

Effect Of Organic Manures On Yield And Economic Analysis Of Tomato Varieties

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ABSTRACT

The field experiment was conducted in the Horticultural farm of Sher-e-Bangla Agricultural University, Dhaka, Bangladesh during the period from October 2013 to March 2014. Two factors were used in the experiment, viz. factor A: four types of organic manure such as M_0 = Control, M_1 = Cow dung (20 t/ha), M_2 = Poultry manure (16 t/ha) and M_3 = Vermi compost (14 t/ha) and factor B: three varieties such as V_1 = BARI tomato 15, V_2 = BARI tomato 14 and V_3 = BARI tomato 2. The experiment was laid out in Randomized complete Block Design with three replications. The maximum yield (86.25 t/ha) was recorded from treatment combination of M_2V_1 , while M_0V_3 gave the minimum (31.25 t/ha). The highest benefit cost ratio (2.98) was obtained from M_2V_1 and the lowest (1.41) from M_0V_3 .

Key Words: Tomato, organic manures, variety, yield and economic analysis.

INTRODUCTION

Tomato (*Lycopersicon esculentum* Mill.) belongs to the family Solanaceae. It was originated in tropical America, [1] particularly in Peru, Ecuador and Bolivia of the Andes. [2] It is one of the important, popular and nutritious vegetables grown in Bangladesh in both winter and summer season around all parts of the country. [3] Bangladesh produces 103 thousand tones of tomato from 18.16 thousand hectares of land, the average yield being 8.72 t/ha. [4] This yield is very low compared to other tomato growing countries. This low yield

may be due to use of low yielding varieties and poor crop management.

Organic matter is a source of food for the innumerable number of microorganisms and creatures like earthworm who breaks down these to micronutrients, which are easily absorbed by the plants. Organic manure plays a direct role in plant growth as a source of all necessary macro and micronutrients in available forms during mineralization, improving the physical and physiological properties of soils. Organic manures such as cow dung, poultry manure and vermin compost improves the soil structure,

aeration, slow release nutrient which support root development leading to higher growth and yield of tomato plants. The macronutrients calcium and micronutrients boron, manganese, molybdenum and iron are important for tomato cultivation. Biologically active soils with adequate organic matter usually supply enough of these nutrients. [5]

Tomato can be grown on a wide range of soil types, ranging from light sand to heavy loam or, even clay that are well supplied with organic matter. Fertilizer management is one of the most important factors, which assured crop production. Use of chemical fertilizers in crop production is one of the important causes of environmental pollution. Use of organic matter in crop production has many advantages over chemical fertilizers. Organic manure saves the crop plants from adverse environment.

Increasing the production and improving the keeping quality of tomato are of paramount importance, now-a-days, for meeting the internal demand the consumers. Hence efforts should be given to identify varieties with high yield potential. Adequate information's on field performance of tomato cultivars are lacking in the country. The present study was undertaken in view of the following objective to determine the best organic manure on growth and yield of tomato.

MATERIALS AND METHODS

The field experiment was conducted in the Horticultural farm at Sher-e-Bangla Agricultural University, Sher-e-Bangla Nagar, Dhaka-1207, Bangladesh during the period from October 2013 to March 2014. The location of the experimental site was at in 23.75° N latitude and 90.34° E longitudes with an elevation of 8.45 meter from the sea level. The climate of the experimental area was subtropical in nature. It is

characterized by heavy rainfall, high temperature, high humidity and relatively long day during kharif season (April to September) and a scanty rainfall associated with moderately low temperature, low humidity and short day period during rabi season (October to March). Soil of the study site was silty clay loam in texture. The area represents the Agro-Ecological Zone of Madhupur tract (AEZ-28) with p^H 5.8-6.5, ECE 25-28. Three varieties of tomato were used in this experiment. Tomato seeds were collected from Vegetable division, Horticulture Research Centre (HRC), Bangladesh Agricultural Research Institute (BARI), Joydebpur, Gazipur. Seedbed was prepared on 8 October' 2013 for raising seedlings of tomato and the size of the seedbed was 3 m × 1 m. Seeds were sown on 12 October 2013 in the seedbed. Healthy and 30 days old seedlings were transplanted into the experimental field on 12 November 2013. The field experiment was conducted by Randomized Complete Block Design (RCBD) with three replications. Two factors were used in the experiment, viz. four types of organic manure and three types of variety. Two factors were used in the experiment, viz. factor A. four types of organic manure such as M₀= Control, M₁ = Cow dung (20 t/ha), M₂ = Poultry manure (16 t/ha) and M₃ = Vermi compost (14 t/ha) and factor B. three varieties such as V₁ = BARI tomato 15, V₂ = BARI tomato 14 and V₃ = BARI tomato 2. The total numbers of plot were 36. The size of a unit plot was 2.4 m × 2.4 m. The experimental area was first opened on 15 October 2013 by a disc plough to open direct sunshine to kill soil borne pathogens and soil inhabitant insects. It was prepared by several ploughing and cross ploughing with a power tiller followed by laddering to bring about a good tilth. Thirty days-old healthy seedlings were transplanted at the spacing of 60 cm × 40 cm in the experimental plots on 12 November 2013.

