Original Article

Influence of Different Rates of Application of Poultry Dropping on the Growth and Yield of Tomato (*Lycopersicum esculentum* L.) cultivars

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Submitted: Aug.10, 2012; Accepted: Nov. 12, 2012; Published: Dec. 17, 2012.

ABSTRACT

A Field experiment was conducted at the Teaching and Research Farm of Crop Production Department , Federal University of Technology Minna, to determine the influence of different rates of application of organic manure (poultry dropping) on the growth and yield of two tomato cultivars(Roma VF and UC-82B). The experiment was arranged in a randomized complete block design (RCBD) with two replicates. The treatments consisted of three levels of poultry dropping (0t/ha, 2t/ha and 4t/ha). Application of poultry dropping (2t/ha and 4t/ha) resulted in the highest number of branches in Roma VF while lowest was observed in UC-82B. There was no significant ($p > 0.05$) difference in the number of leaves (3, 6, and 9 WAT) between Roma VF and UC-82B when 4t/ha of poultry dropping was applied. However, significant ($p < 0.05$) difference was observed in the number of leaves between Roma VF and UC-82B (3, 6, and 9 WAT) when 2t/ha was applied. Application of poultry dropping (4t/ha) resulted in highest number of flowers in Roma VF (6 and 9 WAT) while lowest was obtained in UC-82B. It was observed from the results recorded that Roma VF performed better than UC-82B.

Key words: Organic manure, Poultry dropping, Number of branches, Number of flowers , Number of fruits, Fruit weight

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INTRODUCTION

Tomato (*Lycopersicum esculentum*) is one of the most wide spread species of the botanical family, Solanaceae. They are tall spreading herb with yellow flowers. Tomato plants are propagated by seed and thrive best in rich loamy soil in warm humid and sunny climates. It thrives well in temperature range of 18^{o}C to 30^{0}C with optimum temperature of 21^{o}C to 24^{o}C. Bright sunshine at the time of fruit set helps to develop dark red colored fruits. Tomato is a moderate tolerant crop to wide pH range. A pH of 5.5- 6.8 is preferred. It grow 60cm or more above the ground if supported, although erect bush varieties have been bred, generally 30cm tall or shorter.

Factors influencing selection of tomato varieties include market demands, disease resistance, suitability to production systems and regional adaptability (Diver and George, 2001).

Today tomato enjoys worldwide distribution and is integral to the culinary deposition of multiple cultures. The plant probably originated from southern or central America. The current rage of tomatoes relatives extends from the northern tip of Chile on the

south to the Ecuador on the north, down to the pacific. Today, it is cultivated worldwide. In Nigeria, tomato is cultivated in the savannah region and consumed nationwide.

However, in certain areas of Italy , the fruit was used solely as table top decoration before it was incorporated into a local genesis in the late 17th and 18th century (Paralta and Spooner, 2001).

Tomato consumption is believed to benefit the heart among other things. They contain lycopene which when tomato is cooked has been found to prevent prostate cancer by multiplying cancer-causing free radicals (Durrant, 2008). They are also used for preparation of tomato sauces and tomato juice (Ayanwu*et al.,* 2003). The fruit are used as salad, vegetable in canning industries. Tomato extract is added as Lycomate used for treatment of high blood pressure and also improve the skins ability to protect against harmful ultra – violet rays.

Tomato is one of the most important basic necessities of man. For Nigeria to meet the millennium development goal (MDG) in food production, food, including tomato must be readily available. Low soil fertility could threaten the security of food production and supply. Soil fertility is a major over riding constraint that affects all aspect of crop production (Mbah, 2006).

The objective of this study was to determine the growth and yield of tomato as influenced by poultry droppings.

MATERIALS AND METHODS

A Field experiment was conducted during the 2010 cropping season, at the Research Farm of Crop Production Department, Federal University of Technology Minna, Gidan Kwano Campus. Gidan Kwano is located at latitude 6^0 33E and longitude 9^0 37N in the Southern guinea savanna zone of Nigeria. The average annual rainfall ranges between 750mm – 1250 mm. The soil textural class of the experimental site was sandy loam.

The experiment consisted of three manure levels (0t/ha, 2t/ha and 4t/ha) and two tomato varieties (Roma VF and UC-82B). Treatments were replicated two times and laid out in a Randomized Complete Block Design (RCBD). The field size was 6m x 17m and the size of each plot was 2.25 x2m. Pathways of 1m between each plot and each replicates were created for easy access to the tomato plants within.

The seeds were sown in two plastic filled with top soil and perforated at the bottom .A thin layer of small stonnes were laid to prevent blockage of the holes. A thin layer of dry grasses was placed over the stonnes to serve as an aid for good drainage.

Grooves of not more than 1cm deep were made with a blunt stick. Seeds were then dispensed into the grooves at fair distance apart. The seed were spread in the grooves by hand. Fine soil was spread over the seed and then firmed. The soil was then sprinkled with water skillfully using hand with a bowl.

