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INFLUENCE OF DIFFERENT RATES OF POULTRY MANURE ON THE PERFORMANCE OF MUNGBEAN *(VIGNA RADIATA(L) WILCZEK)*

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ABSTRACT: An experiment was conducted at Teaching and Research Farm of Imo State University, Owerri to investigate the optimum rate of poultry manure for mungbean yield and yield potentials in Owerri. The experiment was arranged in a Randomized Complete Block Design in four replications using four rates of poultry manure (0ton/ha, 3ton/ha, 6ton/ha and 9ton/ha), with 0ton/ha as the control. The poultry manure was collected from the University and was incorporated into the soil two weeks before planting of mungbean seeds, while the mungbean seeds were procured from Michael Okpara University of Agriculture, Umudike Abia State. Ten plants were selected at randomly and data was collected on the percentage emergence, number of days to 50% flowering and podding, 100% pod maturity, plant height at maturity, 100-seed weight, pod weight and seed yield. Results showed that poultry manure rate of 9ton/ha significantly influenced the performance of the mungbean in all the parameters monitored with 88.25%, 52.75days, 30.75cm, and 1600kg/ha for percentage emergence, days to 100% pod maturity, plant height at maturity and seed yield per hectare respectively. Whereas plots that did not receive the manure treatments showed the poorest performance followed by the plants with 3ton/ha of the manure. It is recommended that poultry manure be used at higher rates for optimum performance of mungbean.

KEY WORDS: Application rates, poultry manure, effects, Mungbean, optimum performance.

INTRODUCTION

Mungbean *(Vigna radiata*(L) Wilczek.*)* is a legume that belongs to Fabaceae family (Agugo, 2003). It is widely believed that mungbean originated from Southeast Asia and remains an important pulse crop throughout Southern Asia especially in India, (Kay, 1979). It is also grown to a lesser extent in many parts of Africa (Daisy, 1979). Mungbean is an expanding crop in Northern Australia as growers seek to diverse production and to take advantage of market opportunities opened up as production declines in some South Asian countries, where intensive horticultural production is replacing field crops (Bruce, 2001). The crop constitutes a major protein providing food for people in the South Eastern part of Asia where its production has been found to be the highest (Bruce, 2001). Its seed contains 24.7% protein, 0.6% fat, 0.9% fibre and 37% ash (Potter and Hotchkiss, 1997). Invitro protein digestibility of genotypes of mungbean is greater than urdbean and soybean *(*Chitra *et al.,* 1995).

Mungbean does not do well in a low fertile soil and depends on organic matter. The use of fertilizer is considered one of the most important factor to increase crop yield on per unit basis (Swamy and Reddy, 2004). The application of phosphorous to mungbean has been reported to increase dry matter at harvest, number of pods per plants, seeds per pods, 1000 grain weight, seed yield and total biomass (Mitra, *et al.,*1999; Bismillah *et al.,* 2003). Acquiring chemical fertilizer however is rather difficult and the need for alternative source(s) of nutrient is becoming increasingly imperative. In the tropics organic manure has been identified as an alternative and cheaper source of nutrient supply for crops (Agele, 2001). The quantity and yield of crops produced is dependent on the sources or organic manure used (Hussein, 1997). The superiority of poultry manure over other sources of organic manure have been reported by several researchers. In the same vein, Christo *et al* (2008) confirmed the superiority of poultry manure over other sources of organic manure.

The growing of mungbean in South Eastern Nigeria is not well known due to lack of information about the crop's importance, yield potential and agronomical practices. Nigerians cannot meet their body protein requirement without food legumes and time has come for every region to participate in food legumes production (Agugo, 2003). It is also necessary that a study on how best to produce this important crop be carried out to enhance food security in Nigeria. The present study is aimed at investigating the optimum poultry manure rate for mungbean production in a humid tropical environment.

MATERIALS AND METHODS

The field experiment was conducted at Teaching and Research Farm of Imo State University, Owerri. Randomized Complete Block Design was used. Poultry manure rates of 0 ton/ha, 3 ton/ha, 6 ton/ha and 9 ton/ha collected from the University poultry farm were used for the experiment. Mungbean cultivar NM-94 which was collected from Michael Okpara University of Agriculture Umudike, Abia State was also used. An experimental field of 20mx14m was cleared manually and used. The experimental site was partitioned into 16plots each measuring 4m x 14m. Samples of the soil were collected and analyzed and some of the physico-chemical properties of the soil were ascertained. The poultry manure was incorporated into the soil two weeks prior to sowing of the seeds.