Fruits were harvested at 3-day intervals during early ripe stage when they attained slightly red color. Harvesting was started from 15 February, 2014 and was continued up to 15 March, 2014. The data in respect of yield components were statistically analyzed to find out the significance of the experimental results. The means of all the treatments were calculated and the analysis of variance for each of the characters under study was performed by F test. The difference among the treatment means were evaluated by Duncan's Multiple Range Test (DMRT). [6]

The cost of production was analyzed in order to find out the most economic treatment of organic manures and varieties of tomato. All the non-material and material input costs and interests on running capital were considered for computing the cost of production. The interests were calculated for six months @ 13% per year. The price of one kg tomato at harvest was considered to be Tk. 5.00. Analyses were done according to the procedure determining by Alam *et al.* [7]

RESULTS AND DISCUSSION

Yield per plant

Yield per plant varied significantly due to application of different organic manures (Table 1). The maximum (2.06 kg/plant) yield was recorded from M₂ (Poultry manure), while the minimum (0.99kg/plant) was found from M₀ (Control treatment). The results also agreed to the findings of Kushwah *et. Al.* [8]

Different varieties showed significant variation on yield per plant under the present investigation (Table 1). The maximum (1.75 kg/plant) yield was recorded from V₁ (BARI Tomato 15) and the minimum (1.37kg/plant) yield was obtained from V₃ (BARI Tomato2). Similar trend of results were found by scientists like

Thompson *et al.*, [9] Hossain and Ahmed [10] and Berry *et. al.* [11]

Table 1: Effect of organic manures and varieties on yield/plant and yield/plot of tomato

Treatment	Yield/Plant (Kg)	Yield/Plot (Kg)
Organic manures		
M ₀	0.99 c	23.68c
M ₁	1.53 bc	32.64 b
M ₂	2.06 a	44.08a
M ₃	1.65 b	40.96 ab
Variety		
V ₁	1.75 a	36.9 a
V ₂	1.54 ab	34.86 a
V ₃	1.37 b	34.26 a
LSD (0.05)	0.32	9.01
CV (%)	8.21	7.54

A significant variation was found due to combined effect of organic manures and varieties for yield per plant (Table 2). The maximum (2.07 kg/plant) yield was recorded from treatment combination of M₂V₁ (Poultry manure + BARI Tomato 15), and M₀V₃ (Control treatment + BARI Tomato 2) gave the minimum yield (0.75 kg/plant).

Table 2: Combined effect of organic manures and varieties on yield/plant, yield/plot and yield of tomato

Treatment	Yield / Plant (Kg)	Yield /Plot (kg)	Yield (t/ha)
M ₀ V ₁	1.18 cd	28.32 cd	49.17 cd
M ₀ V ₂	1.03 de	24.72 de	42.92 de
M ₀ V ₃	0.75 e	18.0 e	31.25 e
M ₁ V ₁	1.19 d	28.56 d	49.58 d
M ₁ V ₂	1.39 c	33.36 c	57.92 c
M ₁ V ₃	1.50 bc	36.0 bc	62.50 bc
M ₂ V ₁	2.07 a	49.68 a	86.25 a
M ₂ V ₂	1.69 bc	40.56 b	70.42 b
M ₂ V ₃	1.75 b	42.0 ab	72.92 ab
M ₃ V ₁	1.71 bc	41.04 ab	71.25 ab
M ₃ V ₂	1.70 bc	40.8 ab	70.83 b
M ₃ V ₃	1.71 bc	41.04 ab	71.25 ab
LSD (0.05)	0.32	9.01	15.65
CV (%)	8.21	7.54	9.21

Yield per plot

Yield per plot varied significantly due to application of different organic manures (Table 1). The maximum (44.08 kg/plot) yield was recorded from M₂ (Poultry manure) and the minimum (23.68 kg/plot) was recorded from M₀ (Control treatment).

