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PERCEIVED CONSTRAINTS TO USE OF INDIGENOUS SOIL MANAGEMENT PRACTICES AMONG YAM PRODUCERS IN NASARAWA STATE, NIGERIA

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ABSTRACT

The study identified various constraints to the use of indigenous soil management practices among yam producers in Nasarawa State of Nigeria. This is with the view to describe the socio-economic characteristic of the farmers, determine how famers identify suitable soil for yam production and identify constraints to the use of indigenous soil management practices. A purposive sampling technique was used to collect data from 288 yam farmers. Descriptive statistics and likert scale rating were used for the analysis. The socio-economic characteristics of the respondents such as age were found that 33.7% of the respondents are still within their active age and most (92.0%) of the respondents were male and 88.2% are married. Majority (72.2 %) of them attended one form of education or the other. The challenges encountered in using indigenous soil management practices were land tenure system and transportation problem. It was recommended that extension workers and other relevant organizations should provide training for farmers on useful interventions that will solve the identified challenges for sustainable agricultural development. Also, in order to increase productivity, relevant stakeholders should device means of providing support programmes for indigenous farming practices in the yam sector, this will enhance their efficiency level as those grown using indigenous methods have a great potential for export and increased foreign earning since the world is turning to organically grown crops.

Keywords: Soil, Constraints, Management practices, Yam producers, Indigenous, Nasarawa State

INTRODUCTION

Indigenous knowledge can be conceptualized according to Atte (1992) as a knowledge that an indigenous community accumulates over generations of living in a particular environment. This definition encompasses all forms of knowledge, technologies, know-how skills, practices and belief that enable the community to achieve stable livelihoods in their environment.

Yam (*Dioscorea species*) is an important crop to Nigerian agriculture and recorded among the oldest food crops and ranks second after cassava in the supply of carbohydrates in West Africa (Nweke et al., 1991). It also forms an important food source in other tropical countries including East Africa, the Caribbean, South America, India and South East Asia. Over 90 percent of the world yam is derived from west Africa especially the five countries of the yam zone, namely Nigeria, Benin republic, Togo, Ivory coast and Cameroon (Hahn et al.,1987). In the forest and savannah regions of Nigeria, Yam represents

about 20 percent of the daily calorie intake and constitutes a major cash crop and staple food for the majority of the people (Iwueke et al., 1983).

The greatest threat to sustaining agricultural development in Nigerian farming communities is the declining productivity of soil caused by loss of soil fertility and destruction of natural soil structure due to wrong adoption and use of modern technology such as heavy farm machines for managing soils. The spectacular emergence of the problem of soil erosion in nearly all parts of Nigeria is an attestation to the inappropriate land use practices in many communities (FMAWRD, 1987).

Extension services to yam farmers essentially involve the introduction of recommended practices emanating from experts at research stations and universities. This approach invariably ignores the expertise and indigenous knowledge base of farmers which have been proven to account for steady increase in production and found to be economically viable and ecologically sound. However, the indigenous management practices for managing soil in yam production have a lot of constraints that affects the production of this important crop to Nigerian agriculture.

In Nasarawa state, (NADP, 2005) showed that both the area under cultivation and total yam output were declining. This situation could intricately be linked with the constraints of using indigenous soil management practices widely practiced by farmers to conserve soil for yam production in the area.

This study therefore sought to ascertain the constraints as perceived by farmers in the study area. specifically, the study objectives were to: describe the socioeconomic characteristics of yam farmers in the study area; determine how traditional yam farmers identify suitable soils for yam production in the study area; and identify the major constraints to the use of indigenous soil management practices of yam production as perceived by farmers in the study area.

