African Journal of Biotechnology Vol. 9(33), pp. 5309-5312, 16 August, 2010
Available online at http://www.academicjournals.org/AJB
ISSN 1684–5315 © 2010 Academic Journals

Full Length Research Paper

Performance of *Cochorus olitorius* as influenced by soil type and organic manure amendments in Yewa North Local Government Area, Ogun State

B. A. Senjobi[1]*, C. O. Peluola[2], C. T. Senjobi[3], I. O. Lawal[4], O. T. Ande[5] and B. T. Salami[5]

[1]Department of Soil and Farm Mechanization, Olabisi Onabanjo University, Ogun State, Nigeria.
[2]Department of Crop Production, Olabisi Onabanjo University, Ogun State, Nigeria.
[3]Department of Biological Science, Tai Solarin College of Education, Ogun State, Nigeria.
[4]Citrus Division, National Horticultural Research Institute, Ibadan, Nigeria.
[5]Department of Agronomy, University of Ibadan, Ibadan, Oyo State Nigeria.

Accepted 31 March, 2010

An experiment was conducted in Yewa North Local Government Area, Ogun State to evaluate the effect of four soil types (loamy, sand, clay and silt) amended with poultry manure (PM), plant manure (PLM), sheep/goat manure (SGM) and NPK on performance of *Cochorus olitorius*. It was a factorial experiment in completely randomized design. Pre-treated seeds were planted and watered daily. Agronomic data collected on days after planting were plant height, number of leaves and stem girth. Data were analyzed using generalized linear model of SAS version 9.1. Means were separated by least significant difference at P < 0.05. Results obtained indicated that loamy soil had significantly higher plant height, number of leaves and stem girth than other soil types. Silt had the least values for all the parameters measured. Performance of the soil types were in the order Loam > Sand > Clay > Silt. PLM had significantly higher plant height and stem diameter than PM and NPK but not significantly different from that of SGM. Loamy soil amended with either PLM or SGM performed better for all the parameters measured and therefore recommended in this study.

Key words: Organic manure, plant manure, soil type, *Cochorus olitorius*.

INTRODUCTION

High cost of inorganic fertilizer coupled with unavailability of these materials have been a major constraint to crop production with respect to provision of adequate nutrients for optimum performance of plants. The use of organic wastes as measures in supplying plant nutrients and replacing toxic effects of synthetic chemicals particularly on non-target organisms are becoming increasingly important as an alternative measures (Fabiyi and Ogunfowora, 1990; Adebayo and Olaifa, 2005 and Adenowoola et. al., 2005). However, poultry manure (PM) which are currently use by small scale farmers as a good source of macro and micro-element (Yayock and Awoniyi, 1974) are becoming threatening due to the recent outbreak of "bird flu" diseases. This therefore necessitated the use of other organic manures such as sheep and goat manure (SGM) and plant manure (PLM) (*Cnidoscolus conitifolius)* (Miller) Johnson. In view of the fact that *Cochorus olitorius* is gaining wider acceptability among consumers as a vitamin-rich leafy vegetable used in cooking draw soups with which hard and starchy staple food of the tropics are consumed (Dinakin and Ayanlaja, 1996), there is need for more information on its growth and performance.

This research was conceived with the primary aim of assessing the performance of *C. olitorius* under different soils amended with organic manure with the possibilities of finding alternative measures to deadly syndrome associated with poultry manure resulting from endemic "avian flu".

*Corresponding author. E-mail: bolasenjobi@gmail.com.

Abbreviations: PM, Poultry manure; **PLM,** plant manure; **SGM,** sheep/goat manure.

Table 1. Plant height of *Cochorus olitorius* as influenced by soil type.

Soil type	Plant height (cm) days after planting							
	7	14	21	28	35	42	49	56
Clay	0.36	2.30	3.15	4.96	5.11	5.56	7.09	8.36
Loam	0.97	3.37	5.43	8.20	9.06	11.00	14.29	15.07
Sand	0.93	2.94	4.56	6.37	7.88	8.73	10.99	13.24
Silt	0.21	1.96	2.98	3.46	4.81	5.47	6.39	7.63
SE	0.09	0.16	0.16	0.44	0.56	0.61	1.14	0.93

Table 2. Number of leaves of *Cochorus olitorius* as influenced by soil type.

