Effectiveness of organic soil fertility management practices among maize farmers: An implication for food security in Oriire Local Government area of Oyo state.

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ABSTRACT

This study was designed to determine the effectiveness of organic soil fertility management practices among maize farmers in 0riire local government area of Oyo state. Data were obtained from one hundred and twenty respondents in the study area. The sampled respondents were purposively selected and a well structured interview schedule was used to collect information. To achieve the main objective, the study identified and discussed the socio – economic characteristics of the maize farmers, identified the indices of soil fertility decline and also determined the benefits derived from the use of the management practices. Rank order correlation was used to determine the most effective practice used and the benefits derived from the introduced practices. Result of the findings revealed that majority of the respondents were in their active ages and married, also crop rotation and mixed cropping were found to be the most effective soil fertility practices used in the study area. Chi – square analysis shows that a significant relationship was found between age, sex, educational level, primary occupation, years of farming experience, farm size and the choice of soil fertility management practices. The major findings from this research work revealed that there is little or no influence of extension services on soil fertility management practices in the study area and respondents were expecting so many gaps to be filled by extension agents in this aspect of farming. As a result of this, more extension agents should be recruited to the study area. Also the extension agent should educate the farmers in area of their needs.

Keywords; soil, fertility, indices, effectiveness

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INTRODUCTION

The importance of soil fertility and plant nutrition to the health and survival of all cannot be overstated. As human populations continue to increase, human disturbance on the earth's ecosystem to produce food and fibre will place greater demand on soils to supply essential nutrients (Havlin et al 2006). Soil is a key factor in organic systems and in agriculture as a whole. A fertile soil is one that supplies sufficient nutrients to the crop to allow maximum growth and yield (Olabiyi *et al*, 2010). A soil can become infertile in 3 ways: (1) Physical, chemical or biological run-down causing a reduction in vigor. This can result from excessive product removal (depleting soil nutrients), reduction in plant growth, lowered organic cycling, increasing soil temperatures, leaching, compaction and surface crusting. (2) Reduction in mass and volume through erosion. This reduces the physical size of the soil ecosystem. (3) Accumulation of specific soil chemicals to levels that detrimentally affects plant growth. Such materials include: soluble salts (causing salinity); hydrogen ions (causing acidification); and, some chemicals from industrial, mining and agricultural activities (chemical contamination). Management of soil fertility is one of the major factors limiting sustainable agricultural production, and maintaining the adequate soil fertility level is a key prerequisite to sustain crop productivity and it poses a great challenge to farmers in Nigeria. Also, phosphorus deficiency has been found to be one of the major constraints to crop production in West Africa. Nigeria imports about 200,000 tonnes of phosphorus fertilizer annually to augment local production which could still not go round many of the farmers. However, limited financial resources in the country cannot sustain importation or establishment of more fertilizer plant, more so recent findings have shown that the excessive use of these minerals fertilizers due to lack of technical knowhow on the part of farmers could be detrimental to the resource base. Hence, d use of mineral fertility as a means of maintaining soil fertility is gradually fading away. Maize is a major cereal crop in west and central Africa, currently accounting for a little over 20% of domestic food production in Africa. Its importance has increased as it has replaced other staple food, particularly sorghum and millet (Smith *et al*, 1994), and it has also become a major source of cash for small holder farmers (Smith *et al*, 1997). Maize can be classified according to the structure of the grains and we have sweet corn, flint corn, popcorn, dent corn, soft or flour corn and pod corn. Maize is best adapted to well drain sandy loam to silt loam soils, stagnant water Area is extremely harmful to the crop therefore proper drainage is a must for the success. It will not do well on heavy clays and it can be grown in soils whose pH ranges from 5.5 to 7.5. Land preparation is either mechanically or manually which include parking and leveling followed by ploughing, harrowing and ridging (optional). Maize is either planted early (March 15 to April 30 in derived savanna and May to June in the northern savanna) though planting date depends on when rain becomes steady and late maize is planted between late July to August 15, manuring before sowing enhance good tilt and improve water holding capacity (Akanbi *et al.,* 1996). Maize is one of the most important food grains in the world. It is the highest yielding grain crop with multiple uses for

