DETERMINANTS OF SOIL MANAGEMENT PRACTICES AMONG SMALL-HOLDER FARMERS IN EKITI STATE, NIGERIA

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ABSTRACT
This study investigated the determinants of soil management practice options among crop-based farmers in Ekiti State, Nigeria. The study employed multi-stage random sampling technique to select 90 crop-based farmers from six communities across the three agricultural zones in the State. Data were collected with the used of structured questionnaire. The data collected were analysed by the use of descriptive statistics, multinomial logit model and factor analysis. The results obtained from the analyses showed that major causes of soil degradation in the study area include: increased deforestation or lumbering activities in the area, continuous cropping, short fallow period due to increased pressure on land, poor afforestation or tree planting practices of farmers and poor access to needed farm inputs such as fertilizers among others. The socio-economic attributes of the farmers that significantly ($p \leq 0.01$, $p \leq 0.05$) influenced their preference for soil management practice options include: gender of household head, education, income, farm size and number of extension visits. The challenges militating against effective soil management practices by farmers in the study area were farm inputs, finance, institutional challenge and environmental factor. The study therefore recommends socio-economic capacity building of crop-based farmers in effective conservation tillage operation, adoption of organic and inorganic farming, provision of required infrastructural facilities, education and institutional supports to the farmers for improved food production through sustainable and environmental friendly soil management measures.

Keywords: Soil degradation, soil management, crop production and challenges

INTRODUCTION

The increased use of soil for agricultural production to meet the increasing demand for food is one of the strongest factors affecting soil quality in developing countries. Practices like unguided bush burning, deforestation, grazing, continuous tillage and uncontrolled farm mechanization affect the quality of soil and vegetative cover, thereby resulting in soil degradation. Soil degradation is accelerated when the forest cover is removed, pastures are overgrazed and overall land use patterns are not sustainable (Amusa, Enete and Okon, 2014). In Nigeria and other African countries, the phenomenon of soil degradation is being hastened by reduction in fallow periods and the shift from conventional bush fallowing system to permanent cultivation caused by population pressure and agricultural activities (Ameyan and Ogidiolu, 1989).

Decline in agricultural productivity as a result of soil degradation is evaluated in terms of inputs use such as fertilizer/manuring, water management and tillage methods to boost production (Mbagwu, 2003). The declining soil fertility of agricultural land constitutes a major food production constraint in Africa, especially in Nigeria, and it is becoming increasingly critical to secure sustainable soil productivity (Okwuagwu, Alleh and Osemwota, 2003). This is because; a degraded soil requires fallowing and soil management activities for effective rehabilitation. In affirmation, Panda (2007) emphasized that soil conservation remains the only known way to sustain the productivity of agricultural land. Junge, Abaidoo, Chikoye and Stahr (2009) classified soil conservation practices into three major strategies which include: agronomic, mechanical and soil management strategies.

Soil management practices guarantee sustainable food productivity potential of the soil (Badejo and Togun, 2001). The failure of farmers to adopt appropriate soil conservation practices contributes significantly to the degradation of a considerable portion of agricultural land (Genene and Abiy, 2014). This is because, proper soil management has great potential to contribute to soil organic carbon stocks through the addition of high amounts of biomass to the soil, cause minimal soil disturbance, conserve soil and water, improve soil structure, enhance activity and species diversity of soil fauna, and strengthen the mechanism of elemental cycling (Lal, 2004). Therefore, soil management practices that improve soil quality will become more noticeable, since soil management determines the level of food production, and, to a great extent, the state of the global environment (Komatsuzaki and Ohta, 2007). Soil management activities for agricultural production include conservation tillage operations, organic and inorganic manuring (Dimelu, Ogbonna and Enwelu, 2013; Junge, et al, 2009).

Conservation tillage operations are methods of soil cultivation that leaves the previous year's crop residue (such as corn stalks or wheat stubble) on fields before and after planting the next crop, to reduce soil erosion and runoff (Minnesota Department of Agriculture, 2013). Food and Agriculture Organization (2009) reported that conservation tillage systems include zero and minimum tillage operations which form important part of a sustainable agricultural system. Zero or minimum tillage operations result into greater soil water storage, higher crop yields, greater water-use efficiency and management of soil nutrients. Organic and inorganic manuring also constitutes important practices in soil management for sustainable crop production.