Different varieties showed significant variation on yield per plot under the present trial (Table 1). The maximum (36.9 kg/plot) yield was recorded from V₁ (BARI Tomato 15) and the minimum yield (34.26 kg/plot) was recorded from V₃ (BARI Tomato 2).

The variation was found due to combined effect of organic manures and varieties for yield per plot (Table 2). The maximum (49.68kg/plot) yield was recorded from treatment combination of M₂V₁ (Poultry manure + BARI Tomato 15) and M₀V₃ (Control treatment + BARI Tomato 2) gave the minimum yield (18.00 kg/plot).

Yield per hectare

Yield per hectare varied significantly due to different organic fertilizer (Figure 1). The maximum (67.36 t/ha) yield was obtained from M₂ (Poultry manure) and the minimum (50.56 t/ha) was recorded from M₀ (Control treatment).

Different varieties showed significant variation on yield per hectare under the present investigation (Figure 2). The maximum yield (63.85 t/ha) was recorded from V₁ (BARI Tomato 15) and the minimum yield (59.48 t/ha) was recorded from V₃ (BARI Tomato 2). The present investigation also agreed to the findings of Ajlouni *et.al.* [12]

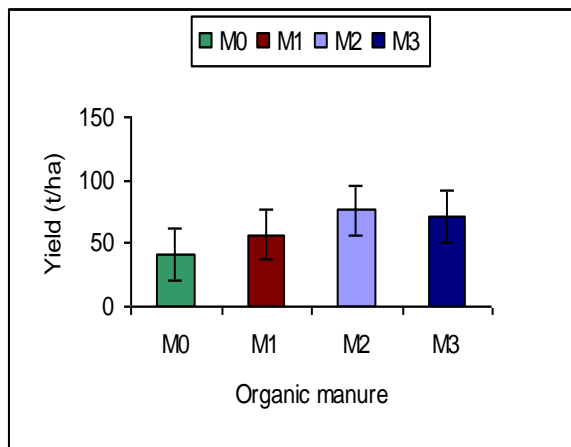


Figure 1. Effect of organic manures on yield of tomato

A significant variation was found due to combined effect of organic manures and varieties for yield per hectare (Table 2). The maximum yield (86.25 t/ha) was recorded from treatment combination of M₂V₁ (Poultry manure + BARI Tomato 15) and the treatment combination of M₀V₃ (Control treatment + BARI Tomato 2) gave the minimum yield (31.25 t/ha).

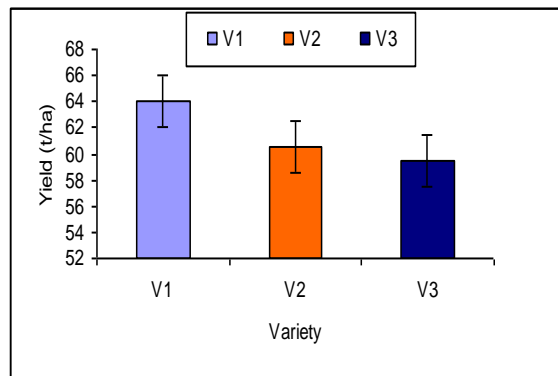


Figure 2. Effect of organic manures on yield of tomato

Economic analysis

Input costs for land preparation, seed cost, fertilizer, irrigation and man power required for all the operations from sowing to harvesting of tomato were recorded for unit plot and converted into cost per hectare (Table 3). Price of tomato was considered in market of Gorgan, Dhaka rate basis. The economic analysis was done to find out the gross and net return and the benefit cost ratio in the present experiment and presented under the following headings:

Gross return: In the combination of organic manures and variety showed different gross return under the trial (Table 3). The highest gross return (USD 5,390.63) per hectare was recorded from M₂V₁ (Poultry manure and BARI tomato 15) and the lowest gross return (USD 1,953.13) was recorded from M₀V₁ (no fertilizer and BARI tomato 15).

Net return: In case of net return different treatment combination showed different amount of net return (Table 3). The highest net return (USD 3,583.81) was recorded

from M₂V₁ (Poultry manure and BARI tomato 15) and the lowest net return (USD 564.44) was recorded from M₀V₁ (no fertilizer and BARI tomato 15).

Benefit cost ratio: The combination of organic manures and variety for benefit cost ratio was different for treatment

combination (Table 3). The highest (2.98) benefit cost ratio was recorded from M₂V₁ and the lowest benefit cost ratio (1.41) was recorded from M₃V₃. From economic point of view, it was apparent from the above results treatment combination of M₂V₁ was more profitable compare to others.

