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Original Article

EFFECT OF COWDUNG ON THE PERFOMANCE OF TOMATO

***Saidu, A., Bello, L. Y., Tsado, E. K. and Ibrahim. F. K.**

Crop Production Department, Federal University of Technology, Minna, Nigeria

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ABSTRACT

Field experiment was conducted at the Teaching and Research Farm of Crop Production Department, Federal University of Technology Minna, Gidan Kwanu Campus to determine the effect of different levels of cow dung on the performance of tomato. The experiment was arranged in a randomized complete block design (RCBD) with three replications. The treatments consisted of five levels of cow dung (0, 7.5, 12.5, 17.5, and 22.5 t/ha). The application at 17.5 t/ha resulted in the highest plant height and number of fruits, while at 22.5t/ha there were no corresponding increase in the number of fruits at harvest. There was no significant ($p>0.05$) difference in plant height at 3 weeks after transplanting (WAT) but significantly ($p<0.05$) different at 6 and 9WAT. Also, there were significant ($p<0.05$) differences in the number of leaves at 6 and 9WAT. At 6WAT, the highest number of flowers (8) was observed when 17.5t/ha was applied, while the lowest was recorded in 0t/ha. The highest number of leaves (7) were observed when 7.5 t/ha was applied while the lowest (1) was recorded when 0 t/ha was applied. There was no significant ($p>0.05$) difference in fruit weight at harvest. The result showed that application of cow dung at 17.5 t/ha resulted in highest yield of tomato, while additional higher level of cow dung at 22.5 t/ha did not result in corresponding increase in the of yield of tomato.

Key words: Organic manure, Cow dung, Plant height, Number of leaves, Fruit weight

***Correspondence:** saiduadamu08@yahoo.com, +234 07036683435

INTRODUCTION

High cost and scarcity of inorganic fertilizers in developing countries prohibit their use by most peasant farmers, thereby generating renewed interest in the use of organic materials as nutrient sources for the cultivation of nutrient demanding crops like tomato. Most studies on the use of animal wastes dealt with cow dung and poultry droppings and their fertility-improving value has been confirmed for many crops (Akanbi 2002). The use of available and cheap cow dung by vegetable farmers in Nigeria ensure sustainability of production and balanced nutrition as described by Moyin (2003). Studies carried out by Moyin Jesus and OJeniyi (2000) showed that agro-industrial wastes were effective in increasing uptake of N,P,K, Ca, and Mg. Soils treated with farmyard manure were found to contain enough soluble phosphoric acid, potash and lime (Pal *et al.*, 2001). The long term use of cow dung increased aggregate stability, macro pores. Addition of cow dung to soil lower bulk density (Olaniyan *et al.*, 2006). A great part of the benefit of animal manure lies in slow mineralization and the addition of organic matter to the soil which offers a definite advantage over inorganic fertilizers (Lakshmikathan 1983). According to Asadu and Nweke (1999), the application of recommended rates of inorganic fertilizers did not give the expected yield increases under continuous cropping system. Diver and Holy *et al.*, (1999) stated that organic

agriculture is an ecologically sound production management system that promotes and enhances biodiversity and biological activity. The primary goal of organic agriculture is to optimize the health and productivity of interdependent communities of life, plants, animals and people .The principal guideline for organic production is to use materials and practices that enhance the ecological balance of natural systems and that integrate the parts of the farming into ecological whole. Organic agricultural practices cannot ensure that products are completely free from residues, however, methods are used to minimize pollution from air, soil and water. Growers choose organic methods for a variety of reasons. One of the attractions of organic produce is that it sometimes brings about 10-30% premium to the market place. As organically grown produce becomes common place, however, these premiums may be the exception rather than the rule and motivation beyond market premiums should be considered. Incentives may include the possibility of reduced input costs, improved farm safety, reduced environmental impact and a better functioning agro system (Diver and Holly 1999). Well rotted manures applied in the spring or fresh manure applied in the fall tends to enhance production beyond what the use of only commercial fertilizers can achieve. Whatever, the aim is to ensure the presence of organic matter abundance in the soil. Adequate supply of rotting or decaying matter will greatly increase crop yield and improve fruit quality (OMAFRA 2001). Organic food is widely believed by lay public to be healthier than conventional food although the research is inconclusive (Magkos 2003). Cow dung applied with inorganic nitrogen (N), increase soil (pH) and ameliorated acidity (Olayinka and Ailenubhi, 2011).

Farm yard manure has been used as a soil conditioner since ancient times and its benefits have not been fully harnessed due to large quantity required in order to satisfy the nutritional needs of crop (Makinde *et al.*, 2007). Farm yard manure releases nutrient slowly and steadily and activates soil microbial biomass Ayusu *et al.* (1996), Baley *et al.* (2001). Egbbali (2009) noted that K and P deficiencies were reduced when farm yard manure was applied with rising P^H values. The application of animal manure, which contains both mineral and organic N, is useful for maintaining and improving soil fertility and rice production (Takahashi *et al.*, 2004). The organic manures such as cow dung; poultry manure and crop residues can be used as an alternative for the inorganic fertilizers. The objectives of this research was therefore to determine the effect of cow dung on the performance of tomato.