Inorganic manures are fertilizers either of mineral origin or man made through chemical processes. Inorganic manures are available as complete fertilizers with varying degrees of chemical compositions or as individual chemicals such as Nitrogen, Phosphorous or Potash. They offer more concentrated nutrients that quickly dissolve into the soil since they do not need time to decay in order to make the nutrients available for crop use (Myers, 2014). Inorganic fertiliser is a major input in crop production processes and its use is the most adopted agricultural technology by farmers in Nigeria (Chide, 1999). Brady and Weil (1999) noted that improved soil fertility through the application of inorganic fertilisers is an essential factor enabling the world to feed the billions of people that are added to its population. Organic manures on other hand are plant and animal wastes that are used inform of farmyard, compost and green manure as sources of plant nutrients. They release nutrients after their decomposition (Reddy, 2005). Organic fertilizer releases the required nutrients to the soil and step up the power of the soil to bind moisture for improved crop growth and yield (Rajasthan, 2010). In Southwest Nigeria and Ekiti State in particular where most of the cultivable soils are degraded due to excessive deforestation and other economic activities that threaten the natural environment, efforts aimed at bridging food production to meet the need of the growing population must be geared towards sustainable soil management practices through conservation tillage operations, organic and inorganic manuring. This is because; soil fertility is at present the most critical factor for sustainable crop production (Babatunde, Bartholomew, Ogunwale and Obigbesan, 2006).

Recognizing, most especially the significance of sustainable soil conservation measures on agriculture, there is need to strengthen the knowledge of soil management practices among crop-based farmers and other stake holders in Nigerian agriculture. This study therefore estimated the determinants of soil management options (conservation tillage, organic and inorganic manuring) among crop-based farmers in Ekiti State, Nigeria. Also effort was made to identify major causes of soil degradation and the challenges facing farmers in soil management practices in the area.

METHODOLOGY

Study Area: The study was carried out in Ekiti State, South-west Nigeria. The state is located between longitudes 4^0 45^1 and 5^0 45^1 East of the Greenwich meridian and latitudes 70 151 and 80

151 North of the equator (Ekiti State Government, 2013). The population of Ekiti State as reported by National Population Commission 'NPC' (2006) is 2,384,212 people with more than 80% of the population engage in farming as main source of livelihood (Amusa, Enete and Okon, 2011).

Sampling Procedure: Multistage random sampling technique was used in selecting the respondents. Two local government areas were randomly selected from each of the three agricultural zones making six local government areas. From each of the local government area, one farming community was selected making six communities for the study. With the assistance of key informants, the list and location of crop-based farmers in each of the selected communities were compiled from which the sample for the study was drawn. For logistic convenience, 15 farmers were randomly sampled from each of the six communities totaling 90 crop-based farmers that represented the sample frame for the study.

Data Collection: Structured questionnaire was used for data collection. This focused mainly on socio-economic characteristics of the farmers, soil management options (conservation tillage, organic and inorganic manuring practices) most utilized by the farmers, major causes of soil degradation and challenges facing farmers in soil management practices in the area. The data for the study were collected in October – November, 2013 with the help of six extension agents in the state.

Estimation Procedure: The data collected were analyzed using descriptive statistics, multinomial logit model and factor analysis as detailed below.

Mean Rating

To identify the major causes of soil degradation in the study area, mean rating technique was employed using 4-point rating scale. The 4-point rating scale was categorized as Very Serious (VS) = 4, Serious (S) =3, Less Serious (LS) =2 and Not Serious (NS) = 1. The mean ratings of the farmers based on the 4-point rating scale were graded using boundary limit as stated below:

Response Categories	***ordinal values***	***boundary limit***
Very Serious (VS)	= 4	3.50 – 4.00
Serious (S)	= 3	2.50 – 3.49
Less Serious (LS)	= 2	1.50 – 2.49
Not Serious (NS)	= 1	1.00 – 1.49

The boundary limits of 1.00 – 1.49; 1.50 – 2.49; 2.50 – 3.49 and 3.50 – 4.00 were used to interpret the results and categorise the mean values of the causes of soil degradation as: Very Serious, Serious, Less Serious and Not Serious respectively.

