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EFFECT OF ORGANIC MANURES AND INORGANIC FERTILIZERS ON PLANT YIELD AND ECONOMICS INDETERMINATE TOMATO (*SOLANUM LYCOPERSICUM*.L) HY.GS - 600

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ABSTRACT

Present study was carried out the effect of different sources of organic manures along with various levels of inorganic fertilizers on yield and economics improvement of indeterminate tomato (*Solanum lycopersicum*.L.) hy. GS - 600. It is one of the commercial high value crops in our country. Tomato crop requires a balanced fertilizer management without which growth and development of the crop will be impaired leading to substantial reduction not only in yield but also in the market appeal of the produce namely the yield and economics of the indeterminate tomato. Hence, the study was conducted to evaluate the effect of organic and inorganic fertilizers on yield and economics of indeterminate tomato plants. From the study, it was found that yield and economics attributes of indeterminate tomato were significantly influenced by different treatment combinations. Among over all other treatment combinations, application of 50% RDF + 12 t FYM Ha^{-1} was superior in increasing the yield T_7 (147.61 t/ha) characters and economics of maximum benefit: cost ratio was recorded in T_7 with (3.65:1) indeterminate tomato (*Solanum lycopersicum.* L.) hy.GS - 600.

KEYWORDS: Indeterminate Tomato Hy.GS -600, Organic Manures and Inorganic Fertilizers, Plant Yield and Economics

INTRODUCTION

Tomato is one of the most important vegetable crops in the world. The tomato belongs to the family Solanaceae, genus Lycopersicon, which is a relatively small genus within the large and diverse family consisting of approximately 90 genera. Lycopersicon species are native to Ecuador, Peru, and the Galapagon Island though most evidence suggests that the site of domestication was Mexico (**Taylor, 1986**). It consists of vitamins minerals and antioxidants which are essential for human health (**Kallo, 1993**). With the increase in population, the demand for the crop has significantly increased. As a result growers are forced to make heavy use of inorganic sources of plant nutrients. Escalating costs of inorganic fertilizers are hampering the way to increase the productivity per unit area. The majority of tomato growers do not produce good quality fruit at high yield due to lack of knowledge regarding improved production technologies including use of proper inorganic and inorganic fertilizers (**FAO,2003**). Farmer use imbalance inorganic fertilizers and pesticides injudiciously in order to harvest good yield. The continuous uses of chemical fertilizers increase the concentration of heavy metal in the soil (**Arya and Roy, 2011**). Hence, there is a need to adopt some eco friendly nutrient management system to sustain the soil and soil resources, crop yield and to ensure environmental and human health security. Organic manure helps to improve the physical condition of soil and provides the required plant nutrients. Organic manure also enhances cation exchange capacity and acts as a buffering agent against undesirable soil pH fluctuations (**Jones & Wild, 1975; Ngeze, 1998**). Therefore, efforts are being made in this regard to integrate chemical fertilizers with organic manure which are renewable and eco friendly to achieve sustainable productivity with minimum deterious effects of chemical fertilizers on soil health and environment. Keeping this in view, the present investigation was undertaken to find out the best combination of organic and inorganic fertilizers for obtaining the maximum fruit yield of indeterminate tomato hy. GS – 600.

MATERIALS AND METHODS

The present investigation was carried out during rabi season of year 2013-2014 and 2014-2015 in the department of horticulture, allahabad school of agriculture, sam higginbottom institute of agriculture, technology and sciences, Allahabad. There were totally 13 treatments with different sources and levels of organic and inorganic fertilizers and the details are as follows

T_1-Control, T_2-RDF(150:100:50 Kg/ha NPK, T_3-100% Organic manures (33% FYM+33% Poultry manure+33% Vermicompost), T_4 -75% RDF + 25% FYM, T_5-75% RDF + 25% Poultry manure, T_6- 75% RDF + 25% Vermicompost, T_7-50% RDF + 50% FYM, T_8- 50% RDF + 50% Poultry manure, T_9- 50% RDF + 50% Vermicompost, T_{10}- 25% RDF + 75% FYM, T_{11}- 25% RDF + 75% Poultry manure, T_{12}- 25% RDF + 75% Vermicompost, T_{13}- 25% RDF + 25% FYM + 25% Poultry manure + 25% Vermicompost. The observations recorded on fruit yield per plant (g), Fruit yield per plot (kg), Fruit yield per hectare (tonnes), and the cultivation Cost of cultivation (Rs/ha), Gross income (Rs), Net income (Rs), Benefit to Cost ratio

RESULTS AND DISCUSSIONS

Effect of organic manures and inorganic fertilizers on plant yield of indeterminate tomato (*Solanum lycopersicum.* L.*)* hy.GS -600, the two trails ware recorded and calculated mean value and the value of means, statistically analyzed finally the data are presented as a pooled data in the tables 1.1.