The mungbean seeds were sown with the planting distance of 50cm x 10cm, 2cm depth at the rate of 2 seeds per hill which was thinned to one seed per hill two weeks after germination. Weeding of the experimental plots was done manually four times before harvesting.

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The experiment was monitored and data was collected on the following parameters:
Percentage emergence
Days to 50% flowering
Days to 50% podding
Days to 100% pod maturity
Plant height at maturity
100 Seed weight
Number of pods per plant
Number of seeds per pod
Pod weight per plant
Seed yield per hectare as indicated in table 2 and 3 below.

Days to 50% flowering and podding were recorded from the date of emergence till when 50% of the plants in each plot produced flowers and pods respectively. Also days to 100% maturity were recorded from the date of emergence till when all the pods in the plants were matured. Plant height was obtained by measuring the height of ten randomly selected plants from each plot and their average was then worked out. Pods in ten plants randomly selected from each plot were counted and their average was calculated regarding pods per plant. Similarly, number of seeds per pod was calculated by counting the number of seeds of twenty pods from each plot and their average was worked out. Pods in ten plants randomly selected from each plot were weighed and their average was calculated to obtain weight of the pods per plant. Seeds were obtained from randomly selected ten plants from each plot after extraction of the seeds from the pods cleared and then converted into seed yield per hectare.

Analysis of variance (ANOVA) was used to analyse the data, while mean values were separated by the Duncans Multiple Range Test.

RESULTS

Table 1 shows the physico-chemical properties of the experimental site before planting. The table shows that the soil is loamy sand in texture with 87.40%, sand, 4.60% clay and 8.00% silt. The soil is acidic with pH of 5.83. The Nitrogen content of the experimental plot was 0.13% while the Phosphorous and Potassium were 22.60mg/kg and 0.12Cmol/kg respectively. The Exchangeable Acidity of the experimental site was 1.76Cmol/kg. Sodium, Calcium and Magnesium levels of the soil were 0.09cmol/kg 2.00cmol/kg and 1.60cmol/kg respectively. The organic Carbon and Organic Matter values were 1.12% and 1.93%. Effective Cation Exchange Capacity and the Percentage Base Saturation values were 5.57cmol/kg and 68.37%. Consequently, the soil could be described as a loamy soil with low Nitrogen (N), Medium in available Phosphorous (P) and low in Potassium (K). Overall, the soil is very low in Organic Matter with the organic matter content of 1.93% (<2.00 are adjudged low).

received 750ml of the spent motor oil gave a mean seed yield of 3.33kg/ha which was significantly ($P \leq 0.05$) different from the mean seed yield of 10.66kg/ha observed from plants in the control soils (Table 3).

Table 1: Physico-Chemical Properties of the Soil

% Sand	-	87.40	
% Clay	-	4.60	
% Silt	-	8.00	
Texture	-	Loamy sand	
pH (H_2O)	-	5.83	
P mg/kg	-	22.60	
% N	-	0.13	
% OC	-	1.12	
% 0m	-	1.93	
K	-	0.12	
Na	-	0.09	
Ca	-	2.00	Cmol/kg
Mg	-	1.60	
EA	-	1.76	
ECEC	-	5.57	
% BS	-	68.37	

A summary of the growth attributes of mungbean as influenced by poultry manure rates is shown in Table 2. The results revealed that plants that received 9ton/ha of poultry manure gave highest percentage emergence (88.25%), statistically similar (p=0.05) to 86.63% emergence observed from plants that received 6ton/ha of the manure. But the values were significantly higher than 70.69% and 79.56% obtained from 0ton/ha and 3ton/ha of poultry manure treated plants respectively. (Table 2).

Results also showed that application rate of poultry manure significantly influenced days to 50% flowering (Table 2). The plants without any manure had the shortest days (35.00 days) to 50% flowering which was significantly different from all others. But the plants that received the manure rates 6ton/ha and 9ton/ha had the same (36 days) to 50% flowering and was significantly higher (p=0.05) than others.

Statistical analysis of the data showed that various levels of poultry manure had significant effect (p=0.05) on number of days to 50% podding. The manure rates 9ton/ha and 6ton/ha produced plants with the same number of days (38.15days) to 50% podding, statistically similar to the value (37.75days) obtained from 3ton/ha of poultry manure treated plants. The value (38.15days) was significantly higher (p=0.05) than 37.25days observed from the plants without any manure (Table 2).

