.3 percent of the respondents had farming experience of between 11 and 20 years. The level of farming experience cannot be overlooked since same influences the rate of adoption of farming practices including the use of soil improvement practices.

The mean number of years of farming experience was 23.4 and standard deviation of 16.4. This shows that majority of the respondents had over 10 years of farming experience.

3.1.5 Income

About 32.5 percent made between ₦100, 000 and ₦200, 000 per annum while 20.0 percent had between N200, 001 and ₦300, 000 per annum. Only 20.8 percent had over ₦300, 000. While the mean income was ₦53, 202..

3.1.6 Types of soil improvement practices

Results in Table 2 show that all the respondents (100.0%) knew about bush fallowing as a practice to improve soil fertility, but 85percent made use of the approach. Mixed farming, mixed cropping and intercropping were well known planting practices among these planting systems. Among the organic practices, majority (97.5%) made use of mulching to improve nutrients.

Table 1. Distribution of respondents based on socio-economic characteristics (N= 120)

Variables	Frequency	Percentage	
Age			
<20	12	10.0	Means = 43.5
21-40	47	39.2	SD = 15.7
41-60	42	35.0	
61-80	19	15.8	
>80	Nil	Nil	
Household			
1	7	5.8	Means = 7.4
2-5	38	31.6	SD = 4.6
6-10	44	36.7	
11-15	23	19.2	
16-20	5	4.2	
>20	3	2.5	
Years of education			
0	27	22.5	Means = 9.41
1-6	28	23.3	SD = 5.32
7-12	49	40.8	
13-16	10	8.4	
>16	6	5.0	
Farm enterprise			
1-10	32	26.7	Mean = 23.4
11-20	40	33.3	SD = 16.4
21-30	20	16.6	
31-40	16	13.3	
41-50	05	4.2	
51-60	05	4.2	
>60	02	1.7	
Income from arable farming			
1-100,000			Mean = 53.202
100,001-200,000	32	26.7	
200,001-300,000	39	32.5	
300,001-400,000	24	20.0	
400,001-500,000	18	15.0	
	07	5.8	

Sources: Field Survey, 2013

Majority (98.3%) knew about chemical fertilizer NPK while 93.3% percent of the respondents made use of it. These results indicate that practices mainly used by the respondents were bush fallowing, mixed cropping, mulching, animal droppings, NPK. The use of compost, superphosphates were not common among arable crop farmers in the study area.

3.1.7 Preferred soil improvement practices

Results in Table 3 show that majority (72.5%) of the respondents preferred using planting systems as agro-forestry, shifting cultivation, intercropping and crop rotation as soil improvement practices. About 14.2 percent preferred the use of organic practice (i.e. use of animal and plant materials) while 13.3 percent preferred the use of inorganic soil improvement practice.

3.2 Results of Correlation Analysis

3.2.1 Results of correction analysis

The result in Table 4 shows that there was a significant relationship between the years of farming experience, the years of formal education and the use of soil improvement practices at $p \leq 0.05$ and $p \leq 0.01$ respectively. This means that the number of year of formal education and the year of farming experience of the respondents determined their choice of soil improvement practices.

The results in Table 5 also indicate that there was a significant relationship between the level of skill and knowledge of respondents in any soil improvement practice and the use of the soil improvement practice ($r = 0.772$; $P \leq 0.01$). This implies that the use of any of the soil improvement practices is determined by the level of knowledge and skill of the farmers on that practice.

Table 2. Distribution of respondents by the use of soil improvement practices (N= 120)

Soil improvement practice*	Known		Use	
	Frequency	Percentage	Frequency	Percentage
Planting systems				
Shifting cultivation or cropping	120	100.0	102	86.0
Mixed farming	120	100.0	75	62.5
Mixed cropping	120	100.0	120	100.0
Intercropping	118	98.3	91	75.8
Crop rotation	101	84.2	46	38.3
Organic practices				
Green manure	101	84.2	81	67.5
Mulching	120	100.0	117	97.5
Animal droppings	120	100.0	103	85.8
Compost	05	4.2	3	2.5
Inorganic Manure				
NPK fertilizer	118	98.3	112	93.3
Ammonium Sulphate	42	35.0	36	30.0
Urea	36	30.0	28	23.3
Superphosphates	4	3.3	02	1.7

Sources: Field Survey, 2013

Table 3. Distribution of respondents based on preferred soil improvement practices (N= 120)

Improvement planting soil preference	Frequency	Percentage
Planting systems	87	72.5
Organic	17	14.2
Inorganic	16	13.3

Source: Field Survey, 2013

Table 4. Correlation analysis results of relationship between some socio-economic characteristics of respondents and the use of soil improvement practices

Variables	r value	p value
Age	0.142	0.072
Household size	0.153	0.063
Years of formal education	0.223**	0.006
Income	0.123*	0.135
Years of farming experience	0.175*	0.033

Sources: Field Survey, 2013;
Sig at P ≤ 0.5
Sig at P≤ 0.01

Table 5. Correlation analysis results of relationship between knowledge and skill level and use of any soil improvement practices

Variable	Correlation Co-efficient (r)	P value
Agro-forestry	0.848**	0.00
Shifting cultivation	0.780**	0.00
Inter cropping	0.859**	0.00
Crop rotation	0.818**	0.00
Green Manure	0.710**	0.00
Mulching	0.686**	0.00
Compost	0.867**	0.00
Fertilizer	0.694**	0.00
Manure	0.779**	0.00
Total skill	0.772**	0.00

Source: Field Survey, 2013
at P > 0.01

4. CONCLUSION

The study concludes that majority of the arable crop farmers were young and literate. Also the soil improvement management practices mainly preferred and used by the respondents were mixed cropping, mulching, animal droppings and the use of inorganic fertilizers (NPK).The use of composts and superphosphates were however not common among arable crop farmers.

RECOMMENDATIONS

It was recommended that arable crop farmers should be trained in acquiring skills and knowledge of different planting systems like intercropping and crop rotation, preparation of organic practices like mulching and compost making, and proper use of both organic and inorganic fertilizers like NPK, ammonium sulphate and use of superphosphates. This will enable arable crop farmers to use any of the soil improvement practices in such a way that the soil fertility will be sustained, without adversely affecting the environment or human health.

The government should also ensure an adequate supply of inorganic fertilizers at a subsidized rate as most of the times; these types of fertilizers do not get to the target people i.e. the farmers as at when due.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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