

Assessment of Fertilizer Management Practices among Yam Farmers and Consumers Perception on the Quality of Yam Grown with Fertilizers

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Abstract: *Yam (Dioscorea spp) is one of the staple crops grown in southern Nigeria that could be put into various uses to reduce food insecurity in the country. A field survey was carried out to assess fertilizers management in increasing yam production and buyers perception on the quality of yam grown with the fertilizers in Atakumosa Local Government Area of Osun State. Six villages and 20 farmers were randomly selected from each village to make a total sum of 120 respondents. Structured questionnaire and oral interview were used. Likert square was used to assess the buyers perception on yam quality grown with the fertilizer. In the study area, 100% of the respondents applied mineral fertilizers to supplement soil nutrients. Out of the 120 yam farmers, 40, 32, 16 and 12 farmers used broadcasting, ring, row and spot methods of fertilizers application respectively. In the sampled area, no respondent was aware of organomineral fertilizer. 100% of the respondents preferred yam grown without fertilizer to yam grown with fertilizer in term of taste, storability, poundability and colour. The buyer perception about the quality of yam grown with mineral fertilizer may hinder mass yam production. Educating the populace on proper fertilizer management in increasing yam production through Agricultural and Home management Extension Services is imperative. Government should continue to encourage farmers by making fertilizers available at subsidized rate.*

Key word: *pounded yam, yam storage, colour, cropping system, mineral fertilizer, organic fertilizer and organomineral fertilizer*

I. Introduction

The various ways of maintaining soil fertility for crop improvement and yield include fertilizers application, cover cropping, mulching, shifting cultivation, bush fallowing, crop rotation. Among these various ways of soil fertility maintenance, application of fertilizer as external sources of nutrient for crop production is more rampant among arable farmers than the other sources.

Yam is one of the commonest arable crops grown in southern and middle belt of Nigeria. Nigeria is one of the most producers of yam in the world. Yam can be roasted and eat with garden egg, egg, soup and even ordinary palm oil or vegetable oil. Yam could be made into porridge. It could be pounded and eaten with any type of soup. Pounded yam is a delicious food cherished by both the young and old people in Yoruba land in southwester Nigeria. Yam is a major source of carbohydrate.

Many farmers apply fertilizers such as N:P:K in various formulation, urea, calcium ammonium nitrate (CAN), organic fertilizers or manures and organomineral fertilizer. Makinde, (2007) emphasizes that the vegetable fertilized with organic manure tastes better, has longer shelf life and more storability than the crop grown with mineral fertilizers. Also, among organic, mineral and organomineral fertilizers, there has not been any known research that shows yam consumers perception on quality of yam in Atakumosa East Local Government Area of Osun State of Nigeria. Hence, the objectives of these studies were to assess (i) type of fertilizer commonly used by farmers to increase yam production and farmers perception about its nutritive value.

According to Adeleye (2002), a nation that cannot feed itself is not justified to exist as a nation. Food security is very vital in human survival. It is not only producing food that can feed the nation but also production of food that can be stored for future consumption and also serves as source of foreign exchange. The human population is on the increase day in day out, but, there is shortage of food to feed the teeming population. For example, the recent population census conducted in Nigeria in 2006 put Nigeria population at 140million (Federal Republic of Nigeria, 2007). The increase in human population has resulted into reduction in available land for crop production. Many industries, schools, hospitals, and other social activities have been competing with the available land for crop production leading to extinction of shifting cultivation and in some case bush fallowing.

The small available land for crop production in Nigeria has led to soil impoverishment and consequently resulted in low crop yields. Efforts have been made towards increasing crop yield using the

available land, hence, the use of various forms of fertilizer. There has not been any known research to assess the impact of these fertilizers on the growth and yield of yam and the perception of the consumers on the quality of yams grown with mineral fertilizers. The objectives of this research were to assess fertilizer management practices among yam farmers and consumers perception on the quality of yam grown with fertilizers in Atakumosa local Government area of Osun State southwestern Nigeria.

II. Materials and Method

The research was conducted in Atakumosa East Local Government area of Osun State located in Southwestern Nigeria. Most of the inhabitants are agrarian. Common to southwestern Nigeria, the farmers in this area grow yam, maize, cassava, oil palm and cocoa.

III. Sampling Procedure

A total of 120 farmers were randomly selected from six randomly selected villages in Atakumosa East Local Government of Osun State Nigeria. The villages selected comprised Abasoosi, Olorunsogo, Otunrarebi, Olowu, Erunburo and Ajobamidele. An interview designed to measure relevant indicators was used. Ballot paper was used to select the villages used for the research. The questionnaire was divided into two sections (A and B). The farmers, who grow yam, were allowed to fill section A, while the yam consumers especially yam sellers were allowed to fill section B of the questionnaire. The literate farmers were allowed to fill the questionnaire while the less privileged respondents were assisted by the researcher to fill the questionnaire. The Researcher and his assistant conducted both oral and written interview.

IV. Statistical Analysis

Table and percentages were used to analyze the data collected from the field.