The shortest days (50 days) to 100% maturity was recorded from the plants without any poultry manure. This was statistically similar (p=0.05) to the values obtained from 3ton/ha (50.25days) and 6ton/ha (50.50days) treated plants, but significantly lower than the value (52.75days) obtained from 9ton/ha treated plants (Table 2).

Statistical analysis of the data showed that various levels of poultry manure had significance effect (p=0.05) on plant height at maturity (Table 2). The plant height at maturity (30.95cm) was obtained from the plants that received manure rate of 9ton/ha. This was significantly different (p=0.05) from all others. The plant height at maturity of the plants that received poultry manure rates of 3ton/ha and 6ton/ha were 27.50cm and 28.26cm respectively. The values were statistically similar, but significantly higher (p=0.05) than the plant height (25.00cm) obtained from 0t/ha manure treated plants (Table 2).

TABLE 2: EFFECTS OF DIFFERENT RATES OF POULTRY MANURE ON GROWTH ATTRIBUTES OF MUNGBEAN

Poultry manure rate (t/ha)	Percentage emergence	Days to 50% flowering	Days to 50% podding	Days to 100% pod maturity	Plant height at maturity (cm)
0	70.69^{c}	32.00^{0}	37.25^{b}	50.00^{b}	25.00^{c}
3	79.56^{b}	35.00^{b}	37.75^{ab}	50.25^{ab}	27.50^{b}
6	86.63^{a}	36.00^{a}	38.15^{a}	50.50^{ab}	28.26^{b}
9	88.25^{a}	36.00^{a}	38.15^{a}	52.75^{a}	30.75^{a}
Cv	4.44	0.81	1.16	0.74	5.11

Means having the same letter(s) are not significantly different at 5% level of probability according to DMRT.

The effects of poultry manure rates on the yield and yield attributes of mungbean are shown in table 3. The poultry manure rates showed significant differences (p=0.05) in the number of pods per plant. The highest number of pods per plant (23.28pods) were recorded from the plants that received 9ton/ha of the manure. This was significantly different (p=0.05) from the values obtained from other treatments. While the plants without any manure produced the least number of pods per plant (9.60pods) which was statistically similar to the value (11.88pod) produced by the plants that received 3ton/ha of the organic manure (Table 3). The 100-seed weight (5.21g) produced by the plants with 9ton/ha of the organic manure was the highest, significantly (p=0.05) higher than others. Analysis of the data also revealed that various levels of poultry manure have significantly (p=0.05) affected pod weight per plant. The pod weight per plant obtained from the plants that were treated with 6ton/ha and 9ton/ha of the organic manure were 82.50g and 100.45g respectively, statistically similar (p=0.05) to each other and significantly higher than other values. But the pod weight obtained from 3ton/ha (56.24g) and 0ton/ha (39.98g) were statistically similar (Table 3).

Poultry manure rates also exhibited significant influence on number of seeds per pod. The trend is that, the higher the rate, the more the seeds in a pod. Plants that received 9ton/ha of the poultry manure produced the highest number of seeds per pod (11.98) (Table 3). Though this was not significantly different from the number of seeds per plant recorded in the plots that received 6ton/ha manure, it was significantly different (p=0.05) from those values that were obtained from 3ton/ha and 0ton of poultry manure treated plants.

Data regarding seed yield per hectare is shown in table 3. There was no significant difference (p=0.05) between the seed yield (1600kg/ha) obtained from the plants that were treated with 9ton/ha and 6ton/ha poultry manure (1330kg/ha). However, the values were significantly higher (p=0.05) than the seed yield from 3ton/ha and 0t/ha manure treated plants, 830kg/ha and 530kg/ha respectively.

Table 3: Effects of different rates of poultry manure on yield and yield components of mungbean

Poultry manure rate (t/ha)	100 seed weight (g)	Number of pods per plants	Number of seeds per pod	Pod weight per plant	Seed yield (kg/ha)
0	4.37^{c}	9.60^{c}	10.15^{c}	39.98^{b}	530^{b}
3	4.56^{bc}	11.88^{c}	11.33^{b}	65.24^{b}	830^{b}
6	4.75^{b}	17.73^{b}	11.53^{ab}	82.50^{a}	1330^{a}
9	5.21^{a}	23.28^{a}	11.98^{a}	100.45^{a}	1600^{a}
Cv	4.39	14.65	2.66	16.59	25.73

Mean followed by the same letter(s) are not significantly different at 5% level of probability according to Duncans Multiple Range Test.