METHODOLOGY

Study Area

The research was conducted in Nasarawa State of Nigeria. The State is located between latitudes 7^{o} and 9^{o} North of the equator and longitude 7^{o} and 10^{o} East. It is a multi-ethnic state with major ethnic groups such as Alago, Eggon, Mada, Hausa-Fulani, Gbagyi, Ebira, Migili, Afo, Gwandara, Agatu, Rindre, Bassa, Nyankpa and Tivs. The State has a population of about 1,863,274 and it is made of 945,556 males and 917,719 females (NPC, 2006). Farming is the major occupation of majority of the people who reside mostly in rural areas and the major crops suitable to the ecological conditions and produced in large quantities are: cassava, yam, sesame, melon, rice, maize, sorghum, soybean, cowpea, ginger, sugar cane, cashew, mango, palm kernel and vegetables. The State has 13 Local Government Areas (LGAs) and is divided into three Agricultural Zones by the Nasarawa Agricultural Development Project (NADP). They are the Southern Agricultural Zone which is made up of Lafia, Doma, Keana, Awe and Obi Local Government Areas (LGA_S); The Central Agricultural Zone which comprises Nasarawa Eggon, Wamba, Akwanga and Kokona LGA_S and the Western Agricultural Zone which comprises Keffi, Karu, Nasarawa and Toto LGA_S. It shares boundaries with Benue State to the South, Kogi state to the west, the Federal Capital Territory (FCT) Abuja to the north-west, Kaduna and Plateau States to the north-east, and Taraba State to the south-east (NSG,2008)

The study area has a land area of 27,137 km^2. The vegetation is predominantly Guinea Savannah. It has a rainfall of about 131,073mm per annum. The temperature of the area ranges from 25^o C to 36^{o}C (NSG, 2008). Fishing, trading, handcrafts and other artisan services provide sources of livelihood to some of the inhabitants.