V. Result and Discussion

The data obtained from the field showed that 84 out of 120 respondents were male while the remaining 36 respondents were female. The higher number of male to female who participated in yam production could be as a result of cumbersome nature of yam production which some women might not be capable of doing.

In southwestern Nigeria culture, it is known that women in villages mostly participate in retail business. Most women in these villages might have participated in retail businesses as well as weeding the farms already cultivated by their husbands. Culturally, women are allowed to plant pepper, melon and tomatoes in the yam plots cultivated by their husbands. This might also be the reason why male participated more than women in yam production in the study area.

Table 1 below shows the distribution of the respondents according to their ages. It could be deduced from the table that most of the respondents' age falls within the working class. Even below age 20, 10 % engaged in yam production, and only 6.67 % who cultivated yam were above 50 years of age. This research is in disagreement with the notion that old people participate in farming than the young and energetic people in Nigeria. Government might have provided favourable condition for farming in Atakumosa East Local Government. Another reason for more youth participating in yam production might be as a result of the respondents' low education. The highest numbers of those who have no education or primary education were 64 out of 120 respondents. Lack of job as a result of no certificate might have forced these categories of respondents into farming because no certificate is required for farming in Nigeria. The young people take after their parents. They acquire informal education in farming from their parents. The very low population of the aged people who engaged in yam production (Table 1) shows that yam production in Atakumosa Local Government Area is not likely to go into extinction in the nearest future as more youth participate in yam production than the old people. Yam production might also be a lucrative work in the study area.

Table 1: Distribution of Respondents According to Age

Sex	Respondents
Below 20	12
21 – 30	24
31 – 40	30
41 – 50	40
51 – 60	8
61 and above	6

On size of the respondents' yam farm, the data from the farms showed that 24 respondents cultivated less than 1 acre of land, 56 respondents cultivated land between 2 – 5 acres, 36 respondents cultivated between 6 – 10 acres while only 4 respondents cultivated above 10 acres of land out of 120 respondents interviewed. The above data shows that majority of the respondents are subsistence farmers who cultivate little for sale. Inadequate capital and low educational standard might have affected their level of involvement in yam production. They might also engage in tree crop production such as oil palm, plantain, cocoa farming or kolanut farming. Majority of southwestern Nigeria farmers are of the opinion that permanent crop production are more productive and lucrative than arable crop production hence most of the farmers are involved in arable crop production in feeding their family. The data in the field shows that 88 out of the 120 respondents participated in mixed cropping while the remaining 38 participated in mono cropping buttressed the assertion that most of the respondents might have engaged in tree crop production or other crops which might have led into cultivation of small acres of land for growing yam.

The data collected from the field showed that all the respondents, applied fertilizers to increase the yield of yam in the study area. This shows that the available land used for yam production might not be fertile enough to sustain yam production, hence additional source of plant nutrients from other sources. Tables 2 and 3 below show the type of fertilizer the farmers used for yam production and the methods of fertilizer application.

Table 2: Types of Fertilizer used for yam production in Atakumosa Local Government Area

Fertilizer	Type	No interviewed
Mineral fertilizer	120	120
Organic manure	23	120
Organomineral fertilizer	0	120

Table 3: method of fertilizer Application adopted by the sampled farmers

Method of Fertilizer Application	Respondents
Broadcasting	89
Bad placement	3
Ring method	38
Row method	0
Total	120

The percentage of the respondents who applied organic manure was very low. The farmers might not be aware of the importance of applying organic manure in fertilizing yam farms or because of the demerits attached to organic manures. Many researchers have shown that the bulkiness of organic manures, foul odour and late in nutrient mineralization is bottlenecks to organic manure application. Ayeni *et al.*,(2015), Ayeni (2015) affirmed that before organic manure could be meaningful in nutrient release, about 10t/ha is needed to be applied compared with 400kg/ha NPK fertilizers required for optimum production of most arable crops in southwestern Nigeria. Table 2 shows that no farmer applied organomineral fertilizer in the study area. The farmers were likely to have no knowledge of organomineral fertilizer. Ayeni (2014), affirmed that organomineral fertilizer combines the attribute of both mineral and organic fertilizers. In order to have adequate food security in the country, effort should be geared toward creating awareness about the usefulness of organomineral fertilizers.

Ondo and Oyo state Governments in Nigeria produce organomineral fertilizers termed sunshine and pacesetter organomineral fertilizers respectively. Organomineral fertilizers are manufactured in both Ondo and Oyo states in which Osun state is located in-between the two states. The shallow knowledge exhibited by the respondents in Atakumosa East Local Government Area might be the absence of organomineral fertilizer manufacturing industry located in the state. This might also be the reason while the extension workers in the

state especially the sampled area do not give the desired attention to the significance of organomineral fertilizer. This assertion is buttressed by the fact that all the respondents were not aware of the presence of organomineral fertilizers in the market. The significance of fertilizers compared with the sole use of either mineral fertilizer or animal waste cannot be over emphasized. Organomineral fertilizer is known to combine attributes of both mineral fertilizer and organic manure (Makinde *et al*, 2010, Adeoye *et al* 2008).