Soil type	Number of leaves days after planting							
	7	14	21	28	35	42	49	56
Clay	4	7	13	15	17	20	24	27
Loam	4	8	14	18	23	26	30	36
Sand	4	8	14	16	19	21	26	29
Silt	4	7	12	14	16	18	22	24
SE	0.10	0.12	0.17	0.25	1.36	0.31	0.32	0.37

MATERIALS AND METHODS

The study was an open field pot experiment conducted at Olabisi Onabanjo University, Ayetoro Campus, Ogun State which was located on latitude 7° 12′N and longitude 3° 01′E. Four soil types - loam, sand, silt and clay were packed at approximately 5.0 kg soil per pot per soil type. Each soil sample was amended with different organic manure-PM, SGM, plant based organic manure (*Cnidoscolus* sp.) and NPK each at 0, 50 and 100 g per pot of soil. Poultry, goat and sheep manure used for the amendment were collected from the Teaching and Research Farm, College of Agricultural Sciences, Olabisi Onabanjo University, Ayetoro while the plant based manure, PLM, was obtained in the neighbourhood of Ayetoro town, Ogun State. Poultry, sheep and goat manure were air-dried before incurporated separately into the pots at 0, 50 and 100 g organic manure per pot and NPK at similar rate. They were left to decompose for 2 weeks before planting as described by Harper et al. (1980). Seeds were planted as broadcast on the peripheral 3 cm depth of the pot. Three plants were selected randomly from each pot, tagged and used for weekly observation. The experiment was a factorial laid out in completely randomized design with four replications. Data were collected on morphological characters, such as plant height, stem girth and number of leaves per treatment. Mineral nutrient analyses of the soil at 6 weeks after planting were carried out according to AOAC (1990) to determine the nutrient uptake Data were subjected to analysis using generalized linear model of SAS Version 9.1., 2005. Means were separated using least significant difference (LSD) at P < 0.05%.

RESULTS

Growth performance as influenced by soil type

Plant height

Table 1 shows plant height of *C. olitorius* as influenced by different growth media. Significant differences in plant height occur among the different soil types. Plant growth with loam soil consistently maintained significant (P ≤ 0.05) higher plant height range of 0.97 to 15.07 cm for the period of 7 to 56 days after planting. This been significantly different from those obtained from other growth media for the same period of growth. Following this were plants grown with sandy soil with height range of 0.09 to 13.24 cm for the same period. The least result was obtained in plants grown with silt soil with height range of 0.21 to 7.63 cm for the same period of investigation.

Number of leaves

Table 2 shows the number of leaves as influenced by different growth media. There were no significant differences in number of leaves at the initial stages of growth. However, plants grown with loam soil had significantly (P ≤ 0.05) higher number of leaves range of 18 to 36 from the period of 28 to 56 DAP as compared to other growth media. Following this were plants grown with sand soil which had significantly higher number of leaves (16 to 29) than plant grown with either clay or silt from the period of 28 to 56 DAP. The least number of leaves was obtained in plants grown with silt soil which had a range of 14 to 24 leaves for the same period of investigation.

Stem girth

Stem girth as influenced by different growth media is as shown in Table 3. As observed for number of leaves, there were no significant differences in stem girth among the different growth media at the initial stages of growth.

However, plants grown with loam soil had significantly (P

Table 3. Stem girth of *Cochorus* as influenced by soil type.

Soil type	Stem girth (cm) days after planting							
	7	14	21	28	35	42	49	56
Clay	0.13	0.16	0.16	0.18	0.28	0.41	0.50	0.58
Loam	0.12	0.23	0.52	0.57	0.63	0.75	0.82	0.90
Sand	0.22	0.23	0.31	0.45	0.55	0.65	0.75	0.85
Silt	0.10	0.10	0.12	0.17	0.25	0.38	0.45	0.56
SE	0.03	0.01	0.08	0.03	0.05	0.06	0.07	0.07

Table 4. Plant height of *Cochorus* as influenced by organic manure type.

