DETERMINANTS OF SOLID WASTES USAGE BY FARMERS FOR CROP PRODUCTION IN BOSSO LOCAL GOVERNMENT AREA OF NIGER STATE, NIGERIA

By

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Abstract
The study examined the determinants of solid wastes usage by the farmers for crop production in Bosso Local Government Area of Niger State, Nigeria. A total of 126 respondents were randomly selected for the study. Data were collected using interview schedule and data collected were analyzed using descriptive statistics and probit regression analysis. The result indicates that 54.0% of the respondents were between the ages of 21-40 years, while only 24.6% had formal education. Average farm size of the respondents was 1.7 hectare. Homes/commercial refuse (38.9%) and animal dung (31.7%) were the commonest solid wastes used by the farmers for crop production in the area. Age, livestock ownership, farm size and town residence had significant positive effect on the usage of solid waste ($P < 0.05$) for crop production. Major constraints include problem of handling of solid wastes (51.6%) and inadequate knowledge on the selection of appropriate solid waste materials for crop production (44.4%). Based on the findings, it was recommended that farmers should be encouraged to practice mixed farming to enable them generate enough animal dung from livestock for crop production to supplement chemical fertilizers. In addition, extension efforts should be made to enlighten farmers on the selection of appropriate solid waste materials for crop production. Also, farmers should be thought the techniques of making compost manure to enable farmer's process solid waste of high quality for crop production.

Introduction

Agriculture is the leading non-oil sector of Nigerian economy and is given special attention by the government to spearhead the economic transformation of the country. However, the problem of availability and acquisition of inorganic fertilizer or chemical fertilizer still remain the major challenges that are adversely affecting agricultural production in the country, hence the need to use organic fertilizer to supplement the chemical fertilizer.

Organic fertilizers, comprising plants and animals remains as well as solid wastes from homes can be used for soil improvement (USEPA, 2005). Solid waste is defined as any semi-solid or solid material discarded from homes, industries, commercial centers, mining and agricultural operations which includes commercial refuse, waste treatment plants, debris or air pollution control facilities and other discarded materials (EPDK, 2005).

According to Olawande (1991) solid waste is the collective name for all the component parts of materials generated as domestic, commercial or industrial by-products which may be found in human environment. The use of solid waste on farmlands has potentials for improving soil fertility and crop production. This stems from the fact that it provides the basic plant nutrients as well as composted organic matter which improves the fertility and physical conditions of the soil.

This study is significant in that the identification of determinants for the usage of solid waste for crop production will inform decision makers to direct policy for soil fertility management practices, as for the academics, the knowledge of the factors that determine farmers' decision to use solid waste for crop production can enhance their ability to come up with sustainable intervention measures and skills for the usage of solid waste for soil fertility management and food security enhancement in the country.

Objective of the study

The broad objective of the study is to identify the determinants for the usage of solid waste for crop production by farmers in Bosso Local Government Area of Niger State. The specific objectives are to:

i. Identify the socio-economic characteristics of the respondents;
ii. Determine the types of solid wastes used for crop production by the respondents;
iii. Identify the determinants of solid waste usage by the respondents; and
iv. Determine the constraints faced by the respondents in using solid wastes for crop production.

Methodology

This study was conducted in Bosso Local Government Area of Niger State located in the Southern Guinea Savanna ecological zone of Nigeria. The Local

Government Area has a population of 148, 136 people (NPC, 2006). More than 80 percent of the population is engaged in small-scale farming. Rainfall starts in April and ends in October each year with its peak in August. Some of the crops grown include cowpea, rice, sorghum, maize, millet, groundnut, yam and cassava. Animals reared include sheep, goat, cattle, camel, donkey and poultry (NSADP, 2001).

Simple random sampling technique was used in selecting 7 villages/towns from the sampling frame. The selected villages/towns were Chanchaga, Beji, Bosso, Garatu, Maitunbi, Maikunkele and Sabon Daga. In each village/town 18 farmers were randomly selected, giving a total of 126 respondents for the study. Interview schedule was used for data collection and information were collected on socio-economic characteristics, types of solid waste used and constraints faced. Survey for data collection was conducted between May to June, 2012. Data collected were analyzed using descriptive statistics and probit regression analysis.

