Factors Affecting the Use of Organic Fertilizer among Vegetable Farmers in Kwara State, Nigeria

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Abstract

This study examined the factors affecting the use of organic fertilizer among vegetable farmers in Kwara State, Nigeria. A structured questionnaire was used to elicit information from 80 vegetable farmers selected through a three-stage sampling technique. Data obtained were subjected to both descriptive and inferential statistics. The descriptive statistics used include mean, standard deviation, frequency and percentage while Chi-square analysis was used to test the hypothesis of the study. The results revealed that majority of the farmers (77.50%) used poultry droppings and cow dung (55.00%) as organic fertilizers. Difficulty in the transportation of these organic fertilizers was seen as the major challenge faced by vegetable farmers as this had the highest mean score of 4.45. The socio economic characteristics significantly influence the nature of constraints faced by vegetable farmers and the use of organic fertilizer on their vegetable farms. Thus, it was recommended that researchers should look into a way that the bulkiness of organic fertilizer will be drastically reduced for easy transportation.

Keywords: Assessment, Compost, Constraints, Organic fertilizer, Transportation

Introduction

Agriculture remains an important sector of the Nigeria economy. It has huge significance in the aspect of employment generation to the rural and urban populace involved in agricultural businesses which involve production, processing and marketing of agricultural products. Nigeria farmers has been producing 90% of the available food in the country and about 75% of the labour force making a living from this sector (CBN, 2005; IFAD, 2010). Over the years, increasing human population and urbanization has increase the demand for agricultural products with land becoming a constraint. The traditional system of cultivation in most Nigeria is given way to continuous system of cropping on the same land, resulting in gradual depletion of soil fertility and crop yield (Alimi *et al.,* 2006). One of the ways to address the problem of low productivity in agriculture is the use of fertilizer both organic and inorganic especially in low income countries where fertilizer use is lowest (Smaling *et al.,* 2006). Thus, the need for application of fertilizer to enhance the soil fertility and simultaneously improve land productivity is an important issue among farmers. Indeed, the average fertilizer use intensity in Nigeria of 8 kg/ha is very low when compared to 86 kg/ha in Latin America, 104 kg/ha in South Asia and 142 kg/ha in Southeast Asia, while in Western Europe and USA, fertilizer use intensity is up to 288 kg/ha on average (Liverpool-Taise and Takeshima, 2013; Agbahey *et al.,* 2015). Given this, the use of organic fertilizer becomes an option for farmers in Nigeria so that the potential productivity gain can be achieved.

According to FAO (2006), the application of organic materials in agriculture has contributed

immensely in converting poor fragile land of the world into staple productive ecological zones. The proponents of organic agriculture have also asserted that plants grown with biological sources of nutrients such as manures and composted organic waste are less susceptible to the attack of insect pests than other conventional grown plants (Barna *et al.,* 2015). Besides, the study by Anderson *et al.* (2005) found that, organic fertilizer is cheaper and has more efficacy than the inorganic fertilizer.

Organic farming represents a deliberate attempt to make the best use of local natural resources and it is an environment friendly system of farming. It relies much on ecosystem management which excludes external input, especially the synthetic ones. Anderson *et al.,* (2005) stated that organic farming is a production system that excludes the use of synthetically manufactured fertilizer, pesticides, growth regulators and livestock feed additives. The system lies on crop rotation, crop residues, animal manures, and legumes, green manures, off farm organic wastes, minimum mechanical cultivation and aspects of biological pest control to maintain soil nutrients. It became obvious that organic management affects soil macro biological and chemical properties by increasing soil nutrient availability, microbial biomass and microbial activity which represent a set of sensitive indicators of soil quality (Marinari *et. al.,* 2006). The bacterial biomasses that perform soil function and resist environmental stress occurring under organic farming is of great importance than in other farming system (Mulder *et. al.,* 2003). Organic farming improves ecological health because it helps farmer maintain nutrient balances in soil through locally available organic materials or recycled farm waste (Park *et al.,* 2008; Hynes, 2009).