The data were also recorded on marketable yield and price fetched by the crop. The costs of cultivations in general *vis –a-vis* net returns and cost: benefit rations were worked out for all the Treatments. (Table. 1.2) The experimental resolution indicated that staking in tomato irrespective of variety in general induced higher economic return in T_7.

Tomato is mainly grown for ripe fruits which are used in vegetable preparation, salad and processing industries, nitrogen treatment in increasing levels improved the yield and yield attributing characters.

In Pooled all the treatment were recorded significant and they are presented in Table no. 1. Pooled the maximum yield/plant were recorded in T_7 (4.19 kg), T_8 (3.72 kg) and T_9 (3.68 kg) respectively, the minimum fruit yield/plant in kg were recorded in T1 (2.49 kg). The increase yield per plant might be due to the increased growth and flower attributes which in turn lead to the increased photosynthetic activity and accumulation of photosynthates and dry matter production.

Pooled the maximum yield/plot were recorded in T_7 (33.38 kg), T_8 (29.63 kg) and T_9 (29.50 kg) respectively, the minimum fruit yield/plot in kg were recorded in T1 (20.19 kg). The increased yield per plot might be due to increased no. of flowers clusters, no. of flowers per clusters and more no. of fruits per plant leading to the maximum yield. Similar findings were reported by **Mohankumar and Gowda (2010)** in brinjal. Pooled the maximum yield/hector (t) were recorded in T_7 (147.61 t/ha), T_8 (137.03 t/ha) and T_9 (135.06 t/ha) respectively, the minimum fruit yield/hector (t) were recorded in T1 (90.98 t/ha). The maximum yield per per ha T_7 (50% RDF + 50% FYM) might be due to increased yield per plant and per plot which might have increased total yield per ha. Similar findings were reported by **Singh and Manoj (2001)** in cabbage, **Suge *et al* (2011)** in brinjal.

Economics of all treatments were calculated according to expenditure occurred from the land preparation to till harvesting of flower crop viz. Cost of cultivation, gross return, net return and benefit: cost ratio has been worked out and presented in table 4.2.

Maximum gross returns was recorded in treatment T_7 with (50% RDF + 12 t FYM Ha^{-1}) (Rs.7, 38,050.00/ha) and the Minimum (Rs. 4, 54,900.00/ha) was recorded in treatment T_1 (Control). Maximum net returns were recorded in treatment T_7 with (50% RDF + 12 t FYM Ha^{-1}) (Rs.5, 35,926.00/ha) and the Minimum (Rs. 2, 61,208.00/ha) was recorded in treatment T_1 (Control). Maximum benefit: cost ratio was recorded in T_7 with (50% RDF + 12 t FYM Ha^{-1}) (3.65:1) and the Minimum (2.34:1) was recorded in treatment T_1 (Control). Maximum gross returns, net returns and benefit: cost ratio was observed in the treatment T_7 with (50% RDF + 12 t FYM Ha^{-1}) and recorded the best treatment among all the other treatments.

As the economics is the need of the farmers while taking decision regarding the adoption of the techniques and scientific knowledge? Hence, 50% RDF + 12 t FYM Ha^{-1} gave the highest gross return, net return, and cost benefit is due to higher productivity of tomato, which increase the market value of the tomato fruits. Application of organic manure along with inorganic which might have accelerated the vigorous yield and increase benefit –cost ration of tomato plant. It is also relevant to mention to that tomato plant nourished with interaction among organic and inorganic gave maximum yield parameter which is result to increase benefit –cost ratio the similar results found in **mohammed *et al*. (2014).**

CONCLUSIONS

The results of the study on the effect of different combinations of organic and inorganic fertilizers indicated that the treatment differences for the various yield and economics characters of indeterminate tomato *hy*. GS.600, it may be concluded that T_7 (50% RDF + 12 t FYM Ha^{-1}), were found to be the appropriate level of fertilizer and their combination emerged as superior over all other treatment combinations in relation to plant yield and economic returns for cultivation of indeterminate tomato to suit the Allahabad conditions.

