Effect of Soil Management Investment on Cassava Production in Oyo State, Nigeria

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Abstract

This study examines the effect of soil management investment on cassava production in Ido Local Government Area of Oyo State (Nigeria) using cross-sectional data. Data were collected with the use of a structured questionnaire from eighty eight (88) respondents; four villages were randomly selected for the study. The data collected were analysed using descriptive, mean and multiple regression analyses. The results showed that 84.1% of the farmers were male while 15.9% were female, 45.4% were between the ages of 21 and 30 years, 60.2% of the farmers had 1-10 years of farming experience while 33.0% had tertiary education. Fertilizer and manure applications were the major soil management practices used by the respondents; 44.3% of the farmers invested between ₦11,000 and ₦20,000 on soil management during the farming season. The regression analyses revealed that farm size and cassava output were positively significant at 10% and 1% respectively while labour used was negatively signed and significant at 10% to the level of soil management investment. It was however, recommended that farmers should be more educated on the appropriate coping strategies for soil management. Hence, farmers should be encouraged by the Government by providing formal credit facilities with no or little interest rate to improve their soil management system in order to enhance productivity in the study area.

***Keywords*:** Soil Management, Investment, Descriptive, Regression, Oyo, Nigeria

Introduction

Agriculture in Nigeria is a major branch of economy providing employment for majority of the population. The sector is being transformed by commercialized at the small, medium and large scale enterprise level [1]. Major crop grown include beans, cashew nuts, cassava, cocoa beans, groundnut, kola nut, maize, plantain, rice, and yam [1]. To practices agriculture means to used natural resources to produce commodity which maintain life include food, fiber, forest product, horticulture crop and their related service [2]. Soil is the basis of farming, it delivers water and nutrient to crops, physically supports plant help control pest, determine where rainfall gives after it hit the earth, and protects the quality of drinking water and wild life habitat [3]. Soil is the foundation of terrestrial life. According to [4], soil management offers information to manage agriculture soil for optimum crop yield and at the same time maintain or improve the capacity of soil to provide essential ecosystem functions. The use of soil management practices help to deliver nutrient, water and gives plant structural support. It improves, maintain and rebuild the soil, especially soils that have been cultivated for a long period of time. The continuous cultivation of farmland especially cassava production on the same pieces of land without adequate form of management practices is likely to affect soil quality attribute and possibly cassava production in the long term [5]. A key to soil restoration is to maximize the losses of these soil components caused by leaching, runoff and erosion [6].

Small holder farmer have low or inadequate knowledge on soil management involving the conversion of the product ranging from traditional food to livestock feeds. Researcher and scientific consequently embarked upon various means traditional and scientific aimed at achieving and generating higher yield per unit area of land. This is through intensive cultivation which includes the use of non-environmentally friendly materials and substance in order to boost agricultural productivity [7]. The various development processes have not been received complimentary effort from the people because of the effect soil management investment and production process which is a function of many factors. The identification of this factor enables to suggest measure for the soil

management and production process system. It is for this reason that answer were provided for the following objectives which are to:

examine the socio-economic characteristic of the respondent in the study area

examine the soil management practices by the farmers

examine the coping strategies employed by the farmer in the study area

determine the effect of soil management investment on cassava production in the study area.

Methodology

Study area

The Study was carried out in Ido Local Government Area of Oyo State, Nigeria. This local Government Area has a land mass of 1,010,954 square kilometres with the 2006 population of 117,129 using a growth rate of 3.2% and population density of 116 people per square kilometre. Ido local government covers the area spanning, Apata, Ijokodo, Akufo and Apete. It shares boundaries with Oluyole, Ibarapa East, Akinyemi, and Ibadan North West Local Government in Ogun State. The council formerly has six wards, which had been increase to ten for easy exercise of franchise. Among the major town within the local government area are, Ijokodo, Ido, Oomi-Adio, Apata, Akufo, Apete, Bakatari, Ogunweede, Dada, Olowofela, Apooyin, Oderemi, Odetola, Erinwusi, Tade-Alagbara, Iku-Senla, Adesokun, Ilupeju among other. On the account of extension fertile soil, which is suitable for agriculture, the basic occupation of the people is farming.