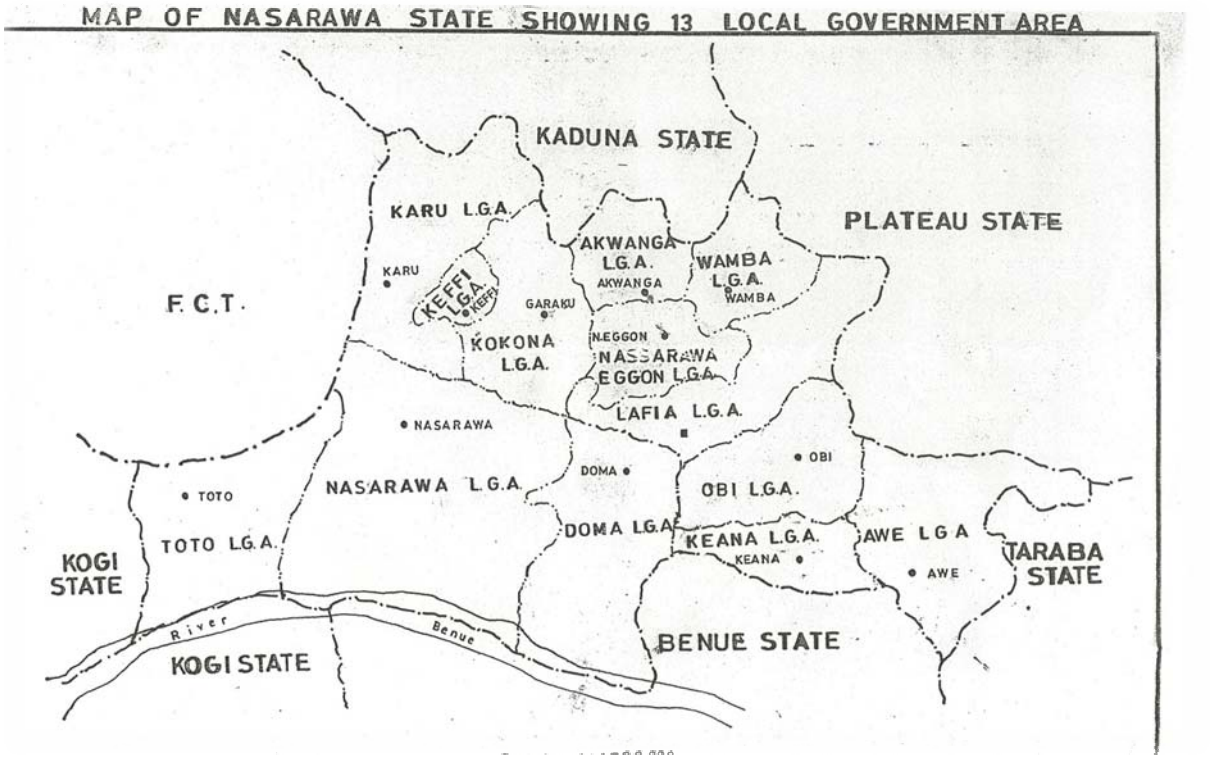

Figure 1

Sampling Technique

The population for this study consisted of all the yam farmers in Nasarawa State. A sample size of 288 respondents was selected from the population using a multistage sampling technique. In the first stage, 2 Local Government Areas were randomly selected from each of the 3 agricultural zones in the state to give a total of 6 LGAs. Secondly, three communities were purposively selected from each of the 6 LGA$_S$ sampled to give a total of 18 communities. The reason for purposive selection is because majority of farmers in the communities were yam producers. Finally, 10% of the population of yam farmers for each community was randomly selected to give a total of 288 yam farmers for the study.

Data Collection

Primary data for this study were collected using a well structured questionnaire and interview schedule with the help of volunteer extension staff of the NADP from each of the agricultural zones.

Reliability

Test and re-test method was used to test the reliability of the research instrument. It was computed by calculating the correlation coefficients between two distributions of test scores obtained at two different times on the same respondents. The instrument was administered to 15 respondents drawn from two communities in Akwanga Local Government Area viz: Gwanje and Bohar at intervals of 2 weeks. Product-moment correlation coefficients (r) of 0.592, 0.842, 0.718, were respectively obtained for sections A, B and C of the instrument. The mean of 0.848 indicated high reliability.

Statistical Tools for Data Analysis

The data for this study were analyzed using descriptive statistics. The socioeconomic characteristics of the respondents and indicators used by farmers to identify suitable soil for yam production in the study area were analyzed using descriptive statistics whereas a 5-point Likert scale rating was used to identify the challenges of using indigenous soil management practices of yam production and the perception of their seriousness by farmers. The options were: 5= very serious, 4=serious, 3= no effect, 2= not serious and 1= not very serious. Analysis of the 5-point Likert scale rating was computed using the following formula:

i. $X_{lsp} = \frac{\sum (LSP)}{Nlsp}$

ii. $X_{ws} = \frac{\sum (F \times LSP)}{188}$

Where:

X_{lsp}= Mean of likert scale points.

X_{ws}= Mean of weighted score.

LSP= Likert scale points (1, 2, 3, 4 and 5).

$Nlsp$= Number of likert scale points (5)

Decision rules

If $X_{ws} < X_{lsp}$: The constraint is not considered serious to the use of indigenous soil management practices;

If $X_{ws} = X_{lsp}$: the constraint has no effect on the farmers' use of indigenous soil management practices;

If $X_{ws} > X_{lsp}$: This is considered by farmers to be a serious constraint to the use of indigenous soil management practices.

RESULTS AND DISCUSSION

Socioeconomic Characteristics of the Respondents

The results in Table 1 show that 33.7% of the respondents were within the age range of 31-40 years followed by 41-50 years. These results agree with Onubougu and Nnadozie (2005) who reported that the age bracket of 31-40 years is an active age bracket in agriculture.

Table 1 also shows that most (92%) of the farmers were male whereas 8.0% were female. This implies that yam production in the state is dominated by male farmers. The male gender dominance may be due to the fact that female are mostly involved in domestic work and do not always have equal means of production like their male counterparts in the study area. Results in Table 1 also showed that majority (88.2%) of the respondents were married whereas 11.8 percent were single.