The odour of animal wastes that scares farmers from using them as fertilizer is removed when mineral fertilizer is fortified with animal wastes. The high rate of volatilization, recorded by mineral fertilizer during the dry season as well as high rate of leaching experienced by mineral fertilizer during the wet season, is reduced when organic wastes are mixed with mineral fertilizer. The bulkiness of organic wastes required by soil to release sufficient nutrients for optimum crop growth and yield is reduced when organomineral fertilizer is used. Ayeni (2015) suggested the reduction of organic wastes from 10t/ha of organic wastes to 5t/ha of organomineral fertilizer for optimum yield of crops in southwestern Nigeria in an incubation experiment performed to determine the rate of nitrogen (N) release to the soil by organic, mineral and organomineral fertilizers. This means the bulkiness of organic wastes is reduced when organic wastes are replaced with organomineral fertilizer in maintaining soil fertility. The acidity caused by the continuous use of mineral fertilizer is reduced when it is used in combination with organic wastes.

All the respondents applied mineral fertilizers but from the oral interview no farmer claimed to have carried out soil analysis that determines the nutrients requirement of the soil before fertilizer application. Optimum yam yield might not be achieved through indiscriminate fertilizer application without soil test that determines which actual nutrient is deficient in the soil. The available land for crop production should be judiciously managed in order to salvage the country from hunger.

Percentage of respondents who used broadcasting method was very high. The advantages of broadcasting fertilizer include low labour intensive but it wastes fertilizer and enhances rapid growth of weeds. Band and ring methods are preferable to broadcasting method because they guide against wastes and the nutrients embedded in the fertilizers are readily made available to the crop. Farmers are advised to adopt the methods that would increase yam production.

The table below shows the consumers perception on the shelf life, taste, colour and poundability of the yam grown with mineral, organic and organomineral fertilizer. Most of the respondents agreed that they preferred the yam naturally grown without artificial fertilizer to the yam cultivated with fertilizer. The oral interview and the data obtained through questionnaire showed that the poundability of the yam into pounded yam is very low compared with yam grown without fertilizer. The colour and shelf life of the yam grown without fertilizer are better than yam planted with mineral fertilizer.

Table 4: Consumers perception about the quality of grown with mineral fertilizer

Consumers perception about the quality of yam	Respondents	
	Yes	No
Did you buy yam fertilized with mineral fertilizer ?	120	0
Did you notice any difference between yam grown with mineral fertilizer and naturally grown yam	120	0
Did the yam grown with mineral fertilizer pound better than unfertilized yam?	97	23
Did the colour of the yam grown with mineral fertilizer darker than naturally grown yam?	120	0
Did the yam grown with mineral fertilizer has better storage than unfertilized yam?	120	0
did the yam fertilized with fertilizer more diseased than yam grown without fertilizer	4	116

According to field survey, 100% of the respondents who were interviewed on their perception of the shelf life, taste, colour and pest infestation of yam gave negative response about the yam grown with fertilizer. 100% agreed that the yam grown without fertilizer had better taste and texture than yam without fertilizer thus corroborates the findings of Makinde, (2010) that the vegetables grown without mineral fertilizer taste better and are of nutrient quality than vegetables cultivated with mineral fertilizers in the research conducted on

nutritional quality of amaranths in Lagos Nigeria. Among the respondents, 76% agreed that the yams fertilized with organic manure also have better taste and colour than the yam fertilized with mineral fertilizer. The consumers were not able to evaluate the effect of organomineral fertilizer on colour, taste, storability, and pest infestation of yam since they were not familiar with the use of organomineral fertilizer used in growing yam.

Also, 100% of the respondents were of the opinion that the yam grown under natural condition had better storage span than the yam fertilized with mineral fertilizer. All the respondents had no idea on the effect of mineral fertilizer and animal dung on pest infestation but only 3% argued that the naturally grown yam had smoother skin devoid of holes created by pests than the soil fertilized with either mineral fertilizer or organic manure. Further research needs to be carried out to substantiate the claim that yam fertilized with mineral fertilizer has lesser quality than yam grown with either organic manure or organomineral fertilizer.

VI. Conclusion

The research was conducted in Atakumosa Local Government Area to assess fertilizers management in increasing yam production and the consumers perception about the quality of the yam grown with fertilizers and yam without fertilizers. Farmers use fertilizers meaning that the soils are not fertile enough for growing yam. The farmers are familiar with mineral fertilizers but they are not familiar with organomineral fertilizers. Fertilizers increase yam yield in the study area yet buyers prefer yam grown without fertilizer to yam grown with mineral fertilizer. Awareness needs to be created by the Agricultural and Home Economics Extension Services about the proper fertilizer management in increasing yam production in order to enhance food security. Youths should be motivated to engage in yam production for sustainable development. Government should continue to encourage farmers by making fertilizers available at subsidized rate.

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