Sampling Procedure

The population of this study constitutes the farmers that were engaged in small scale cassava production in Ido Local Government. Multistage sampling technique was employed in sample selected; four villages in Ido Local Government were purposely selected, because the villages are rural and one of the most populated in Oyo State. The villages chosen were, Ilupeju, Tade Alagbara, Bakatari and Adesokun, 26, 23, 24 and 15, respondents were randomly selected from each of the villages making a total number of 88 respondents used for this study. Data used in this study was

collected from four villages, in Ido local government area of Oyo state with the use of a well-structured questionnaire from 88 respondents in study area.

Data Analysis

Descriptive statistics such as frequencies and percentage distribution was used to achieve the first, second and third objective.

Multiple regression analysis was used to analyze the effect of soil management investment on cassava production.

Model specification

Implicit form of the regression model is specified as following:

Where,

Y = Amount invested on soil management (Naira)

X_1 = Age of farmers (in years)

X_2 = Education level (years of schooling)

X_3 = Household size (number)

X_4 = Access to credit

X_5 = Source of land

X_6 = Farm size (in hectare)

X_7 = Labour used (in man days)

X_8 = Organization

X_9 = Farm distance (km)

X_{10} = Years of experience (year)

X_{11} = Cassava output (tons)

e = Error term

b = Parameter estimated

Results and Discussion

Table1: Socio–economic characteristics of the respondent

Variable	Frequency=88	Percentage (%)
Gender		
Male	74	84.1
Female	14	15.9
Age (years)		
10-20	1	1.1
21 – 30	40	45.5
31 – 40	26	29.5
41 – 50	10	11.4
51 – 60	10	11.4
61and above	1	1.1
Marital status		
Single	34	38.6
Married	46	52.3
Divorced	8	9.1
Educational levels		
No formal education	14	15.9
Primary school	18	20.4
Secondary	20	22.7
ND/NCE	29	33.0
HND/B.sc/PhD	7	8.0
Household size		
1-5	35	39.8
6-10	38	43.2
11-15	15	17
Years of Experience (years)		
1 – 10	53	60.3
11 – 20	31	35.2
21 – 30	3	3.4
31-40	0	0
41 and above	1	1.1
Access to Credit		
Do not have	39	44.3
Have access	49	55.6
Primary occupation		
Farmer	36	40.9
Trader	38	43.2
Civil servant	5	5.7
Other	9	10.2
Source of land		
Rented	22	25.0
Leased	17	19.3
Purchased	23	26.1
Inherited	25	28.4
Government	1	1.1

Socio–economic characteristics of the respondent continued

Variable	Frequency=88	Percentage (%)
Type of farming system		
Commercial	56	63.6
Subsistence	32	36.4
Farm size (hectare)		
1-5	84	95.4
6-10	4	4.6
Labour used		
Family labour	11	12.5
Hire labour	77	87.5
Cassava output (tons)		
1-10	38	43.2
11-20	32	36.4
21-30	10	11.4
31-40	5	5.7
41 above	3	3.3
Farm Distance (km)		
1-10	68	77.3
11-20	20	22.7

Source: Field survey, 2017.

Table1Shows the socio economic characteristic of the respondents, it revealed that 84.1% were male while 15.9% were female. This show that cassava farming was dominated by male farmer, this could be due to the nature of the work while female involve in other activities. 45.4% of the respondent was between the ages of 21-30 years while 29.5%are between the ages of 31-40 years. This implies that the farmer in the study area falls within the active age of farming system. The table also revealed that majority of the farmer in the study area were married with a percentage of 52.3%, while (38.6%) were single, this implies that the farmers could have a larger number of family which may be useful for farming activities. It also reveals that 15.9% of the cassava farmers had no formal education, 20.5% had primary school education, 22.7% had secondary school education (SSCE), 33% had National Diploma (ND), while 8% had tertiary education (HND/Bsc). The implication of this is that majority of the farmers are educated and this is likely to make them respond to the new innovation, and accept soil management practices. The table further revealed that 60.3% the respondents had farming experience between 1-10 years, 35.2% had between 11-20 years farming experience, while 1.1% had above 40 years of farming experience. This implies that majority had a substantial number