Therefore, the fertility management in organic farming relies on a long term integrated approach rather than the short term. The organic agriculture has been associated with returns on investment because it offers farmer a much more secure income than when they rely on only one or two inputs (Osborne, 2009). Organic farmers adopt practices to conserve resources, enhance biodiversity and maintain the ecosystem for sustainable production and can lead to increased food production. In many cases, the use of organic fertilizer has been resulting into doubling of yields which makes an important contribution to increasing the food security of a region (Park *et al.,* 2008). Yet, many factors have been reported to limit the use of organic fertilizer among farmers in Africa. However, it has been observed that, there has been disparity and conflicts of ideas on the constraints to the use of organic fertilizer by farmers based on reports from previous scholars.

Wheeler (2008) identified a number of the problems which farmers faced in the use of organic fertilizers. The problem includes slow effect of organic fertilizer, labour intensive, limited sources of manure, higher cost of organic fertilizer, storage of manures, emergence of weeds and unfavorable smell of most of organic fertilizers. Lack of skills and technical knowhow are also constraints in the use of organic fertilizers identified by Pornpratansombat (2010). Other major constraints to increased adoption of the organic fertilizer include technological challenges, polices for quality control of organic products, and lack of or inadequate access to extension service that provide technical advice. Besides, Odhiambo and Magandini (2008) study in South Africa found that transportation was the main constraint regarding farm yard manure use and that the main source of farm yard manure was from neighboring pens/kraal. This is in contrary to the study of Alimi *et al.* (2006) in Nigeria which found that the major challenges facing farmers who use organic fertilizers are the doubtful efficacy and its offensive odour.

Vegetables are simply defined as edible parts of plants that are consumed wholly or in parts, raw or cooked as part of main dish which is important in healthy human diet (Ndie *et al.,* 2013). Vegetables enhance the nutritional quality of diets given their richness in vitamins and minerals such as carotene, iron, iodine; and calcium (Ihekoronye and Ngoddy, 1985; Shiundu, 2002). They provide little dietary energy, making them to be very

important in energy limited diets. Its dietary fibres and its nutrient content such as folate, antioxidants, vitamins and phytochemicals are associated with low risk of cardiovascular diseases content and have beneficial effects on blood cholesterol (Strandhagen, 2000; Hart *et al.,* 2005). Therefore, given these significant benefits, increase population and urbanization have increased the demand for vegetable in Nigeria. Hence, there is high need to increase the production of vegetables to meet the increasing demand. However, one of the proven ways to increase crop yield is the efficient use of organic fertilizer. The use of inorganic or organic fertilizers helps to alleviate declining soil fertility and improve yield (Gruhn *et al.,* 2000). Despite the numerous past studies on the effect and adoption of organic fertilizers on farmers output, little is known about the factors limiting the use of organic fertilizers among vegetable farmers in Kwara State. Hence, the study specifically examines the socio-economic characteristics of the respondents, the type of organic fertilizers mostly used among the vegetable farmers, and the constraints to the use of organic fertilizers among the vegetable farmers in Kwara state, Nigeria.

Research hypothesis

H01: There is no significant relationship between some selected socio-economic characteristics of the respondents and factors affecting the use of organic fertilizer by vegetable farmers.

Methodology

This study was conducted in Kwara State. The state is located between longitudes 4º-6º East of Greenwich Meridian and between latitudes 8º-10º north of the Equator and it covers a land area of about 32,500 km^2. Kwara state has two main climate seasons, dry and wet. The natural vegetation comprises of wooded and rain forest savannah, with annual rain falls ranging between 1,000 to 1,500 mm while the average temperature lies between 30°C and 35°C (FOS, 1995). Kwara State has about 36,820 hectares of farmland. According to the 2006 census reports, the population of Kwara state stood at 2.37 million consisting of mostly the Yoruba, Nupe and Baruba ethnic groups (NPC, 2007).

The study population comprised of all the vegetable farmers in Kwara State. The common vegetables planted by the farmers includes; *Amaranthus* spp. (efo), *Corchorusolitorius* (ewedu), *Abelmoschus esculentus* (okra), *Cucumis melo* (melon), *Citrullus lanatus* (water melon) and *Cucumis sativus* (cucumber). The data used for this study was collected through a well-structured questionnaire. A three-stage sampling techniques was used in this study. The first stage involved the random selection of four (4) local governments out of the sixteen local governments in the state. The second stage involved the purposive selection of five (5) communities known for vegetable production in each of the local government previously selected. The third stage involved the random selection of four (4) vegetable farmers in each of the communities. This gave a total of eighty (80) respondents that were selected for this study. Data collected were analyzed using both descriptive and inferential statistics. The descriptive statistics included mean, standard deviation, frequency and percentage while the hypothesis was tested using Chi square analysis.