food and industrial purposes (Adepoju, 2006). Growth in maize utilization has been driven by the rapidly increasing demand for maize as livestock feed, industrial food and non food products. The demand for maize as livestock feed in Nigeria for the past two decades has been on the increase. Despite all the strategic importance of maize, there is inadequate supply of maize in commercial quantities that is needed to meet the requirements. This might be attributed to the fact that soil fertility is deteriorating at an alarming rate as Eilitta *et al.* 1998 confirmed that this is dire among poor small holder farmers who cannot afford to buy few chemicals to improve the agricultural production. It then becomes very essential to determine the effectiveness of soil fertility management practices among maize farmers in Oyo state. The study therefore identified and discussed the socio – economic characteristics of the maize farmers. The study further determined the indices of soil fertility decline and the various practices in use with their level of effectiveness Finally the study identified the specific benefits derived from using these practices and also determined the relationship between the socio – economic characteristics of farmers and their choice of the soil fertility management practices.

METHODOLOGY

The study was carried out in Oriire Local Government Area of Oyo State. TheLocal Government shares boundaries with Oke Ogun via old Oyo Empire which is in the south western part of Nigeria in Ogbomoso town Oyo State. Oriire LGA plays a prominent role in Agriculture because the area is located in the savanna vegetation in a low land rain forest zone for the cultivation of wide variety of crops such as Maize, Cassava, Yam, Cowpea, Pepper and Vegetables, Fruit Crops (Plantains, Pawpaw, Bananas, Pine- Apple). The permanent crops grown include Cashew, Mangoes, Tobacco and Citrus.

The study population is comprised of sampled maize farmers in Oriire Local Government of Oyo State. There are ten political wards in the study area. Simple random sampling technique was used in selecting twelve respondents from each ward. This gave a total sample size of one hundred and twenty farmers. Data were collected using a well structured interview schedule. The dependent variable is the effectiveness of organic soil fertility management practices in use by the respondents, while the independent variables are the socio- economic characteristics of the respondents. The descriptive statistics used include percentages, frequency counts, and mean, while chi square was used to determine the relationship between the variables.

RESULTS AND DISCUSSIONS

Socio-economic characteristics of the respondents

Table 1 revealed that most of the respondents (46.7%) were between the ages of 31 and50 years. The mean age of the farmers was calculated to be 42.5 years. This indicates that most of the maize farmers were middle aged and still active in agricultural production and within the economically active age

category. The mean household size was 5 as about 70% of the respondents had more than 4 persons under the same roof. This is rather contrary to the belief of large house hold size in the rural communities as a source of family lab our. The table also revealed that 83.3% of the respondents were male while only 16.7% of them were female. This implies that the males were more involved in planting of maize than the female. It was revealed that 71.7% were married, while only 17.5% were single and most of the respondents 75% had one form of formal education or the other which might have contributed positively to the adoption of improved technologies on maize production. This study further shows that 51.7% of the farmers cultivate between 1and 2 hectares of land. This indicates that the respondents in the study area are into small scale maize production and from the findings of the study, the entire respondent (100%) complained of non – functioning of extension service in the study area.

Table 1: Distribution of the Respondents (N= 120)

Age	**Frequency**	**Percentage**
31 – 50	56	46.7
51 – 70	26	21.7
71 – 90	25	20.8
< 90	13	10.8
Sex		
Female	20	16.7
Male	100	83.3
Marital status		
Single	21	17.5
Married	86	71.7
Divorced	13	10.8
Level of education		
Non – formal	30	25.0
Primary	21	17.5
Secondary	65	54.2
Adult	13	10.8
Tertiary	4	3.3
Pry occupation		
Farming	58	48.3
Technical	13	10.8
Civil Servant	17	14.2
Trading	32	26.7
Farm size (hectares)		
1-2		51.7
3-4	22	18.5
5-6	21	17.5
7-8	11	9.2
9-10	4	3.3
Sources of information		
Friends and co- farmers	52	43.3
Farmers' Co-operative	68	56.7
Extension agents	0	0.0
Household size		
1-5	80	66.7
6-10	25	20.8
11-15	15	12.5

Source: Field Survey, 2011.