Multinomial Logit Model

The multinomial logit model was used to estimate the influence of socioeconomic attributes of the crop-based farmers in the state on the preferred soil management practice options. The dependent variable in this study (soil management options) was coded with the following values: 1 for conservation tillage operations, 2 for organic manuring and 3 for inorganic manuring. The numbering was arbitrarily assigned so that it did not imply any order of importance or magnitude. Moreover, in few cases where farmers combined two soil management options, which were rare in the study area perhaps due to low farm resources of farmers in the study area, the major practice was considered. Multinomial logit model as specified in this study was estimated with a set of coefficients, β(1), β(2) & β(3) as follows:

$$\Pr \quad (Z = 1) = \frac{\ell^{x\beta(1)}}{\ell^{x\beta(1)} + \ell^{x\beta(2)} + \ell^{x\beta(3)} + \ell^{x\beta(3)}} \quad \ldots\ldots (1)$$

$$\Pr \quad (Z = 2) = \frac{\ell^{x\beta(2)}}{\ell^{x\beta(1)} + \ell^{x\beta(2)} + \ell^{x\beta(3)} + \ell^{x\beta(3)}} \quad \ldots\ldots (2)$$

$$Pr\ (Z = 3) = \frac{\ell^{x\beta(3)}}{\ell^{x\beta(1)} + \ell^{x\beta(2)} + \ell^{x\beta(3)} + \ell^{x\beta(3)}} \quad \ldots\ldots\ldots\ldots (3)$$

Multinomial logit model is a choice between three or more alternative response (Kartels, Boztug and Muller, 1999). The model however is unidentified in the sense that there is more than one solution to $\beta^{(1)}$, $\beta^{(2)}$ and $\beta^{(3)}$ that lead to the same probabilities for Z = 1, Z = 2 and Z = 3. To identify the model, one of the $\beta^{(1)}$, $\beta^{(2)}$ and $\beta^{(3)}$ was arbitrarily set to O. That if $\beta^{(1)}$ is arbitrarily set = 0, the remaining coefficients $\beta^{(2)}$ and $\beta^{(3)}$ will measure the change relative to the Z = 1. In other words, this study compared the case of conservation tillage practice (1) of the farmers with other soil management practice options of organic (2) and inorganic (3). Therefore, using three category response as used in the model for this study and setting $\beta^{(1)} = 0$, the equation became.

$$Pr\ (Z = 1) = \frac{1}{\ell^{x\beta(1)} + \ell^{x\beta(2)} + \ell^{x\beta(3)}} \quad \ldots\ldots\ldots\ldots (4)$$

$$Pr\ (Z = 2) = \frac{\ell^{x\beta(2)}}{\ell^{x\beta(1)} + \ell^{x\beta(2)} + \ell^{x\beta(3)}} \quad \ldots\ldots\ldots\ldots (5)$$

$$Pr\ (Z = 3) = \frac{\ell^{x\beta(3)}}{\ell^{x\beta(1)} + \ell^{x\beta(2)} + \ell^{x\beta(3)}} \quad \ldots\ldots\ldots\ldots (6)$$

The relative probability of Z = 1 to the base category is

$$\frac{Pr\ (Z = 1)}{Pr\ (Z = 3)} = \ell^{x\beta(1)} \quad \ldots\ldots\ldots\ldots (7)$$

Farmer's preferred soil management option as conservation tillage, the use of organic or inorganic manuring was hypothesized to be function of socio-economic characteristics of the farmers as explanatory variables for the Mlogit model.