Table 1 show that 30.2% of the respondents had primary education whereas 27.4 percent did not go through formal education and only about 26.4 percent and 16 percent had secondary and tertiary education respectively. This implies that most of the respondents were not well educated. Table 1 also shows that 41.7 percent of the respondents had less than 20 years farming experience whereas 68 percent and 28 percent of yam farmers in the area operated on less than 5 and between 5-8 hectares respectively. These results disagree with the findings of Aderinola and Akinrinola (2005) that carried out a similar study and reported that majority of yam farmers in Ondo state operated on less than 2 hectares only. This variation may be due to the fact that yam farming is the major occupation of majority of farmers in Nasarawa State compared to Ondo State farmers who took yam production as a supplement to their main occupation probably to produce for consumption and sell the few remaining for income generation.

Table 1 show that 31.9 percent of the respondents earned N200, 000 - N300, 000 per annum whereas those with higher annual income level (above N400000) were 6.8%. These results imply that an average farmer in the area earned N16, 000 - N25, 000 per month. This is about the same amount with the federal minimum wage of N18, 000 which is being agitated that is too small to sustain an average Nigerian family. Farmers, therefore, need increase in their income level if they must sustain the livelihood of their families.

Identification of Suitable Soil for Yam Production by Farmers in the Study Area

The respondents were asked to state the factors that indicated suitability of a site for yam production. Table 2 shows that all the respondents agreed that the presence of earthworm casts and green vegetation in a field is indicative of fertility and suitability of soil for yam production. Presence of dark loamy soil (99.7%) and Soil texture (45.8%) were also considered as good indicators whereas only 34.0 percent of the respondents considered fallow land as being a site selection indicator. These results confirmed that dark colored soils indicate the presence of organic matter. Some organic matter play the crucial role of helping to maintain an active soil microbial population that can promote mineralization and pesticide decomposition, minimize the development of pest organisms, and promote the absorption of nutrients by plants. These effects of soil organic matter imply that the level of organic matter in the soil may be taken as an indicator of the sustainability of a soil

management system (Greenland, 1994). These results also agree with the findings of Naswem (2003) who reported that earthworm excrements and luxuriant grasses indicated that a land will give a good harvest of yam among the Tiv farmers in Katsina-Ala local government area of Benue state, Nigeria. Phillips and Titilola (1985) observed that loose, well drained, sandy loamy soil with a gentle slope were the most preferred soil for yam production as they give maximum tuber elongation and fattening.

According to Uguru (1981) the activity of the earthworm is beneficial to the soil. It burrows into the soil by eating or squeezing its way through soil particles. The process of earthworm cast formation subjects the soil organic matter and soil minerals to the effects of various enzymes and grinding action within the worm. This digestive enzymes help in breaking down the organic matter, facilitating the release of nutrient contents to the plants.

In the night, some earthworms come out to the surface and drag fallen leaves into the soil. This keeps the soil loose and well aerated, serving as channels for water drainage and growth of plant roots. The local farmer may not understand the scientific principle at work, but comes to possess knowledge about the working of his environment through years of observation, practice and experimentation.

Challenges of Using Indigenous Soil Management Practices in the Study Area

The constraints to the use of indigenous soil management practices of yam production and the degree of their seriousness as perceived by the respondents is shown in table 3. The means of weighted scores (X_{ws}) for land ownership, transportation problem and the tedious nature of using indigenous soil management practices were 3.4, 4.1, and 4.3 respectively whereas lack of organic manure and lack of mulching materials had weighted score means (X_{ws}) of 2.9 and 3.0 respectively. From the results, each of the X_{ws} for transportation problem, land ownership and the tedious nature of using indigenous soil management practices are greater than the mean of likert scale points ($X_{lsp} = 3.0$). These results imply that transportation problem, land ownership and the tedious nature of using indigenous soil management practices are considered by the respondents to be serious challenges encountered in using those management practices.