Table 2: Distribution of Respondents by Indices of Soil Fertility Decline.

Sign	*Frequency	Percentage
Yellow leaves	72	60
Stunted growth	84	70
Red steak of maize	0	0
Poor cob yield	53	44.2

* Multiple responses
Source: Field Survey, 2011

Table 3: Distribution of Respondents to Benefit Derived

Benefit	Agreed (3)		Undecided (2)		Disagreed (1)		Total score	Ranking
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage		
Increased yield	114	95.0	4	3.3	2	1.7	352	3
Increased income	108	90.0	12	10.0	0	0	348	4
Better crop Quality	116	96.7	2	1.7	2	1.7	354	1
Healthier crop	114	95.0	6	5.0	0	0	354	1

Source: Field Survey, 2011.

Table 4: Distribution of Respondents by Effectiveness of the organic soil fertility management practices in use.

Practices	Very effective (3)		Rarely effective (2)		Not effective (1)		Total score	Ranking
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage		
Crop rotation	116	96.7	0	0	4	3.3	352	1
Mixed cropping	110	91.7	8	6.7	2	1.7	348	2
Mixed farming	0	0	0	0	120	100	120	5
Organic manure	58	48.3	34	28.3	28	23.3	270	4
Fertilizer	106	88.3	9	7.5	5	4.2	341	3
Mulching	0	0	0	0	120	100	120	5
Agro forestry	0	0	0	0	120	100	120	5

Source: Field Survey, 2011

Table 5: Chi – Square Analysis.

	Age	Sex	Educational level	Primary occupation	Extension agents' information	Years of farming experience	Farm size
Chi – Square	75.867	139.050	71.417	41.533	106.849	146.400	111.333
Degree of Freedom	51	2	4	3	3	36	9
Level of Significance	0.014	0.000	0.000	0.000	0.379	0.000	0.000

Source: Field Survey, 2011

Indices of Soil Fertility Decline

Findings on Table 2 below revealed the indices of soil fertility decline. Most (70% and 60%) of the farmers interviewed agreed that stunted growth and yellowing of leaves were the main indices of soil fertility decline they experienced on their various farms, followed by poor cob yield (40.2 per cent). This implies that stunted growth and yellowing of leaves were the major signs of soil fertility decline to the farmers in the study area which might have been as a result of Nitrogen and phosphorus depletion in the soil.

Benefit Derived From Introduced Practices.

The data presented in table 3 showed the specific benefits derived from the practices introduced. The benefits were grouped into four categories: increased yield, increased income, better crop quality and healthier crops. The ranking order of the benefits derived shows that better crop quality (354) and healthier crops (354) were the major benefits derived by the respondent, followed by increased yield (352) and increased income (348). This implies that the introduced practices had impacted positively on the production level of the respondent.

Organic Soil Fertility practices in use and their level of effectiveness

All the farmers interviewed agreed to the importance of maintaining soil fertility for maize production. Investigation into various practices showed that greater number of the farmers believed that crop rotation was the most effective method with a mean score of 352, followed by mixed cropping (348) and inorganic fertilizer application (341) and use of organic manure (270). The findings of the study revealed that the use of mixed farming; mulching and agro forestry was poor as they were revealed as not effective as shown in the table 4 below.

Test of the Hypothesis.

H01: There is no significant relationship between the socio – economic characteristics of farmers and choice of soil fertility management practices.

The result of chi – square analysis revealed that the effectiveness of organic soil fertility management practice of the maize farmers was influenced by the selected characteristics except extension agents' information to the farmers.

CONCLUSION

Based on the findings, it can be concluded that there was little or no influence of extension service activities on organic soil fertility improvement. Also crop rotation and mixed cropping were found to be the most effective soil fertility practices used in the study area. It was also concluded that respondents in the study area were small scale farmers who were limited due to inadequate financial support. Therefore more extension workers should be recruited to the study area to educate the farmers on organic soil fertility improvement.

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