DISCUSSION

The results of the study showed that poultry manure significantly improved the growth attributes and yield of mungbean plant. This could be possibly due to the nutrient status of the poultry manure. Thus the quality of nutrient supplied to plants from organic manure depends on the quality and quantity of the manure applied (Christo *et al.,* 2008).

The highest percentage emergence was obtained from the plants that was obtained from the plants that received the highest level of the poultry manure, while the least was obtained from the plants without any manure treatment. This is in agreement with Madukwe *et al.* (2008) who obtained the least percentage emergence in cowpea from the plants without any manure application.

The days to 50% flowering, 50% podding and 100% pod maturity increased as the rate of manure application increased. This disagrees with the work of Hussein (1997) who recorded the least number of days to 50% flowering and maturity from the plants that receive organic manure.

The variation might be due to differences in soil and organic manure fertility status. This also might be due to availability of more nitrogen in the higher doses of poultry manure which could prolong the vegetative phases of the mungbean plants.

The plants that received the highest manure rate (9ton/ha) produced the highest plant height at maturity, while the least was obtained from the control plots. Similar observation has been reported (Agele, 2001). The application of poultry manure influenced 100-seed weight and number of seeds per pod. These were maximum with crops that received the highest dose (9ton/ha) of poultry manure. This is in agreement with Hussein (1997) who stated that quality and quantity of organic manure applied influence the amount of nutrients released. This result implies that pod filling was more effective with higher dose of poultry manure. This could be associated with the ability of the mungbean plant to assimilate available nutrient quickly from higher dose of organic manure and use them efficiently. Practically the mungbean yield was substantial with significant difference in the various rates of application. This could also be due to the fact that poultry manure is a rich manure and releases more nutrients as the quantity increases (Madukwe *et al.,* 2008; Lateef *et al.,* 1998).

CONCLUSION

It was concluded that higher rates of poultry manure should beapplied for optimum performance of mungbean.

REFERENCES

Agele, S.O. (2001). Growth and yield of tomato grown on degraded soil amended with organic waste. *Proceeding of the 35th annual conference of the Agricultural Society of Nigeria.* September 16-20, 2001pp. 151-154. University Technology, Abeokuta, Nigeria.

Agugo, B.A.C. (2003). Introducing Mungbean in the Southeastern Nigerian humid forest. Overview of potentials. *Proceedings of 37th annual conference of the Agricultural Society of Nigeria held at Calabar* pp. 301-309.

Bismillah, K.M., M. Asif, N. Hussein and M. Aziz (2003). Impact of different levels of phosphorous on growth and yield of mungbean genotypes. *Asian Journal of Plant Sciences* 2(9): 677-679.

Chitra, U., V. Vimla, U. Singh and P. Geervani (1995). Variability in Phytic acid contentments and protein digestibility of grain legumes. P1. *Food for human-nutrition,* 47:163-172.

Christo, I.E.C., D.K. Madukwe, and M.O. Onuh (2008). Growth and yield of cowpea *(Vigna unguiculata (L.) Walp)* as influenced by cultivar and organic manure source in the humid Tropical Environment. *International Science Research Journal* 1(1) 47-52.

Hussein, T.O. (1997) Effect of poultry manure on the growth of tomato. Proceedings of the 15th annual conference. HORTSON April 8-11, 1997 NHORT, Ibadan, Nigeria pp. 43-45.

Lateef, E.M. T.G. Behairy and N.I. Ashour, (1998). Effect of phosphatic potassic fertilization on yield and its components of mungbean *(Vigna radiata (L.) Wilczek)* varieties. *Arab University Journal of Agricultural Science* 6: 167-181.

Mitra, S., S.K. Rhattacharya, M. Datta and S. Banik. (1999). Effect of variety, rock phosphate and phosphate solubilizing bacteria on growth and yield of green gram in acid soils of Tripura. *Environment Ecology,* 17:926-930.

Madukwe, D.K., I.E. Christo and M.O. Onuh (2008). Effects of organic manure and cowpea *(Vigna unquiculata (L) Walp)* varieties on the chemical properties of the soil and root nodulation. *Science World Journal* Vol. 3 (No.1)

Potter, N.N. and J.H. Hotchkiss, (1997). *Food Science* CBS Publishers, New Delhi India pp: 403.

Swamy, A.A. and G.L.K. Reddy (2004). Stability analysis of yield in mungbean *(Vigna radiata L. Wilczek). Legume Research* Vo. 27(2) 107-110.