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Original Research Article

Perception of arable crop farmers on usage of organic fertilizer in maize production

Abstract

One major problem facing maize production can be attributed to the fertility status of most Nigerian soils which is considerably low. The study was conducted to examine arable crop farmers' perception of the use of organic fertilizer in maize production in Ido Local Government Area of Oyo State. A total of one hundred and twenty respondents were randomly selected for the study from 10 villages. Primary data were collected using a well-structured questionnaire and interview guide. Data were analyzed using descriptive statistics such as frequency, percentages and mean. Chi-square was used to test the hypothesis of the study. Poultry manure (90.0%) was the major source of organic fertilizer and constitutes the most frequently used (70.8%). It was found that bulkiness of organic fertilizer was the most severe constraint that affect its usage ($\bar{x}$=2.43). However, there was an unfavourable perception on use of organic fertilizer in maize production. Test of hypothesis revealed that age (χ^2= 4.46, df= 1) and educational level (χ^2= 8.54, df = 3) were found significantly related with the perception of respondents on usage of organic fertilizer (p = 0.05). Advocacy should be intensified on usage of organic fertilizer in crop production.

Keywords: Perception; arable crop; organic fertilizer; maize production

Introduction

Maize is one of the most important food crops in Africa and the developing world in general (Forum for Agricultural Research in Africa (FARA), 2009). Together with rice and wheat, maize provides at least 30% of the food calories to more than 4.5 billion people in 94 developing countries (Von Braun, Byerlee, Chartres, Lumpkin, Olembo and Waage, 2010). About 67% of the total maize production in the developing world comes from low and lower middle income countries; hence, maize plays an important role in the livelihoods of millions of poor farmers (FAOSTAT, 2010).

According to Food and Agricultural Organization (FAO) (2000), maize is a staple food that can remedy food insecurity in the tropics. In spite of the economic importance of maize to the teeming populace In Nigeria, its production has not over time meet food and industrial needs of the country. The demand for maize sometimes outstrips supply as a result of the various domestic uses (Akande, 1994). One major problem facing its production level can be attributed to the fertility status of most Nigerian soils which is considerably low. There has been much concern on how to improve the fertility and productivity of the soil for increased agricultural production (Azagaku and Anzaku 2002).

The use of inputs as soil amendments in the form of mineral fertilizer or organic manure have been found useful in improving the productivity of the soil. Recognizing the myriad of deficiencies inherent in the use of inorganic fertilizer in crop production, agricultural based agencies have advocated the use of organic manures as alternatives to inorganic fertilizer (Adeoye, 1985). Usage and benefits derived from organic fertilizer have been discussed by many authors (Adediran *et. al.,* 2003; Adetunji, 2010). Unlike inorganic fertilizer, nutrients contained are released more slowly and are stored for a longer time in the soil, ensuring longer residual effects, improved root development and higher crop yields (Abou El Magd *et. al.,* 2006). Organic fertilizer also helps to improve soil by lowering bulk density, reduce soil erosion and improve soil fertility (Wheeler, 2008). Issues of underground water pollution by

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some of the inorganic fertilizers and the need to have a less polluted environment also justify the use of organic manure.

However, the use of organic fertilizer nowadays is being advocated in the production of organic food products which plays a great role in the health of man. The study therefore examined the perception of arable crop farmers' on use of organic manure in maize production.

Objectives of the study

The general objective of the study was to examine the perception of arable crop farmers on use of organic fertilizer in maize production in Ido Local Government Area of Oyo State, Nigeria. Specifically, the study was meant to:

i. describe socio-economic characteristics of maize farmers in the study area;
ii. examine sources of organic fertilizer for maize production;
iii. ascertain level of usage of organic fertilizer on maize production;
iv. identify challenges associated with use of organic fertilizers in maize production;
v. examine famers' perception of use of organic fertilizer for maize production.

Hypothesis of the study

Ho1: There is no significant relationship between socio-economic characteristics and arable crop farmers' perception of the use of organic fertilizer in maize production.

Methodology

The study was carried out in Ido Local Government Area, Oyo State, with its headquarters at Ido. The study area has a land mass covering an area of 986km^2 and a total population of 103,261 (NPC, 2006). Ido Local Government Area covers the area spanning Apata, Ijokodo, Omi-Adio, Akufo and Apete. The climatic condition of Ido is equatorial, notably with dry and wet seasons with relatively high humidity.

The population of this study was the arable crop farmers in Ido Local Government Area of Oyo State. Ten (10) villages were purposively selected for the study because of their involvement in arable crop production. The villages include Sinkooke, Sinkoisale, Odetola, Onigbagbo, Alakaso I, Alakaso II, Adeseku, Tade, Oderemi and Alagba. Twelve arable crop farmers were randomly selected each from the ten villages making a total of one hundred and twenty respondents. Data were collected through the use of well-structured questionnaire and interview guide.