Results and Discussion

Socio-economic characteristics of respondents

The result of the socio-economic characteristics of the respondent is presented in Table 1. It shows that more than half of the respondents (54.0%) were between the ages of 21-40 years. Therefore, the respondents can still be said to posses the strength and vigor required for farming activities. The table further reveals that 24.6 percent of the respondents had one form of formal education or the other. The level of education of the few respondents is expected to enhance their farming activities and technology adoption. Earlier study by Umar *et al.* (2009) showed that there is a positive relationship between farmers' level of education and adoption of agricultural technologies and innovations. The implication is that high level of education promotes the adoption of new technology among farmers. Average farm size of the respondents was 1.7ha, while 49.3 percent of the respondents had family size of 6-10 peoples. Furthermore, findings of the study revealed that 51.6 percent of the respondents had their farms located at a distance of between 4-6 Kilometers away from their homes. Also , 81.7 percent of the respondents had farming experiences of 11 years and above, indicating that majority of the respondents had long years of experience in farming occupation.

Table 1: Socio-economic characteristics of respondents

Variables	Frequency	Percentage
Age (years)		
Below 21	11	8.7
21-40	68	54.0
41-60	33	26.2
Above 60	14	11.1
Total	126	100.0
Mean	31.5	25.0
Education		
No formal education`	95	75.5
Formal education	31	24.6
Total	126	50.0
Mean	63	
Farm size (ha)		
Below 1	34	27.0
1-2	74	57.9
Above 2	19	15.1
Total	126	100.0
Mean	42.0	33.33
Family size (no)		
Below 6	24	19.0
6-10	62	49.3
Above 10	40	31.7
Total	126	100.0
Mean	42.0	33.33
Farm distance (km)		
1-3	49	38.9
4-6	65	51.6
7-9	12	9.5
Total	126	100.0
Mean	42.0	33.33
Farming experience (years)		
1-10	23	18.3
11-20	56	44.4
21-30	30	23.8
31& above	17	13.5
Total	126	100.0
Mean	31.5	25.0

Source: Field survey, 2012

Types of solid wastes used by respondents

The result of this study shows that the respondents in the area used varieties of solid waste which include homes/commercial refuse, abattoir waste, animal dung, farm by-product and poultry litter. The highlight of the result in Table 2 reveals that 38.9 percent used homes/commercial refuse as a solid waste for crop production, while 31.7 percent and 28.6 percent respectively used animal and poultry litter for crop production in the study area. However, the proportion of the respondents that used farm by-product as a solid waste for crop production was the lowest and constituted 20.6 percent. This was attributed to the fact that farm by-product and crop residues have become the most vital source of feeds for livestock owners in the area. However, complete removal of crop residues can aggravate soil nutrient depletion and cause a large drain on the nutrient stock and decline in soil fertility.

Table 2: Type of solid waste used for crop production

Solid waste	Frequency	Percentage
Homes/commercial refuse	49	38.9
Abattoir waste	32	25.4
Animal dung	40	31.7
Farm by-product	26	20.6
Poultry litter	36	28.6

Source: Field survey, 2012
***Multiple responses**

Determinants of solid waste usage

The result of the determinants of solid waste usage is shown in Table 3. It reveals that age of the respondents had a positive and significant relationship with the usage of solid waste for crop production ($P< 0.05$). The positive and significant effect could be explained by the fact that older farmers have better experience in indigenous soil fertility management practices, This finding is consistent with the previous study by Akilu (2006) which showed farmers' age to have positive significant influence on soil management practices, As expected, the result indicates that livestock ownership had a positive and significant effect on the usage of solid waste ($P < 0.05$). This could be attributed to the fact that respondents with more livestock have available manure which could be used for crop production. Hence, increasing livestock size would lead to increase of manure application by the respondents.