Results and Discussion

Socio-economic characteristics of the respondents

The results from Table 1 revealed that 37.5% of the vegetable famers are within the age class of 30 – 39 while only few (3.75%) of the vegetable famers are above the age of 60 years which is the maximum working age in Nigeria. The average age of the vegetable farmers is 37 years which is below the life expectancy of 47 and 52 for both male and female in Nigeria. This is an indication that majority of the respondents are below the ages of forty (40) and it is believed that they are in their most active age. Hence, majority of the vegetable farmers fall within the categories of youth given the fact that anybody between the ages of 18 and 40 can be categorized as been a youth and this has a good implication for Nigeria agriculture. The results (Table 1) also revealed that majority of the vegetable farmers were male (72.5%) while (27.5%) were female. More so, 48.7% of the respondents have no formal education while 12.5 % of the respondents have tertiary education.

This shows that there is the need for technical education input in vegetable production. The average household size of the vegetable farmers is 8.04 which are far above the general 4.9 and 5.9 for the state and national average households' size respectively (FAO, 2006). This might be as a result of their levels of literacy, poverty and nature of agricultural activities.

Table 1: Socio Economic Characteristics of the Vegetable Farmers in Kwara State

Socio-Economic Characteristics	Frequency	Percentage	Mean
Age:> 20	4	5.00	
20 – 29	23	28.75	
30 – 39	30	37.50	
40 – 49	12	15.00	
50 – 59	8	10.00	
60 & Above	3	3.75	(37)
Gender: Male	58	72.50	
Female	22	27.50	
Education Status			
No formal education	38	48.75	
Primary	13	16.25	
Secondary	18	22.50	
Tertiary	10	12.50	
Years of Farming Experience:			
1-5	9	11.25	
6-10	17	21.25	
11-15	11	13.75	
16-20	13	16.25	
21-25	21	26.25	
26-30	5	6.25	
>30	4	5.00	
Household Size:			
<5	25	31.25	
6-10	43	53.75	
>10	12	15.00	(8.04)
Farm size			
<1.0	12	15.00	
1.0-1.9	30	37.50	
2.0-2.9	22	27.50	
3.0-3.9	10	12.50	
>3.9	6	7.50	(2.21)
Cooperatives society:			
Yes	13	16.25	
No	67	83.75	

Source: Field survey 2016.

Thus, a larger household size implies that the vegetable farmers have adequate personnel for the application of organic fertilizers and carry out other farm activities. The results further revealed that, majority (88.7%) of the vegetable farmers have more than 5 years of farming experience while 11.2% have less or equal 5 years of experience. However, having a wide breadth of farming experience could aid better adoption of utilization of organic fertilizers among vegetable farmers in Kwara state. Also, it was revealed that the vegetable farmers have access to an average of 2.21 hectares of land and more than half (52.5%) of the vegetable farmers has access to less than 2.0 hectares of land. This indicated that vegetable farmers have access to small land size which might which might be one of the reasons for vegetable farmers in Kwara State to have no access to modern irrigation facilities given the prolonged incident of drought in the state. Hence, they make use of the little land space that is cultivatable close to the water bodies. Also, only few (16.2%) of the respondent belongs to a cooperative society when compared to majority (83.7%) and this might be because of inadequate information on the benefits of being a member of a working cooperative society.

Types of fertilizers used by the vegetable farmers in Kwara State

The results in Table 2 revealed that 77.5% of the respondents use poultry droppings, 55.0% of the respondent uses cow dung, 41.2% uses urea, 35.0% uses NPK, 26.2% uses compost while others that uses tarry and ashes were 13.0% of the respondent. This is in conformity with the findings of Alimi *et al.* (2006) who noted that organic manures mostly used by vegetable farmers is poultry droppings and this is due to its cheapness and availability. This result also corresponds with the work of Ajewole (2010), that only few of the vegetable farmers do not use organic fertilizer which might be a result of its greater perceived efficiency.