Table 3. Cost and return in tomato production as influenced by organic manures and variety

Treatment	Total cost of production (USD/ha)	Yield (t/ha)	Gross income (USD)	Net Return (USD)	Benefit cost Ratio (BCR)
M ₀ V	1,388.69	49.17	1953.13	564.44	2.21
M ₀ V ₂	1,388.69	42.92	2,682.5	1,293.81	1.93
M ₀ V ₃	1,388.69	31.25	3,073.13	1,684.44	1.47
M ₁ V ₁	1,667.44	49.58	3,098.75	1,431.31	1.86
M ₁ V ₂	1,667.44	57.92	3,620.00	1,952.56	2.17
M ₁ V ₃	1,667.44	62.5	3,906.25	2,238.81	2.34
M ₂ V ₁	1,806.81	86.25	5,390.25	3,583.81	2.98
M ₂ V ₂	1,806.81	70.42	4,401.25	2,594.44	2.44
M ₂ V ₃	1,806.81	72.92	4,557.5	2,750.69	2.52
M ₃ V ₁	3,019.38	71.25	4,453.13	1,391.94	1.45
M ₃ V ₂	3,019.38	70.83	4,426.88	1,365.69	1.45
M ₃ V ₃	3,019.38	71.25	4,453.13	1,433.75	1.41

Price of tomato @ USD 62.5 per ton

CONCLUSION

The maximum (2.07 kg/plant) yield was recorded from treatment combination of M₂V₁ while the treatment combination M₀V₃ gave the minimum yield (0.75 kg/plant). The maximum (49.64kg/plot) yield was recorded from treatment combination of M₂V₁ while the treatment combination of M₀V₃ gave the minimum yield (18.00 kg/plot). The maximum yield (86.25 t/ha) was recorded from treatment combination of M₂V₁ while the treatment combination of M₀V₃ gave the minimum yield (31.25 t/ha). The highest benefit cost ratio (2.98) was obtained from the treatment combination of poultry manure and BARI Tomato 15 and the lowest benefit cost ratio (1.41) was found from the treatment combination of vermicompost with BARI Tomato 2.

REFERENCES

- Salunkhe DK, Desai BB, Bhat NR. Vegetables and Flower Seed Production. 1st. Edn., Agricola Publishing Academy., New Delhi, India. 1987; 118-119.
- Kaloo. Tomato (*Lycopersicon esculentum Mill*). *Indian Hort.* 1989; 33 (1): 12-15.
- Haque MS, Islam MT, Rahman M. Studies on the presentation of semi-concentrated tomato juice. *Bangladesh J. Agril. Sci.* 1999; 26(1): 37-43.
- BBS. Monthly Statistical Bulletin. Bangladesh Bureau of Statistics, Statistics Division, Ministry of Planning, Govt. of the People's Republic of Bangladesh, Dhaka. 2000; 55.
- Singh SP, Kushwah VS. Effect of integrated use of organic and-inorganic sources of nutrients on potato (*Solanum tuberosum*) production. *Indian J. Agrono.* 2006; 51(3): 236-238.
- Gomez KA, Gomez AA. Statistical Procedure for Agricultural Research (2nd Edn.), John Willey and Sons, New York. 1984; 28-92.
- Alam MS, Iqbal TMT, Amin M, Gaffar MA. Krishitattic Fasaler Utpadan O Unnayan (In Bengali). T. M. Jubair Bin Iqbal, Sirajganj. 1989; 231-239.

8. Kushwah VS, Singh SP, Lal SS. Effect of manures and fertilizers on potato (*Solanum tuberosum*) production. *India. Potato J.* 2005; 32(3/4): 157-158.
9. Thompson HC, Kat AH, Kelly WC. *Vegetable Crops*. 5th Edn. McGraw Hill Book Co. New York. 1979; 392.
10. Hossain AKMA, Ahmed KU. I. A comparative study on the performance of different varieties of tomato. II. Varietal responses of different spacing in respect of yield and other characteristics of the tomato varieties Oxheart and Anabic. *Bangladesh Hort.* 1973; 1(1): 39 –45.
11. Berry SZ, Wiese KL, Aldriel TS. “Ohio 85563” hybrid processing tomato. *Hort. Sci.* 1995; 30 (1): 159 -161.
12. Ajlouni MM, Shibli RA, Hussein A, Ereifej KI. Seasonal distribution of yield of tomato (*Lycopersicon esculentum* Mill) cultivars grown in Jordan. *Indian J. Agric. Sci.* 1996; 66(9): 541-545.

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