Furthermore, farm size of the respondents had a very high positive and significant effect on the use of solid waste ($P<0.05$). Some of the respondents reported that because of their farm sizes, the amount of chemical fertilizer supplied to them was not adequate; thus, the need to use solid waste to supplement chemical fertilizer. Moreover, town residence had high significant relationship with farmers' usage of solid waste for crop production ($P> 0.05$). This is likely because farmers who reside in towns have more access to solid waste collection sites such as commercial refuse sites and abattoirs than the farmers who lives in the rural areas. However, educational level of the respondents had significant inverse relationship with the use of solid waste for crop production. The negative effect could lead to the conclusion that respondents with higher educational levels focus more on chemical fertilizer than the indigenous fertilizer of solid waste and manures.

Table 3: Probit regression analysis for determinants of usage of solid wastes

Variables	Estimated coefficients	S.E	Z-value	p-value
Age	.267	.061	4.372	.000***
Farming experience	.004	.004	.945	.345^{ns}
Livestock ownership	.022	.010	2.106	.035*
Gender	.140	.104	1.339	.180^{ns}
Farm size	.023	.004	5.874	.000***
Marital status	.004	.010	.411	.681^{ns}
Town residence	.155	.045	3.449	.001**
Cooperative member	.071	.038	1.863.	.062^{ns}
Education	-769	.255	3.135	.002**

Source: Computed from field data, 2012
***=Significant at 5%**
NS=Not significant

Constraints by respondents to solid waste usage

Result in Table 4 reveals that 51.6% of the respondents faced challenges of handling of solid wastes, while 44.4% of the respondents complained of inadequate knowledge on selection of appropriate solid waste materials for crop production. Similarly, 37.3% of the respondents claimed that some solid waste harbor seeds and pest/insects that cause diseases to crops in the farms. Other constraints include problems of smelling (25.4%), bulkiness (19.0% and transportation (16.7%) of solid waste.

Table 4: Problems of Solid Wastes Usage for Agricultural Production

Constraints*	Frequency	Percentage
Handling difficulties	65	51.6
Transportation difficulties	21	16.7
Inadequate knowledge	56	44.4
Bulkiness	24	19.0
Harbors weed/pest/disease	47	37.3
Smelling	32	25.4

Source: Field survey, 2012

*Multiple responses

Conclusion

From the findings of this study, it can be concluded that more than half of the respondents were between ages of 21-40 years. Commonly used solid wastes for crop production in the area were home/commercial refuse and animal dung. Age, Livestock ownership, farm size and town residence had positive significant effects on the usage of solid for crop production. Some of the challenges faced by the respondents were problems of handling and inadequate knowledge on the selection of appropriate solid waste materials for crop production. If these constraints are tackled, it will help boost the usage of solid waste by farmers for crop production in the study area.

Recommendations

i. Government in collaboration with other stakeholders should put in place organized measure of urban solid waste collection and distribution, in order to make solid waste readily available to farmers for crop production.

ii. Extension efforts should be made to enlighten farmers on the selection of appropriate solid waste materials for crop production.

iii. Farmers should be encouraged to practice mixed farming (crop and livestock farming) to enable them generate enough solid wastes in form of animal dung for crop production to supplement chemical fertilizers.

References

Aklilu, A. (2006). Caring for the Land Best Practices in Soil and Water Conservation in Beressa Watershed and Highlands of Ethiopia. Tropical Resource Management Paper, No 76. Pp 1-7

EPDH (2005). "Solid Waste in Hong-Kong" on line www.epd.gov.hk/epd/english/environmenthk/wastedata/nomt.

NPC (2006). Provisional Census Figure, Federal Government of Nigeria. Pp 1-15.

NSADP (2001). An Insight into Agricultural Activities in Niger State, Minna. 2001 edition. Pp 1-10

Olawande, P. A. (1991). Wande Foundation Bulletin on Solid Waste Disposal, Ibadan. Pp 1-9.

Umar, S. I., Ndanitsa, M. A. & Olaleye, S. R. (2009). Adoption of Improved Production Technologies among Youth Farmers in Gbako Local Government Area, Niger State. *Journal of Agricultural Extension,* 13 (1): 1-8.

USEPA (2005). Municipal solid waste: Generation, Recycling and Disposal Facts and Figures. Available on line www.epa.gov/msw/msw991.