Factor Analysis

Exploratory factor analysis procedure was employed to identify farmer's challenges in effective soil management practices in the area. The challenges noted by the farmers were grouped into four factors using principal component factor analysis with iteration and varimax rotation and factor loading of 0.40. The model is represented as:

$Y_1 = a_{11}X_1 + a_{12}X_2 + * \ * *+ a_{1n}X_n$
$Y_2 = a_{21}X_1 + a_{22}X_2 + * \ * * + a_{2n}X_n$
$Y_3 = a_{31}X_1 + a_{32}X_2 + * * * + a_{3n}X_n$
$* =$ $*$
$* =$ $*$
$Y_n = a_{n1}X_1 + a_{n2}X_2 + * \ * + a_{nn}X_n$

***Where*:**

$Y_1, Y_2 \ldots Y_n$ = observed variables/challenges to farmers in soil management practices.
$a_1 – a_n$ = factor loadings or correlation coefficients.
$X_1, X_2, \ldots X_n$ = unobserved underlying challenging factors facing farmers in soil management.

RESULTS AND DISCUSSION

Major Causes of Soil Degradation in the Study Area

Table 1 presents the mean ratings of the major causes of soil degradation in the study area. Five out of the twenty identified causes of soil degradation in the table had mean values that ranged from 3.53 to 3.67 which fell within boundary limit of 3.50 – 4.00 on 4-point rating scale. This finding indicated that the identified five items are very serious causes of soil degradation in the study area. The identified causes with their corresponding mean values include: increased deforestation or lumbering activities in the area (3.67), continuous cropping (3.53), short fallow period due to increased pressure on land (3.55), poor afforestation or tree planting practices of farmers (3.66) and inadequacy of fertilizers for farmers use in the area (3.54). In addition, seven items that were considered serious causes of soil degradation with their corresponding mean values were: incessant bush burning of forest covers (3.18), land or soil pollution (2.63), continuous soil tillage by farmers (3.37), poor waste disposal system (2.55), weak institutional platform for enforcing soil management practices (3.36), inadequate financial capacity to ameliorate degraded soil (2.66), and increased demand for cultivable lands for construction of road, buildings and markets (2.57). In agreement with this finding, Ballayan (2000) stated that soil degradation can either be as a result of natural hazards or due to unsuitable land use and inappropriate land management practices such as continuous cropping, deforestation, poor drainage system and population increase.

Table 1: Mean Ratings of the Major Causes of Soil Degradation in the Study Area. (N = 90)

S/N	Causes of Soil Degradation	$\bar{X}$	SD	Remarks
1	Increased deforestation or lumbering activities in the area	3.67	0.54	**VS**
2	Continuous cropping	3.53	0.53	**VS**
3	The naturally poor soil texture in the area	1.32	0.99	**NS**
4	Short fallow period due to increased pressure on land	3.55	0.55	**VS**
5	Incessant bush burning of forest covers	3.18	0.63	**S**
6	Land or soil pollution	2.63	0.78	**S**
7	Overgrazing in the farm land	1.38	0.97	**NS**
8	Continuous soil tillage by farmers	3.37	0.61	**S**
9	Poor knowledge based of the farmers in soil management	1.69	0.94	**LS**
10	Poor afforestation or tree planting practices of farmers	3.66	0.52	**VS**
11	Increased cases of soil erosion in farm lands	2.46	0.80	**LS**
12	Poor drainage and erosion control channel	2.30	0.85	**LS**
13	Over population on the available land	1.98	0.93	**LS**
14	Poor waste disposal system	2.55	0.77	**S**
15	Weak institutional platform for enforcing soil management practices.	3.36	0.60	**S**
16	Inadequate financial capacity to ameliorate degraded soil	2.66	0.68	**S**
17	Urbanisation and increased demand for cultivable lands for construction of road, buildings and markets etc	2.57	0.72	**S**
18	Rough topography of farm lands in the study area	2.40	0.82	**LS**
19	Inadequacy of fertilizers for farmers use in the area	3.54	0.51	**VS**
20	Tedious nature of soil management activities	2.42	0.89	**LS**

Note: $\bar{X}$ *= Mean*
SD = Standard Deviation
***VS** = Very Serious; **S** = Serious; **LS** = Less Serious; **NS** = Not Serious*
Source: Field Survey, 2013.

Socio-Economic Determinants Influencing Farmers' Preference for Soil Management Practice Options in the Study Area.