Fertilizer control	Plant height (cm) days after planting							
	7	14	21	28	35	42	49	56
PLM	2.42	4.41	6.25	8.29	10.69	10.44	17.08	22.16
NPK	1.39	2.36	4.60	7.40	8.67	10.95	15.00	19.36
PM	1.38	3.23	6.08	8.25	10.27	12.77	16.18	20.23
SGM	2.48	4.57	6.53	9.84	11.51	15.88	18.54	23.92
SE	0.09	0.16	0.24	0.44	0.56	0.61	1.14	0.93

Table 5. Number of leaves of *Cochorus* as influenced by organic manure type.

Fertilizer control	Number of leaves (days after planting)							
	7	14	21	28	35	42	49	56
PLM	6	13	17	18	25	28	31	34
NPK	6	12	13	14	22	26	28	31
PM	6	12	13	14	24	26	29	32
SGM	6	13	19	22	27	30	34	37
SE	0.10	0.12	0.17	0.26	0.29	0.31	0.32	0.37

≤ 0.05) wider stem girth range of 0.25 to 90 cm for the period of 21 to 56 DAP as compared to other growth media. Following this were plants grown with sand soil with stem diameter range of 0.31 to 0.85 cm for the same period of growth. Plant grown with silt sand had the lowest stem girth range 0.12 to 0.56 cm for the same period of growth.

Growth performance as influenced by organic manure

Plant height

Influence of organic manure type on plant height of *Cochorus* is shown in Table 4. There were significant differences in plant height among the different organic fertilizer treatments. Plant endorsed with SGM maintained significantly (P ≤ 0.05) higher plant height range of 2.48 to 23.92 cm for the period of 7 to 56 DAP than those obtained from other treatments. Following this were plants grown with PLM which had height range of 2.42 to 22.16 cm for the same period. Plants treated with NPK fertilizer had the least plant height 1.39 to 19.36 cm for the same period of growth.

Number of leaves

Table 5 shows the influence of manure type on the number of leaves of *Cochorus*. There were no significant differences among the different treatment at the initial stages of growth. However, plants grown with SGM maintained significantly higher number of leaves range of 19 to 37 for the period of 21 to 56 DAP than those obtained from other treatments for the same period. Following this were plants endorsed with PLM which has number of leaves range of 17 to 34 for the same period. This been significantly different from those obtained in PM and NPK fertilizer.

Stem girth

Stem girth as influenced by organic manure type is as indicated by Table 6. Significant difference exists among some of the fertilizer treatments as regards stem girth.

Table 6. Stem girth of *Cochorus* as influenced by organic manure type.

Fertilizer control	Stem girth (cm) days after planting							
	7	14	21	28	35	42	49	56
PLM	0.17	0.21	0.45	0.49	0.52	0.59	0.72	0.86
NPK	0.10	0.12	0.13	0.24	0.31	0.39	0.46	0.64
PM	0.13	0.18	0.22	0.41	0.49	0.54	0.63	0.80
SGM	0.15	0.21	0.48	0.50	0.56	0.61	0.70	0.83
SE	0.30	0.01	0.08	0.03	0.03	0.04	0.05	0.06

Plants grown with PLM and SGM maintained almost the same stem girth growth for the period of 7 to 50 DAP with no significant difference between them. For this period SGM and PLM had stem growth range of 0.15 to 0.83 and 0.17 to 0.86 cm, respectively. These been significant different only to those obtained in NPK fertilizer which had 0.10 to 0.64 cm for the same period of investigation.

DISCUSSION

The use of organic fertilizers produced significant effects on the performance of *Cochorus* when compared with the mineral fertilizers. All the growth parameters considered were positively improved under organic manure amendments, with plant manure and sheep and goat manure producing significantly higher values. However, the integration of plant manure or sheep and goat manure with loamy soil gave significantly higher results compared with other soil types. This is because the management practices that a given soil is subjected to have a direct influence on the determinants of its productivity as reported by Agboola and Aiyelari (2000).