Measurements of variables

The dependent variable of the study was the perception of arable crop farmers on the use of organic fertilizers. A list of perception statements were presented to respondents. Responses were recorded on four-point likert- type scale of strongly agree (SA), agree (A), disagree (D) and strongly disagree (SD) and scored as 3, 2, 1 and 0 respectively for positive statements and 0, 1, 2 and 3 respectively for negative statements. The average score is 1.5, values greater than or equal 1.5 was regarded as favourable perception while scores less than 1.5 was regarded as unfavourable perception.

Frequency of usage of organic fertilizer for arable crop production was measured on a three point scale and scored as very often (VS) = 3, often = 2 and rarely = 1 with an average score of 2. Perceived constraints associated with organic fertilizer were measured using three point likert type scale and scored as very severe (VS) = 2, Severe (S) =2 and not severe (NS) = 0.

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Meanwhile, perceived benefit associated with the use of organic fertilizer were recorded on a two-way response format of yes = 1, and no =0.

Data Analysis

The data collected were analyzed using descriptive statistics such as frequency count, percentages and mean. An inferential statistics such as Chi-square was used to test the study hypothesis.

Results and discussion

Socio-economic characteristics of respondents

Results on age distribution of respondents as found in Table 1 indicate that less than half of the respondents (41.7%) were between the age range of 26 - 35years. The mean age was found to be 41years which implies that the respondents were still in their active age. This indicates a good supply of agile workforce in maize production which tends to have positive effect on individual's efficiency and seriousness. Findings further revealed that most of the respondents (77.5%) were male. This suggests that maize production in the study area was male dominated. This may be attributed to the accessibility and control of resources as well as land tenure system which tend to favour men. It was also revealed that 72.5% of the respondents were married which implies that respondents were responsible for the provision of means of survival for their family. Spouses and children may constitute source of labour for farming operations. Findings on religious status show that a little below average (46.7%) were Christian. This implies that the respondents were predominantly Christians. About half (51.7%) had secondary school education, 37.5% had primary school education, 6.7% possessed higher education while 4.2% of the respondents had non-formal education. The findings indicate that the respondents had the basic education which is needed for interpretation of agro-information. Similarly, farmers with basic knowledge on how to read and write can appreciate and use most of the crop production technologies available. Findings further revealed that the respondents had an average household size of 5 which means that respondents had considerable smaller number of household. The distribution based on farming experience among the respondents indicates that 59.2% had between 1 to 10years of farming experience while very few (33.3%) had between 11 to 20years experience. Years of experience plays a prominent role in farming activities because it determines the quantum of knowledge gathered over time for better production.

Table 1: Socio-economic characteristics of respondents (n = 120)

Variables	Frequency	Percentage (%)	Mean
Age (Years)			
16 – 25	23	19.2	
26 – 35	50	41.7	
36 – 45	34	28.3	41years
46 and above	13	10.8	
Sex			
Male	93	77.5	
Female	27	22.5	
Marital status			
Single	17	14.2	
Married	87	72.5	
Divorced	5	4.2	
Widowed	11	9.2	
Religion			

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Christianity	56	46.7	
Islam	50	41.7	
Traditional	14	11.7	
Educational background			
No formal education	5	4.2	
Primary education	45	37.5	
Secondary education	62	51.7	
Tertiary education	8	6.7	
Household size			
1-5	63	54.2	5
6-10	42	34.1	
10 and above	15	2.5	
Years of farming experience			
1 to 10	71	59.2	
11 to 20	40	33.3	17 years
21 to 30	6	5.0	
31 and above	3	2.5	

Source: Field survey, 2015

Sources of organic fertilizer for arable crop production

Findings in Figure 1 show that poultry manure (90.0%) constitute the major source of organic fertilizer used in arable crop production. This may be attributed to its availability and reported nutrient contents which were found to be more compare to other sources of organic fertilizers. This is supported by Nweke, Ijearu, Igili, (2013) findings that poultry manure was the richest manure among goat and pig manure applied at the same rate. This was also corroborated by Weevil (2002) that application of poultry manure to the soil enhances satisfactory growth in crops such as okro. Aliyu (2000) and Dauda *et. al.,* (2008) made similar observation in their separate studies with poultry manure in the growth and yield of crops. However, other sources of organic fertilizer used by the respondents include cow dung (71.7%), compost (48.3%), household waste (42.5%), crop residue (42.5%) while equal percentage of the respondents (36.7%) indicated green manure and pig manure as other sources organic fertilizer.