Table 2 presents the parameter estimates of multinomial logistic regression model characterizing socio-economic attributes of farmers that influence their preference for soil management options. The explanatory power of the model as reflected by Pseudo R^2 was high (63%). The overall goodness of fit as reflected by Prob > Chi^2 (0.0000) was good. In terms of consistency with *a priori* expectations on the relationship between the dependent variable (soil management options) and the explanatory variables, the model seems to have behaved well. Out of the eight variables specified in the model, five significantly influence farmers' preference for soil management practice options. Figure 1 shows the percentage distribution of farmers' preference for the three soil management practice options considered in the study.

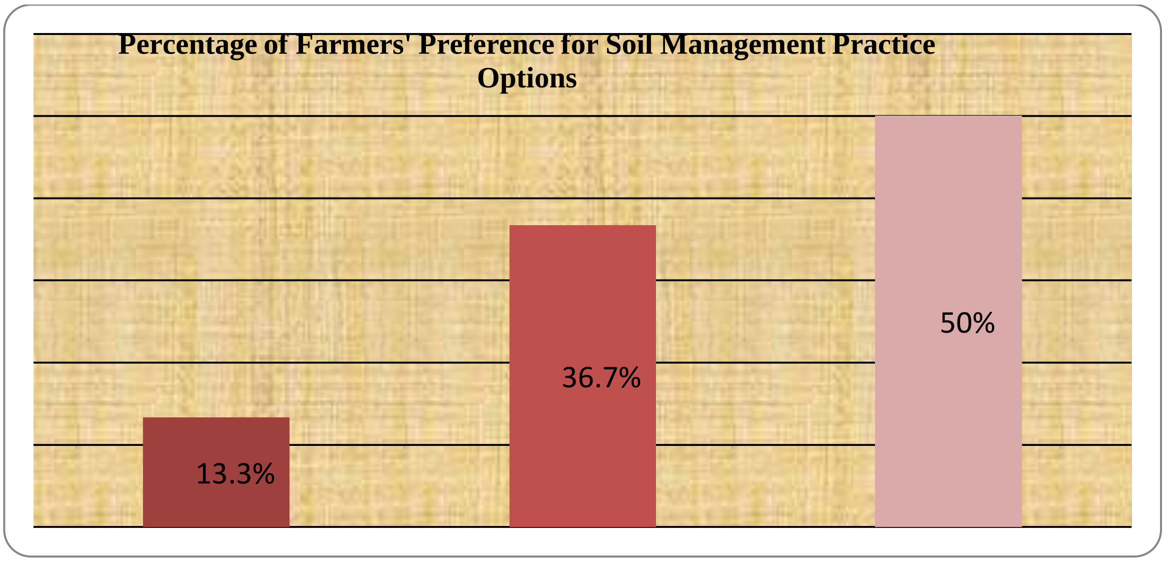

Figure 1: Percentage of Farmers' Preference for Soil Management Practice Options in the Study Area.
***Source:* Field Survey, 2013.**

The gender of household head (male 1 & female 0) was significant ($p \leq 0.05$) and negatively related with the probability of preferring organic manuring but was positive and significantly ($p \leq 0.01$) related to preferring inorganic manuring in comparison with preference for conservation tillage operation. The significant negative relationship of gender with preference for organic manuring implied that male farmers are less likely to prefer organic to inorganic manuring option for soil management in the study area. Farmers' years of education was significantly ($p \leq 0.05$) and positively related with the probability of using organic manuring but negative and significantly ($p \leq 0.01$) related with probability of using inorganic manuring in comparison with conservation tillage operations. By this result, educated farmers are more likely to practice organic manuring than inorganic. This agreed with the report of FAO (2008) which showed a positive significant relationship between education and adoption of organic agriculture.