Table 1.1: Effect of Organic and Inorganic on Fruit Yield / Hectore (Tonnes) of Indeterminate Tomato (*Solanum Lycopersicum*. L*)* Hy GS-600 in Pooled

Treatment	Fruit Yield/ Plant (Kg)	Fruit Yield / Plot (Kg)	Fruit Yield / Hectore (t)
T1	2.49	21.20	90.98
T2	3.49	29.17	120.66
T3	3.08	25.36	111.31
T4	3.57	29.60	130.98
T5	3.56	29.28	126.87
T6	3.55	29.44	125.96
T7	4.19	33.65	147.61
T8	3.72	30.56	137.03
T9	3.68	30.32	135.06
T10	3.27	26.64	119.46
T11	3.25	27.03	118.88
T12	3.24	27.04	118.31
T13	3.17	26.93	116.83
F-test	**S**	**S**	**S**
S.Ed.(±)	**0.070**	**0.631**	**2.767**
C.D. (0.05%)	**0.144**	**1.303**	**5.710**

Table 1 2: Economics and Benefit Cost Ratio for Different Treatments of Tomato (*Solanum Lycopersicum*l.) Hy. GS-600 in Open Condition

SYMBOL	Treatment Combination	Total Fixed Cost Rs.	Total Variable Cost Rs.	Total Cost Of Cultivation Rs.	Fruit Yield (t/ha)	Sale Rate Rs./Kg	Gross Return Rs./ ha	Net Return Rs./ ha	Benefit: Cost Ratio
T_1	Control	1,93,692	-	1,93,692.00	90.98	5	4,54,900.00	2,61,208.00	2.34:1
T_2	100% RDF @ (120:80:75 kg NPK Ha^{-1})	1,93,692	7,312	2,01,004.00	120.66	5	6,03,300.00	4,02,296.00	3.00:1
T_3	8 t FYM + 2 t Vermicompost + 1.3 t Poultry manure Ha^{-1} (33.3% FYM +33.3%VC +33.3% PM)	1,93,692	5,580	1,99,272.00	111.31	5	5,56,550.00	3,57,278.00	2.79:1
T_4	75% RDF + 6 t FYM Ha^{-1}	1,93,692	7,872	2,01,564.00	130.98	5	6,54,900.00	4,53,336.00	3.24:1
T_5	75% RDF + 1.5 t Vermicompost Ha^{-1}	1,93,692	6,672	2,00,364.00	126.87	5	6,34,350.00	4,33,986.00	3.16:1
T_6	75% RDF + 1 t Poultry manure Ha^{-1}	1,93,692	6,072	1,99,764.00	125.96	5	6,29,800.00	4,30,036.00	3.15:1
T_7	50% RDF + 12 t FYM Ha^{-1}	1,93,692	8,432	2,02,124.00	147.61	5	7,38,050.00	5,35,926.00	**3.65:1**
T_8	50% RDF + 3 t Vermicompost Ha^{-1}	1,93,692	6,032	1,99,724.00	137.03	5	6,85,150.00	4,85,426.00	3.43:1
T_9	50% RDF + 2 t Poultry manure Ha^{-1}	1,93,692	4,832	1,98,524.00	135.06	5	6,75,300.00	4,76,776.00	3.40:1
T_{10}	25% RDF + 18 t FYM Ha^{-1}	1,93,692	9,040	2,02,732.00	119.46	5	5,97,300.00	3,94,568.00	2.94:1
T_{11}	25% RDF + 4.5 t Vermicompost Ha^{-1}	1,93,692	5,440	1,99,132.00	118.88	5	5,94,400.00	3,95,268.00	2.98:1
T_{12}	25% RDF + 3 t Poultry manure Ha^{-1}	1,93,692	3,640	1,97,332.00	118.31	5	5,91,550.00	3,94,218.00	2.99:1
T_{13}	25% RDF + 6 t FYM + 1.5 t Vermicompost +1 t Poultry manure Ha^{-1}	1,93,692	6,040	1,99,732.00	116.83	5	5,84,150.00	3,84,418.00	2.92:1

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