Watering was done every morning except when it rains. Shade was also provided to prevent excess heat from the sun. Seedlings were kept free of weed by hand until they were about four weeks after broadcasting.

The experimental field was ploughed, harrowed and ridges were made before transplanting.

Poultry dropping were incorporated into the ridges at different rates, two weeks prior to transplanting as recommended by Brown and James (1995). The poultry droppings were applied at $0tha^{-1,}$ $2tha^{-1}$ and $4tha^{-1}$

Healthy, vigorous and uniform size seedlings of tomato varieties (Roma VF and UC-82B) were selected and transplanted at spacing of 50 X 60cm. The naked root system was used. Five stands of tomato plant were randomly selected and tagged from each plot for data collection. Data collected included number of

branches, leaves, flowers, fruits and fruit weight.

DATA ANALYSIS

Data obtained were subjected to analysis of variance (ANOVA) using SPSS (16). Using the least significant difference (LSD).

RESULTS AND DISCUSSION

The result shows that for the control treatment (0t/ha) in Roma VF, there was no significant difference ($p>0.05$) in number of branches at 6WAT and 9WAT but significant difference ($P<0.05$) was observed at 3WAT (Table 1). Similar result was observed when 2t/ha of poultry droppings was applied to Roma VF (Table1). Application of 4t/ha of poultry droppings to Roma VF, showed a significant difference ($p<0.05$) in the number of branches at 3WAT, 6WAT and 9WAT respectively. For the UC-82B variety, there was significant difference ($P<0.05$) in the number of branches at 6WAT and 9WAT, for the control. When 2t/ha of poultry of droppings was applied to UC-82B there was no significant difference ($P>0.05$) in the number of branches was at 3WAT, 4t/ha of poultry droppings applied to UC-82B did have any significant difference ($p<0.05$) in the number of branches at 3WAT, 6WAT and 9WAT respectively. This results suggest that the number of branches significantly increases with increasing level of poultry dropping probably due to quicker release of N,P, and K than other sources of manure Smith and Ayenigbara (2001).

In the variety (Roma VF, there was significant difference ($p<0.05$) in the number of leaves at 3WAT, 6WAT, and 9WAT in the control(Table 2). Similar results was observed when 2t/ha of poultry droppings was applied. With the application of 4t/ha of poultry droppings, however no significant difference ($p>0.05$) was observed at 6WAT and 9WAT but significant difference ($p<0.05$) was observed at 3WAT(Table2).For UC-82B there was significant difference ($p<0.05$) in the number of leaves at 3WAT, 6WAT and 9WAT in the control. Similar was also observed when 2t/ha of poultry was applied, 4t/ha of poultry droppings however produce no significant difference ($p>0.05$) on the number of leaves at 3WAT, 6WAT, and 9WAT. This is line with the findings of Agbede (2005) who found that number of leaves significantly increased with increase in the concentration of poultry droppings.

The variety (Roma VF) did not show any significant difference ($p>0.05$) at 6WAT and 9WAT in number of flowers for the control (Table3).Application of 2t/ha poultry droppings however resulted in significant differences($p<0.05$) in the number of flowers at 6WAT and 9WAT(Table3). Application of 4t/ha of poultry droppings to Roma VF, showed that there was a significant difference ($p<0.05$ in the number of flowers at 6WAT and 9WAT respectively. For the variety (UC-82B) there was a significant difference ($p<0.05$) at 6WAT and 9WAT in the number of flowers in the control. Similarly, application of 2t/ha and 4t/ha poultry droppings showed significant differences ($p<0.05$) at 6WAT and 9WAT in the number of flowers. This is in line with the findings of Agbede (2008), who found that number of flowers significantly increased with increase in the concentration of poultry droppings.

There was a significant difference ($p<0.05$) in the number of fruits between Roma VF and UC-82B (Table5). In the variety(Roma VF),the control showed a significant difference ($p<0.05$) in the number of fruits with the application of 2t/ha and 4t/ha of poultry droppings at 9WAT. There was no significant difference ($p>0.05$) in the number of fruits when 2t/ha of poultry droppings was applied to UC-82B, but there was a significant difference ($p<0.05$) in the number of fruits. When 2t/ha and 4t/ha of poultry droppings was applied to UC-82B

there was no significant difference (P>0.05) in the number of fruits at 9WAT. This agrees with the findings of Agele (2001), who found that increase in the concentration of poultry manure litters resulted in better growth and yield of tomato.

There was no significant difference (P>0.05) in the fresh fruits weight of Roma VF when 2t/ha and 4t/ha of poultry droppings was applied (Table5). However, significant difference (P<0.05) on the control (Roma VF) at 12WAT was observed. The UC-82B shows no significant difference (P>0.05) in the fresh fruit weight between the control (UC-82B) and 2t/ha of poultry droppings but no significant difference (P<0.05) in the fresh fruit weight when 4t/ha was applied to UC-82B at 12WAT. This agrees with the findings of Ghorbani *et al.,* (2008) which show that tomato fruit weight increased with increasing manure source.