Farmers' income was significant ($p \leq 0.01$) and negatively related with their probability of preferring organic manuring but was positive and significantly ($p \leq 0.05$) the probability of preferring inorganic manuring in comparison with conservation tillage operations. This result implied that increased farmers income favours the use of inorganic fertilizers than organic manures. Farm size was significant ($p \leq 0.05$) and negatively related with the probability of practicing organic farming but positive and significantly ($p \leq 0.01$) related to probability of adopting the use of inorganic manuring for soil management in comparison with conservation tillage operations. In affirmation, Okoye (1998) reported that among the most important factors influencing farmers' adoption of soil erosion control practices (SECPs) are income, farm size and risk attitude for recommended practices. The number of extension visits was significant ($p \leq 0.05$) and positively related with the probability of practicing both organic and inorganic farming. The positive and significant implication of number of extension visits shows that, the higher the number of visits per cropping season, the more the likelihood of the farmers' awareness and adoption of organic and inorganic farming. Extension visits constitute one of the major factors that influence the utilization of different soil conservation practices by farmers (Kipsat, 2007).

Table 2: Parameter Estimates of the Multinomial Logistic Regression Model of Determinants of Farmers' Preference for Soil Management Practices

Variables	Organic Manuring (2)	Inorganic Manuring (3)
Gender of Household Head (1 male, 0 female)	2.312 (-1.130)**	3.410 (1.875)***
Years of Farming Experience (in number)	0.233 (0.617)	0.367 (0.305)
Years of Formal Education (in number)	6.857 (11.774)**	3.417 (-9.646)**
Estimated Annual Income (in ₦)	4.174 (-0.306)***	0.637 (0.560)**
Farm Size (in hectare)	1.162 (-1.921)**	1.366 (1.840)***
Topography of the land (1 if smooth, 0 if rough)	4.295 (1.336)	3.343 (-1.853)
Number of Extension Visits (in number)	0.537 (2.245)**	0.438 (2.321)**
Household Size (in number of persons)	1.540 (3.231)	1.460 (3.325)
Intercept	23.892 (5.564)***	20.127 (4.729)***

Statistics:	Chi^2:	163
	Prob > Chi^2:	0.0000
	Pseudo R^2:	0.6321
	No of Obs:	90

Note: Conservation Tillage Operation (1) is the comparison category.
Figures in parentheses are z-ratios;
*** denotes $P \leq 0.01$, ** denotes $0.01<P\leq0.05$, while * denotes $0.05<P\leq0.10$

Farmers' Challenges in Effective Soil Management Practices in Ekiti State

Table 3 presents the varimax-rotated challenging factors facing crop-based farmers in effective soil management practices in the area. Four factors were extracted based on the responses of the farmers. Only variables with factor loadings of 0.40 in absolute terms and above were used in naming the challenging factors. Variables that had factor loading of less than 0.40 in absolute terms and those that loaded in more than one factors were not used (Madukwe, 2004). The next step was to give each factor a denomination according to the set of variables or characteristics it was composed of. In this regards, the variables with factor loading of 0.40 and above were grouped into four major challenging factors namely: input factor, financial factor, institutional factor and environmental factor.

Under input factor, the specific challenging variables against farmers with their corresponding factor loading include: poor access to conservation information by farmers (0.483), high cost of farm inputs (0.570), poor access to and control of farm resources e.g. land by most of the farmers (0.520), inadequate farm labour to support (0.615) and high cost of available farm labour for effective soil management (0.440). The findings of this study agreed with that of Amusa, Enete and Okon (2011) who found that high cost of farm input and inadequate access to inputs constitute major challenges of farmers in Ekiti State. Under financial factor, the specific challenging variables against farmers with their corresponding factor loading include: illiteracy of the farmers (0.434), lack or low financial capacity of the farmers to invest in soil conservation practices (0.550), inadequate knowledge of some soil management (0.564) and insufficient knowledge of credit source to support soil conservation in the farm (-0.660).