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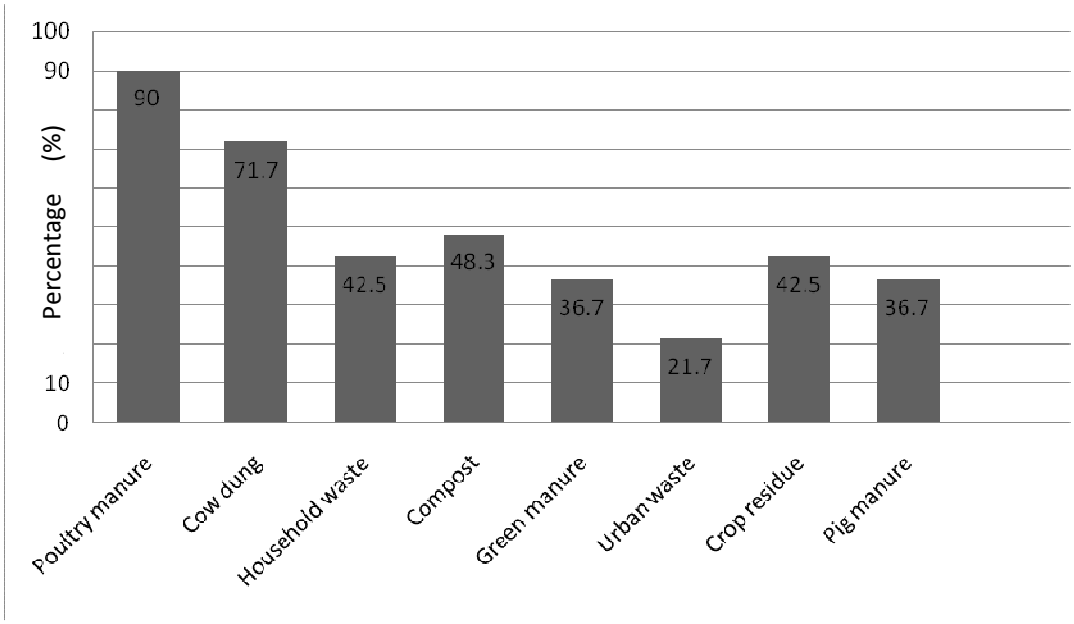

Fig 1: Sources of organic fertilizer for arable crop production (n= 120)

Frequency of usage of organic fertilizer in maize production

Frequency of usage of organic fertilizers in maize production as found in Table 2 revealed that poultry manure ($\bar{x}$= 2.62) and cow dung ($\bar{x}$= 2.47) were the most frequently used source of organic fertilizers. The findings are expected since poultry and cow dung constitute the most available source of organic fertilizer as earlier reported. However, urban waste (x =1.59) was found to be the least frequently used source of organic fertilizer. This may be attributed to its unavailability within the farm communities.

The overall findings on frequency of usage of organic fertilizer revealed that organic fertilizer was rarely used in maize production as indicated by 42.5% of the respondents despite the potential benefits accrued to it. However, usage of organic fertilizer is gradually gaining recognition in Nigerian farming system because of the advocacy for production of natural/ chemical free food.

Table 2: Frequency of usage of organic fertilizer by the respondents (n=120)

Category	Always Freq.	Occasionally Freq.	Not at all Freq.	Mean	Standard deviation
Poultry manure	85(70.8)	24(20.0)	11(9.2)	2.62*	0.65
Cow dung	68(56.7)	40(33.3)	10(10.0)	2.47*	0.67
Household waste	21(17.5)	51(42.5)	48(40.0)	1.78	0.73
Compost	31(25.8)	41(34.2)	48(40.0)	1.86	0.80
Green manure	25(26.8)	40(33.3)	55(45.8)	1.75	0.78
Urban waste	16(13.3)	39(32.5)	65(54.2)	1.59	0.72
Crop residue	21(17.5)	48(40.0)	51(42.5)	1.75	0.74

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Pig manure	27(22.5)	34(28.3)	59(49.2)	1.73	0.81
Grand Mean				15.55	
Mean level				1.94	

Source, Field survey, 2015
Figures in parentheses are percentages
Overall frequency of usage: Mostly used = 35.0%, rarely used = 42.5%, Never used 22.5%

Table2b: Overall frequency of usage of organic fertilizer (n=120)

Frequency of usage	Frequency	Percentage
Mostly used	42	35.0
Rarely used	51	42.5
Never used	27	22.5

Perceived constraints associated with the use of organic fertilizers in maize production

Results in Table 3 reveal the constraints facing the usage of organic fertilizer in maize production. It was found that organic fertilizer is usually bulky ($\bar{x}$ = 2.34). This tends to create pressure on storage and transportation and consequently add to the cost of production in maize. It was also observed that large quantity of organic fertilizer will be needed to meet up with crop requirement ($\bar{x}$= 2.35) unlike inorganic fertilizer. Organic fertilizer was also found to emits offensive odour (x = 2.33) which may predisposes farmers to health hazard.