Table 1: Effects of different levels of poultry dropping on number of branches

TREATMENT (S)	NUMBER OF BRANCHES		
	3WAT	6WAT	9WAT
0t/ha Roma VF	2.10^{c}	3.00^{b}	3.10^{b}
2t/ha Roma VF	2.70^{a}	3.70^{ab}	4.00^{ab}
4t/ha Roma VF	2.80^{a}	4.80^{a}	4.90^{a}
0t/ha UC-82B	2.00^{c}	3.20^{b}	3.30^{ab}
2t/ha UC-82B	2.25^{bc}	3.50^{ab}	3.30^{ab}
4t/ha UC-82B	2.60^{ab}	3.90^{ab}	4.30^{ab}
LSD	0.4051	1.4435	1.7573

Means with different superscripts within the column are significantly different (p<0.05)
KEY: t/ha=Tonnes per hectare, WAT=Weeks after transplanting, LSD:Least significant difference

Table 2:Effect of different levels of poultry dropping on number of leaves

TREATMENT (S)	NUMBER OF LEAVES		
	3WAT	6WAT	9WAT
0t/ha Roma VF	11.30^{cd}	12.60^{ab}	12.90^{ab}
2t/ha Roma VF	14.40^{c}	17.00^{a}	16.60^{ab}
4t/ha Roma VF	5.20^{ab}	18.00^{a}	18.10^{a}
0t/ha UC-82B	9.00^{d}	14.30^{ab}	11.10^{b}
2t/ha UC-82B	12.00^{cd}	8.20^{b}	13.90^{ab}
4t/ha UC-82B	16.10^{a}	18.00^{a}	18.00^{a}
LSD	3.7552	8.6806	5.9469

Means with different superscripts within the column are significantly different (p<0.05)KEY: t/ha=Tonnes per hectare, WAT:=Weeks after transplanting, LSD= Least significant difference.

Table 3: Effect of different levels of poultry dropping on number of Flowers

TREATMENT (S)	NUMBER OF FLOWERS	
	6WAT	12WAT
0t/ha Roma VF	10.40^{bc}	3.50^{c}
2t/ha Roma VF	20.50^{ab}	10.60^{c}
4t/ha Roma VF	27.60^{a}	20.40^{a}
0t/ha UC-82B	8.50^{c}	4.20^{c}
2t/ha UC-82B	12.60^{bc}	11.30^{c}
4t/ha UC-82B	24.90^{a}	16.60^{ab}
LSD	11.173	9.6667

Means with different superscripts within the column are significantly different (p<0.05)
KEY: t/ha=Tonnes per hectare, WAT=Weeks after transplanting, LSD=Least significant difference

Table 4: Effects of different levels of poultry dropping on number of fruits

TREATMENT (S)	NUMBER OF FRUITS 12WAT
0t/ha Roma VF	6.72[c]
2t/ha Roma VF	4.01[ab]
4t/ha Roma VF	19.71[a]
0t/ha UC-82B	5.93[c]
2t/ha UC-82B	7.00[c]
4t/ha UC-82B	11.50[bc]
LSD	6.21

Means with different superscripts within the column are significantly different ($p<0.05$)

KEY:

t/ha: Tonnes per hectare

WAT: Weeks after transplanting

LSD: Least significant difference

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Table 5: Effect of different levels of poultry dropping on fresh fruit weight

TREATMENT (S)	FRESH FRUIT WEIGHT 12WAT
0t/ha Roma VF	0.16[b]
2/ha Roma VF	0.27[a]
4t/ha Roma VF	0.32[a]
0t/ha UC-82B	0.13[b]
2t/ha UC-82B	0.14[b]
4t/ha UC-82B	0.26[a]
LSD	0.10

Means with different superscripts within the column are significantly different ($p<0.05$)

KEY:

t/ha: Tonnes per hectare

WAT: Weeks after transplanting

LSD: Least significant difference

CONCLUSION

It was observed that Roma VF recorded the highest number of branches, leaves, flowers, number of fruits and fresh fruit weight. 4t/ha Roma VF recorded the highest number of branches at 3weeks, 6weeks and 9weeks, 4t/ha Roma VF recorded the highest number of leaves at 3weeks, 6weeks and 9 weeks after transplanting. 4t/ha Roma VF recorded the highest number of flowers at 6weeks, 12weeks. 4t/ha Roma VF recorded the highest number of fruits, also 4t/ha Roma VF recorded the highest fruit weight (0.32).

For every concentration of the poultry droppings applied at 0t/ha, 2t/ha and 4t/ha, Roma VF performed better compared to UC-82B. The level of significance at every variable of data collected was significant ($p < 0.05$).The zero treatment recorded the lowest yield. At this preliminary level, 4t/ha of poultry droppings should be applied to Roma VF and also 4t/ha of poultry droppings should be applied to UC-82B varieties of tomato for optimum performance and yield may be recommended.

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