Challenges affecting the use of organic fertilizers in Kwara State

Results in Table 3 revealed a number of challenges affecting the use of organic fertilizer by the vegetable farmers in Kwara state. The challenges were ranked using the means score computed from the 5 point Likert scale type. The study rated high difficulty in the transportation of organic fertilizer from the source to the point of use. This was followed by high labour cost of application with a mean score of 3.66. While, the least rank with the mean of 2.16 was the difficulty on the use of organic fertilizer. This result supported the work of Odhiambo and Magandini (2008) where they both highlighted that transportation was the main constraint regarding manure use and that the main source of manure was from neighbouring pens/kraal, hence the need for transportation. This result indicated that, problem of transportation of organic manure to the point of use remains a major barrier to the use of organic fertilizer. However, this was found to be in contrary to the findings of Alimi *et al.* (2006) who noted that the major challenges facing farmers that use organic fertilizers were the uncertainty of its efficiency and its offensive odour.

Hypothesis testing

In Table 4, the Chi-square ($\chi 2$) analysis reveals that at ($p \leq 0.05$) there is significant relationship between all the selected socio

Table 2: Types of Organic Fertilizer used on the Vegetable Farmers of the Respondent

Fertilizer Type	Yes	%	No	%
NPK	28	35.oo	52	65.00
Urea	33	41.25	47	58.75
Compost	21	26.25	59	73.75
Poultry drop	62	77.50	18	22.50
Cow dung	44	55.00	36	45.00
Other: Tarry and Ash	11	13.75	69	86.25

Source: *Field survey data 2016*

Table 3: Challenges Affecting the Use of Organic Fertilizer by the Respondents

Constraints	SA(5)	A(4)	I(3)	D(2)	SD(1)	Mean	Rank
Ignorance of technical details on the proportion to use	7	8	20	24	21	2.45	7th
Difficult to use	5	17	11	10	27	2.16	8th
Availability	27	14	18	9	12	3.44	3rd
High labour cost	32	22	6	7	13	3.66	2nd
Unfavourable weather condition	23	11	8	15	25	2.98	5th
Problem of pest and diseases	17	19	30	10	4	3.44	3rd
Odour	17	13	12	15	23	2.83	6th
Transport challenges	41	27	5	11	6	4.45	1st

Source: Field Survey data, 2016` SA=Strongly Agree, A=Agree, I=Indifference, D=Disagree, SD=Strongly Disagree

Table 4: Chi-square analysis showing the difference between the selected socio-economic Characteristics of the Respondents and the Constraints to the use of Organic Fertilizer

Variables	$\chi 2$	Df	P. value	Rank	Decision
Age	42.19	18	0.000	S	Rejected
Gender	13.44	1	0.000	S	Rejected
Education status	25.32	3	0.000	S	Rejected
Farm years of establishment	77.72	12	0.000	S	Rejected
Farm size	36.04	7	0.000	S	Rejected
Membership	37.34	1	0.000	S	Rejected

Source: *Field survey 2016 S = Significant*

economic characteristics of the vegetable farmers and the constraints faced by the farmers in the use of the organic fertilizers. This result indicated that age, gender, education status, farming experience, farm size and cooperative membership significantly influence the nature of the constraints faced by vegetable farmers in their use of organic fertilizers on their vegetable farms. This is an indication that age, whether children, youth or adult had influence on the nature of the constraint type faced by the vegetable farmers in the use of organic fertilizers. This support the works Geoffrey and Mildred (2012) which found that socio-economic characteristics of the farmers' stands to be a factor influencing the adoption of the use of organic fertilizers.

Conclusion

This study examined the socio-economic characteristics of the respondents, the type and the constraints to the use of organic fertilizers by the vegetable farmers in Kwara State. The most organic fertilizers used by the respondent was poultry droppings. The study concluded that the most important challenges affecting the use of organic fertilizer were the difficulty in its transportation to the farm and the high labour cost of application which might be as a result of its bulkiness and not its offensive odour as it was earlier reported. Finally, the hypothesis testing also revealed that socio economic characteristics of the respondents significantly influence the nature of constraints faced by vegetable farmers and the use of organic fertilizer on their vegetable farms. Based on the findings of this study, the following recommendations are made:

1. Farmer should employ strategy that keep the wet organic fertilizer dry in order to reduce the difficulty in transportation and bulkiness to farm site.
2. Emphasis should be placed on improving

the awareness on the importance of organic fertilizers through the extension agents to stimulate or increase use among farmers.

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