Table 3: Varimax Rotated Challenging Factors Undermining Farmers Practice of Soil Management in the Study Area (N = 90)

S/N	Challenging Variables Against the Farmers	Components			
		Input Factor	Financial Factor	Institutional Factor	Environmental Factor
1	Illiteracy of the farmers	-0.273	**0.434**	0.381	-0.260
2	Lack of extension visits to the farmers.	0.366	-0.238	**0.402**	0.105
3	Poor access to conservation information by farmers.	**0.483**	0.040	-0.330	-0.207
4	Tedious nature of soil conservation practices.	-0.146	0.364	0.015	0.379
5	Lack or low financial capacity of the farmers to invest in soil management practices.	-0.290	**0.550**	0.345	0.032
6	Lack of access to supporting facilities	-0.332	0.118	**0.537**	0.253
7	**Poor knowledge of the importance of agronomic soil conservation by most farmers.	0.050	0.056	**0.415***	**-0.662***
8	High cost of farm inputs	**0.570**	0.270	0.154	0.337
9	Rough topography of the farm land	0.134	0.234	0.265	**0.661**
10	Inadequate knowledge of some soil conservation practices.	0.196	**0.564**	0.023	0.044
11	Poor access to and control of farm resources e.g. land by most of the farmers.	**-0.520**	-0.361	0.384	0.106
12	Low level of farming experience by most of the farmers in the area.	0.175	0.224	0.041	**0.462**
13	The nature of land tenure system in the area	0.050	0.383	**-0.551**	0.228
14	Inadequate farm labour to support soil conservation practices.	**0.615**	0.200	0.083	-0.099
15	**Continuous cultivation of the farm lands.	**0.440***	0.369	-0.015	**-0.475***
16	Porous nature of the soil in water holding capacity.	0.322	0.116	-0.301	0.348
17	Insufficient knowledge of credit source to support soil conservation in the farm.	0.101	**-0.660**	0.243	-0.080
18	High cost of available farm labour for effective soil conservation by farmers.	**0.440**	-0.233	-0.092	-0.111
19	Subsistence scale nature of crop production of most farmers in the area.	-0.090	0.219	0.315	0.390
20	Inadequate institutional support from government	0.397	-0.025	**0.685**	-0.174
21	Lack of collateral security required to secure loan for intensified agronomic soil conservation operations	0.054	0.214	0.336	0.360

Note: Factor loading of **0.40** is used at 10% overlapping variance.
Variables with factor loadings of less than **0.40** were not used.
**Variables that loaded in more than one factor were discarded
Source: **Field Survey, 2013.**

Enete (2003) reported that most financial institutions in developing countries do not usually lend to agriculture, not only because the farmers lack the basic collateral as a result of poverty, but also because the farming is considered very risky. The specific variables that loaded under institutional factor with their corresponding factor loading were: lack of extension visits to the farmers (0.402), lack of access to supporting facilities (0.537), the nature of land tenure system in the area (-0.551) and inadequate institutional support from government for intensified soil management (0.685). Inadequate extension contacts and supporting facilities are some of the institutional challenges facing farmers as Madukwe (1996) noted that ineffective transfer of agricultural technology through extension agents is a major problem facing agricultural development in Nigeria. Under environmental factor, the specific challenging variables undermining effective soil management among farmers with their corresponding factor loading were: rough topography of the farm land (0.661), and low level of farming experience by most of the farmers in the area (0.462). Blosser (2009) found that rough topography of the farmland is a major challenge of farmers in soil conservation practices.

CONCLUSION

The paper estimated the determinants of soil management options among crop-based farmers in Ekiti State, Nigeria. From the data analysed, deforestation and lumbering, continuous cropping, short fallow period, poor afforestation or tree planting practices of farmers, inadequacy of fertilizers for farmers use, weak institutional platform for enforcing soil management practices and incessant bush burning of forest covers are some of the identified causes of soil degradation in the study area. The socio-economic attributes of the farmers that significantly influenced the preference for soil management options include: gender of household head, years of education, income, farm size and extension visit. The challenging factors undermining effective soil management practices by crop-based farmers in the study area were farm inputs, finance, institutional challenge and environmental factor. The results suggest socio-economic capacity building of crop-based farmers in sustainable tillage operation, effective organic and inorganic manuring to sustain food production on the degrading and threatened soil in the state. In particular, credit facilities should be made available to the farmers in form of soft loans to enable them procure necessary farm inputs to cope with the challenges of managing soil fertility and productivity. Provision of required infrastructural facilities, education and institutional supports to the farmers should be made a priority by government for sustained food production through sustainable and environmental friendly soil conservation measures.

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