of farming experience which could embrace the adoption and technicality of investing on soil management practices in the study. 39.8% of the farmers had household size between 1-5 people and 43.2% had between 6 and 10 while 17% had between 11-15 household members, which may be use as family labour, this implies that most of the respondents have between 6-10 household sizes at the time the research was conducted. This might be helpful as household labour and thereby reducing the cost incurred on payment of labour. 44.3% had no access to credit facilities while 49 respondents 55.7% had access to credit facilities. The table also show that 63.6% of the respondent engaged in commercial farming while 36.4% in subsistence farming. The result also shows that 95.4% of the farmers had farm size between 1-5 hectares, while 4.5% of the farmers had farm size between 6-10 hectares of land for cultivation of cassava. This implies that majority of respondent that attended the questionnaire at the time of the study only had a farm size of the range 1-5 hectares of land for cultivation of cassava 12.5% of the responded used family labour while 87.5% used hire labour 43.2 of the respondents have yield between 1-10 in the study area.

Table2: Soil management practiced by the farmers

Farm Mgt practices	Frequency	Percentage (%)
Fertilizer application	44	50.0
Mulching	14	15.9
Herbicide application	16	18.2
Manure application	46	52.3
Bush fallow	5	5.7
Crop rotation	28	31.8

Source: Field survey, 2017. (Multiple responses)

Table 2 revealed different types of soil management practiced, which was captured in multiple response a total of six soil management methods practiced by cassava farmers were identified in the study area, these include fertilizer application, mulching, herbicide application, manure application, bush fallowing and crop rotation. A total of 46 respondents representing (52.3%) practiced manure application. This shows that manure is the most common soil management practiced in the study area. This probably might not be unconnected with the fact that manure improves the soil fertility

over time. Fertilizer application is the next to manure with about 44 respondents representing (50%) of farmers practicing it. While 5 respondents representing (5.7%) of bush fallowing which was the least practiced soil management method was the use of inorganic fertilizer with (50%) of the farmers practicing it. This might probably be as a result of expensive nature of organic fertility in the study area.

Table 3 Respondent coping strategies employed

Variable	Frequency=88	Percentage (%)
Changing planting date	22	25
Post harvesting	13	14.8
Changing farm land	32	36.3
Adoption of new variety	21	23.9

Source: Field survey, 2017

Table 3 revealed that 36.3% of the respondent adopted changing farmland as their major coping strategy for soil management, 25% adopted change in planting date, and 23.9 % also adopted usage of new variety while 14.8% adopted post harvesting. This implies that most of the respondents employed changing farmland and change in planting date as their major coping strategies in adjusting to the effect of soil management investment on cassava production in the study area.

Table 4: Amount Spent on Soil Management

Variable	Frequency	Percentage (%)
Amount Invested (₦)		
1000 – 10,000	19	21.3
11,000 – 20,000	40	44.3
21,000 – 30,000	20	24.3
31 and Above	9	10.1
Total	**88**	**100.0**
Amount realised from sales of cassava per/hectare		
4000 - 10,000	18	20.5
10,500 – 20,000	34	38.6
21,000 – 30,000	14	15.9
31,000 – 40, 000	08	9.1
41, 000 and above	14	15.9
Total	**88**	**100.0**

Source: Field survey, 2017

Table 4 showed that 21.3% of the respondent invested between ₦1, 000 and ₦10, 000, 44.3% invested between ₦11, 000 and ₦20, 000 while 10.1% of the respondent invested ₦31, 000 and above. This indicated that majority of the farmer invested substantial amount on soil management in order to conserve the soil and improve production. The table also shows the amount realized from the sales of cassava per hectare, 38.6% of the respondent realized between ₦10, 500 and ₦20, 000 while 9.1% of the respondent realized between ₦31, 000 and ₦40, 000. This shows that cassava farmers could realized between ₦10, 000 and above depending on the amount of cassava sold per hectares and also considering good soil management practices in the study.

Table 5 Regression result on Effect of soil management investment on cassava production