The results in table 3 also show that lack of organic manure and lack of mulching materials had a weighted score means of 2.9 and 3.0 respectively. Compared to the mean of likert scale points ($X_{lsp} = 3.0$), these results imply that lack of organic manure was not a serious constraint whereas lack of mulching materials had no effect as a constraint to the use of indigenous soil management practices by the respondents in the study area. The study further showed that most farmers relied on the expensive commercial means of transportation to move materials and people to and fro the farms due to lack of access to private means of transportation. Lack of organic manure was not a serious constraint, this may be due to its abundance as the presence of Fulani herdsmen were obvious all over study area.

CONCLUSION AND RECOMMENDATIONS

The study has shown that yam farmers in Nasarawa state use of indigenous soil management practices, which have positively affected the production of yam and create opportunity for sustaining a growing population and rural community develpment in the area. From the study, the factors determining a suitable site for yam production in the study area include presence of

earthworm casts, soil texture, fallow land, presence of green vegetation and dark colored soils. The difficulty of using indigenous soil management practices, land ownership (tenure system), and transportation are the major challenges encountered by the respondents in using indigenous soil management practices. In view of the findings of this study, the following recommendations are made:

1. Farmers in this study were found to be adults with low educational qualifications. Therefore, government and non-governmental organizations should design effective adult literacy programmes and policies in the area which will encourage farmers to improve on their educational levels. This will enable them understand the scientific principle at work in their environment and stimulate them to improve on the indigenous knowledge of soil management they leant through years of observation, practice and experimentation
2. Constraints to the use of indigenous soil management practices identified in this study should be addressed by the government through subsidizing the cost of transportation, providing funds and designing programmes to enable the farmers either individually or cooperatively own their means of transportation as this was found to be a serious bottleneck. This will encourage farmers to improve their indigenous knowledge skills and boost production for sustainable development.
3. To sustain and increase the productivity of agriculture in the country, relevant stakeholders should device means of providing support programmes for indigenous farming practices in the yam sector, this will enhance their efficiency level as those grown using indigenous methods have a great potential for export and increased foreign earning since the world is turning to organically grown crops.

TABLE 1: DISTRIBUTION OF RESPONDENTS ACCORDING TO THEIR SOCIOECONOMIC CHARACTERISTICS (N=288)

Characteristics	Frequency	Percentage
Age		
20-30	27	9.4
31-40	97	33.7
41-50	91	31.6
>50	73	25.3
Sex		
Female	23	8.0
Male	265	92.0
Marital status		
Single	34	11.8
Married	254	88.2
Educational level		
Non formal	79	27.4
Primary	87	30.2
Secondary	76	26.4
Tertiary	46	16
Farm size		
<5	192	68.1
5-8	82	28.5
9-12	5	2.2
>12	5	1.2
Farm experience		
<20	120	41.7
20-30	79	27.4
31-40	55	19.1
>40	34	11.8
Annual income(N)		
<100000	14	4.9
100000-3000000	69	24.0
200001-400000	92	31.9
300001-400000	48	16.7
>400000	65	22.5

Source: Field survey, 2011

TABLE 2: INDICATORS OF SUITABLE SOIL FOR YAM PRODUCTION (N=288)

Indicators	*Frequency	Percentage
Presence if earthworm casts	288	100
Soil texture	137	45.8
Dark soil	287	99.7
Fallow land	211	34.0
Green vegetation	288	100

Source: Field survey, 2011

***Multiple responses

TABLE 3: CHALLENGES ENCOUNTERED IN USING INDIGENOUS SOIL MANAGEMENT PRACTICES (X_{lsp}= 3.0)

Constraints	1	2	3	4	5	X_{ws}
Lack of organic manure	45	77	39	98	29	2.9^{NS}
Land ownership	19	45	78	108	38	3.4*
Transportation problem	9	12	25	143	99	4.1*
Lack of mulching materials	38	71	64	87	28	3.0^{NE}
Tedious	4	13	9	123	139	4.3*

[1]Very serious, [2]Serious, [3]No effect, [4]Not serious, [5]Not very serious

[NS] Not a serious constraint to the use of indigenous soil management practices.

NE No effect

* This is considered by farmers to be a serious constraint to the use of the use of indigenous soil management practices.

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