Table 3: Constraints facing the use of organic fertilizer (n=120)

Constraints	Very severe Freq	Severe Freq	Not severe Freq	Mean	SD
Bulkiness	58(48.3)	55(45.8)	58(48.3)	2.43*	0.60
Need for large quantity to meet crop requirement	57(47.5)	48(40.0)	15(12.5)	2.35*	0.69
Nutrients are released slowly	51(42.5)	43(35.8)	26(21.7)	2.21	0.78
Emission of offensive odour	51(42.5)	58(48.3)	11(9.2)	2.33*	0.64
Usage can lead to health hazard	49(40.8)	56(46.7)	15(12.5)	2.28	0.68
Presence of impurities	45(37.5)	59(49.2)	16(13.3)	2.24	0.67
Limited information on quantity to be used	55(45.8)	41(34.2)	24(20.0)	2.26	0.77
Grand mean				16.1	

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Mean level	2.30

Source, Field survey, 2015
Figures in parentheses are percentages
SD= Standard deviation

Perception on usage of organic fertilizer

Findings on perception of usage of organic fertilizer as found in table 4 show that more than half of the respondents (51.7%) strongly agreed that large quantity is needed to meet crop requirement, Also, 50.0%) strongly agreed that organic manure is easy to produce while less than half (44.2%) strongly agreed that it requires special skills for production and application. However, it was found that little above half of the respondents (52.5%) had unfavourable perception on use of organic fertilizers in maize production. This implies that maize farmers were more disposed to conventional farming which involves the use of inorganic fertilizer.

Table 4: Perception on the use of organic fertilizers by the respondents (n=120)

Category	SA	A	D	SD	Mean	Sd
Organic fertilizer is easy to produce	60(50.0)	33(27.5)	15(12.5)	12(10.0)	3.18	1.00
Large quantity is needed to meet crop requirement	62(51.7)	29(24.2)	24(20.0)	5(4.2)	3.23	0.91
Preparation is labour intensive	47(39.2)	48(40.0)	17(14.2)	8(6.7)	3.11	0.89
Usage increases soil micro organisms	45(27.5)	68(56.7)	4(3.3)	3(2.5)	3.29	0.65
Special skill is needed for production and application	53(44.2)	43(35.8)	15(12.5)	9(7.5)	3.17	0.92
Organic manure does no harm to soil microbes	42(35.0)	58(48.3)	16(13.3)	4(3.3)	3.15	0.77
Transportation is expensive	45(37.8)	48(40.0)	20(16.7)	7(5.8)	3.09	0.88
Usage is dangerous on human health	36(30.0)	44(36.7)	27(22.5)	13(10.8)	2.86	0.97
It is environmentally friendly	40(33.3)	57(47.5)	16(13.3)	7(5.8)	3.08	0.84
Application is very easy	43(35.8)	60(50.0)	10(8.3)	7(5.8)	3.16	0.81
It reduces incidence of pest and diseases	35(29.2)	54(45.0)	22(18.3)	9(7.5)	2.96	0.88
Not effective for early maturing crops	31(25.8)	40(33.3)	38(31.7)	11(9.2)	2.76	0.94

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It is not economical	33(27.5)	35(29.2)	27(22.5)	25(20.8)	2.63	1.10

Source: Field survey, 2015
Figures in parentheses are percentages
SA = strongly agree, A= Agree, Disagree, SD = strongly disagree, Sd = Standard deviation
Overall perception: Favourable 47.5%, unfavourable 52.5%

Test of relationship between socio-economic characteristics of respondents and perception of organic fertilizer usage

The result of chi-square analysis in Table 5 shows that age (χ^2= 4.46, df= 1) and educational level (χ^2= 8.541, df= 3) were found to be significantly related with the perception of respondents on use of organic fertilizer in maize production at 5% level of significance. This implies that perception of farmers on usage of organic fertilizer is developed overtime and may be attributed to the experience gained as they advance in age and education.

Table 5: Test of relationship between socio-economic characteristics of respondents and perception of organic fertilizer usage

Socio-economic characteristics	χ^2	df	p-value	Decision
Sex	4.461	1	.07	not significant
Age	13.470	3	.00	significant
Education level	8.541	3	.04	significant
Marital status	6.061	3	.11	not significant
Religion	6.150	2	.07	not significant
Year of farming experience	3.736	3	.29	not significant

Significant at 5% probability level

Conclusion

It can be concluded from the study that poultry manure constituted the major source of organic fertilizer. Despite the relative advantages associated with usage of organic fertilizer, there is a reservation towards its usage among farmers. This may be associated with the identified challenges which include bulkiness, need for large quantity to meet crop requirement and emission of offensive odour which may lead to health challenge. It is therefore recommended that farmers should be adequately informed on production process, handling and application of organic fertilizers.

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