Variable	Cobb-Douglas	Exponential	Semi-log	Linear
(Constant	4.034	3.847	3367.677	5473.93
	(9.153)	(19.119)	(0.377)	(0.278)
X_1 Age	-0.196	-0.002	-17.203	-4624.065
	(-0.712)	(-0.462)	(-0.112)	(-0.376)
X_2 Educational Level	-0.084	-0.014	-317.061	-1401.014
	(-0.590)	(-0.536)	(-0.272)	(-0.219)
X_3 Household size	0.215	0.008	332.652	10112.974
	(1.444)	(0.889)	(0.791)	(1.516)
X_4 Credit	0.024	-0.023	403.879	-401.419
	(0.363)	(-0.349)	(0.142)	(-0.136)
X_5 Source of Land	-0.007	0.006	159.317	2687.915
	(-0.061)	(0.445)	(0.258)	(0.514)
X_6 Farm size	0.203*	0.023	1464.079*	10836.943**
	(1.672)	(1.268)	(1.780)	(1.996)
X_7 Labour used	-0.163*	0.171**	4856.893	-5072.824
	(-1.744)	(1.924)	(1.217)	(-1.212)
X_8 Organization	-0.090	0.071	2564.964	-3231.476
	(-1.332)	(1.091)	(0.890)	(-1.075)
X_9 Farm distance	0.118	0.009	230.696	3166.854
	(1.180)	(1.391)	(0.761)	(0.710)
X_{10} Years of exp	-0.028	-0.002	-152.187	-3978.395
	(-0.221)	(-0.332)	(-0.590)	(-0.693)
X_{11}Cassava Output	0.262***	0.008***	406.438***	12615.120***
	(2.789)	(2.986)	(3.295)	(3.005)
R^2	0.233	0.240	0.227	0.224

Author Computation 2017. Note (*) =10%, (**) =5% and (***) =1% level of significant.

Table 5, regression table showed the result in explicit equation considered with respect to their explanatory variables, the R^2 values and the significant levels of coefficient. The double-log model was adopted for the research because it had relatively strongest explanatory variables than the other models. The result therefore, revealed that farm size and cassava output were positively significant at 10% and 1% respectively; this shows that farm size and cassava output has a positive relationship to the soil management investment. This indicate that as the farmer increase or expand their farmland, the more the level of amount invested in soil management practices. Also, as the output of the farmer increases, there will be more capital to be invested on the farmland also to adopt soil management

practices, while labour used was negatively signed though significant at 10% level. This implies that the more labour used increased, the lesser the amount invested on soil management investment practices by the farmer. This is in line with the work of [7].

Conclusion

It was therefore concluded that the farming system was labour intensive, farmers invest heavily on soil management which may not encourage farmers' savings ability but depends on other credit facility, and majority of them depends on fertilizer application as a means of sustaining their farmland. However soil investment enhanced farmers output because the better the farmland management investment is adopted and farm size is expanded the better the farmers output. Also the major coping strategies employed by the farmers are changing farmland and planting date and crop rotation in the study area.

It was however, recommended that farmers be assisted by the policy maker by the provision of agricultural credit and farm machineries at a subsidise rate which could solve the problem of labour intensity and enhance farmers productivity

References

1 Olomola, A.S (2007): "strategies for managing the opportunity and challenges of the current Agricultural commodity Booms in SSA". Economics' Research consortium (AERC), Nairobi, Kenya.

2 Larsen, A., Coyne, D.L., and Talwana, L.A.H., (2004): "Reaction of cassava cultivars to root-knot nematode (Meloidogyne spp.) in pot experiments and farmer-managed field trials in Uganda". *International Journal of Nematology*. 10: 153–158.

3 Griffing D.O., Hog, U.Y. and Hominy, E.O (2004): Soul Food from Africa to America, (Columbia University Press 2004), chapters 1-2.

4 Hepperly, T., Kagoda, F., Wambugu, E. and Ragama, P. (2005): "Response of cassava to

nematicide application and plant-parasitic nematode infection in East Africa, with emphasis on root-knot nematode". *International Journal of Pest Management* 52: 215–23. doi: 10.1080/09670870600722959.

5 Ngome AF, Amougou MFC, Tata PI, Ndindeng SA, Mfopou MYC, Mapiemfu-Lamare D, Njeudeng, TS (2013). Effects of Cassava Cultivation on Soil Quality Indicators in the Humid Forest Zone of Cameroon. *Greener Journal of Agricultural Sciences*, 3(6): 451-457

6 EPA, (2015): "Nematode pests of cassava". *African Crop Science Journal*. 2 (4): 355–359.

7 Oladeebo, J.O (2013): "Effect of soil conservation investment on efficiency of cassava production in Oyo State of Nigeria*.".3, No. Journal of Biology, Agriculture and Healthcare ISSN 2222-3208 (Paper) ISSN-093X (Online) Vol 13, 2013.*