The better performance of loamy soil and moderate performance of sandy soil as observed form the results could be attributed to the influence of the above organic residues on soil properties. Besides enhancing the soil aggregate stability, organic residues particularly of plant or sheep and goat source serves as source and reservoir for soil nutrients as confirmed by Aweto (1981). This organic residue as reported by Senjobi (2007) has charge properties that make it a site for ion exchange. In addition, it has physical and chemical properties that facilitate aggregation with mineral particles especially clay, and in turn modifies soil structure and influences soil water regime thereby encouraging rapid growth (Agboola and Aiyelari, 2000; Senjobi, 2007).

From the results, the use of plant residue or sheep and goat manure as fertilizers could serve as an alternative not only to the use of mineral fertilizers, but also to poultry manure which might endanger lives due to recent endemic avian flu.

In view of the fact that the organic manure of the above sources influenced many of the biological mediated processes of the soil as reported by Swift and Woomer (1993) and Senjobi (2007), it then becomes pertinent for peasant farmers to adopt this technology for efficient and sustainable production of this widely acceptable crop in West African microcosm.

REFERENCES

Adebayo TA, Olaifa JI (2005). Evaluation of Tephrosia vogelu (Hook) in the control of flea beetles (Podagrica sp.) in Okra (*Abelmoschus esculentus* (L.) Moench). IJAAR (2005). Int. J. Appl. Agric. Apicult. Res. Faculty of Agric. Sciences, Lautech, Ogbomosho, Nigeria. 2(1): 111-119,

Adenowoola AR, Akanbi WB, Akinfasoye JO (2005). Influence of Poultry Manure on Growth Yield and Quality of Oniyaya Cultivar of Jew's Mallow (*Cochorus olitorius* L.): Int. J. Appl. Agric. Apicult. Res. (IJAAR), 2(1): 93-101, Faculty of Agricultural Sciences, Lautech, Ogbomosho, Nigeria.

Agboola AA, Aiyelari EA (2000). Land degradation and soil fertility decline in Africa. Proceedings of African Experts Meetings on Fertilizers. Ouagadougou Burkina Faso, July 26-30, 1999, (31): 35-53.

AOAC (1990): Official Method of Analysis (15th Edition). Washington DC. Association of Official Analytical Chemistry.

Aweto AO (1981). Organic Build-up in Fallow Soil in a Part of South-Western Nigeria and its Effects on Soil Properties. J. Biogeogr. (8): 67-74.

Dinakin MJ, Ayanlaja SA (1996). Growth Characteristics and Ascorbic acid Contact of Several Genotypes of Jute *Cochorus olitorius* Linn. Hortic. Sci. 31: p. 164.

Fabiyi LN, Ogunfowora OO (1990). Fertilizer Sub-section in Nigeria. A blue-print for improved performance in the 90's. Paper presented at the 2nd National fertilizer Workshop Company of Nigeria. NICON-NOGA Hotel, Abuja, 5th-7th Nov. p. 18.

SAS (2005). Statistical Analysis System. Cary North. Carolina. Statistical Analysis Systems Cary, North Carolina.

Senjobi BA (2007). Comparative Assessment of the Effect of Land Use and Land Type on Soil Degradation and Productivity in Ogun State, Nigeria. A published Ph.D. thesis in the Dept. of Agronomy, University of Ibadan, Nigeria, p. 161.

Swift MJ, Woomer P (1993). Organic Matter and Sustainability of Agricultural Systems. Definition and Measurement Mulongoy K, Merokx R (eds.). Soil Organic Matter Dynamic and Sustainability of Tropical Agriculture. Chichester, John Wiley and Sons Ltd., pp. 3-18.

Yayock JY, Awoniyi JC (1974). Organic Manure: An Industrial Waste and Chemical Fertilizer of Maize and Sorghum. Samaru Agric. Newslett. 16: 9-10.