MATERIALS AND METHODS

The experiment was carried out at the Teaching and Research Farm of Crop Production Department, Federal University of Technology Minna (9° 30 N and 6° 30 E) in the Southern Guinea Zone during 2009 raining season. The experiment was arranged in a randomized complete block design (RCBD) with three replications. The treatments consisted of five levels of cow dung (0, 7.5, 12.5, 17.5 and 22.5t/ha). The site was ploughed, harrowed, and prepared to a fine tilth with decomposed cow dung incorporated into the field. Seeds were raised in plastic rubber and watered morning and evening. Four weeks old, healthy, vigorous and uniform size seedlings were selected and transplanted. Five plants were randomly selected from the net plot and tagged. Data collected include plant height, number of leaves, number of branches, number of flowers, number of fruits, fruit diameter, and fresh fruit weight. The data collected were subjected to analysis of variance.

RESULTS

Plant height, Number of leaves and branches

There was no significant ($p>0.05$) difference in the plant height at 3 weeks after transplanting (WAT). However, significant ($p<0.05$) difference was observed at 6 and 9 WAT. The highest plant height was observed at 3, 6, and 9 WAT when cowdung was applied at 17.5t/ha. There was no significant ($p>0.05$) difference in the number of leaves at 3 WAT. At 6 and 9 WAT, on the other hand significant ($p<0.05$) difference was observed in the number of leaves in the plot where 17.5 t/ha was applied. There was significant ($p<0.05$) difference in the number of branches at 6 and 9 WAT respectively. The application of cow dung at 22.5 t/ha recorded highest number of branches while the lowest number of branches was recorded where cow dung was not applied.

Table 1. Effect of different levels of cow dung on plant height (cm)

Treatment(s)(t/ha)	3WAT	6WAT	9WAT
0	24.67b	40.87c	41.13c
7.5	26.67ab	53.33b	53.80b
12.5	27.73ab	51.93b	57.13ab
17.5	30.40a	60.93a	61.20a
22.5	28.67ab	59.93a	60.00a
SE	0.89	1.96	2.04

Means with different superscript within the column are significantly different ($P < 0.05$)

Table 2. Effect of different levels of cow dung on number of leaves

Treatment(t/ha)	3WAT	6WAT	9WAT
0	5b	1d	10c
7.5	7ab	6b	14b
12.5	7ab	4c	21a
17.5	8a	8.00a	20a
22.5	8a	4c	14b
SE	0.34	1.22	1.23

Means with different superscript within the column are significantly different ($P < 0.05$)

Number of fruits and fruit weight: There was significant ($p<0.05$) difference in the number of fruits and this was recorded when 17.5 t/ha of cow dung was applied. There was significant ($p<0.05$) difference in the fruit weight at harvest. The highest fruit weight was recorded when 17.5 t/ha

dung was applied and lowest fruit weight recorded in the control.

3. Effect of different levels of cow dung on number fruits

(t/ha)	6WAT	9WAT
0	1a	1d
7.5	1a	3bc
12.5	1a	4b
17.5	1a	5a
22.5	1a	2cd
SE	0.38	0.41

with different superscript within the column are significantly different ($P < 0.05$)

T- Weeks after transplanting

4. Effect of different levels of cow dung on fruit weight (kg)

Treatment(s)(t/ha)	Fruit weight(kg)
0	0.27b
7.5	0.84ab
12.5	0.97a
17.5	0.74ab
22.5	0.77ab
SE	0.86

s with different superscript within the column are significantly different ($P < 0.05$)

– Weeks after transplanting

Table 5 Effect of different levels of cow dung on fruit diameter (cm)

Treatment(s) (t ha^{-1})	Fruit diameter(cm)
0	2.86e
7.5	3.33c
12.5	4.73b
17.5	6.20a
22.5	3.60c
SE	0.34

Means with different superscript within the column are significantly different ($P < 0.05$)

WAT – Weeks after transplanting

DISCUSSION

The result showed that plant height was positively correlated with increase in the cow dung.This result is in line with the findings of Dauda (2003) who observed that each increase in manure rate significantly increased plant height. The significant difference observed in the number of leaves also conformed to the work of Reddy and Reddi (2002) who reported that high quality goat manure increased leaf length. It has been asserted that cultivation of crop in soil with none limiting nutrients aid crop yield, growth and development thereby improving the crop nutritional component (Akanbi 2002; Olaniyan *et al.*, 2006). The fruit count showed positive and significant response to cow dung application. The result from this study indicated that increase in cow dung application generally enhanced fruit production of tomato and that tomato grown without cow dung produced fruits which were smaller and fewer in number. This is in line with the findings of (Olayinka *et al.*, 2006; El-Tantawy, 2009)

The authors reported that the ability of a crop to exhibit its genetic potential for seed production and quality depends to certain extent on the nutrients available for the plant use. The 12.5t/ha of cow dung that produced highest tomato fruit weight means that treatment contained nutrients sufficient enough to produce highest number of fruits. This is in line with the report of Olaniyan *et al.*, (2005).The report indicated that fertilizer application generally enhanced fruit production in *S. macrocarpan* and that plant grown without fertilizer produced fruits which were smaller and fewer with many unfilled seeds. From the result recorded in this study, the use of 12.5t/ha and 17.5t/ha produced high quality of tomato fruits.

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