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RESEARCH ARTICLE

Effect of fertigation on yield and economics of Tomato (*Lycoppersicon esculentum* Mill.)

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Abstract

A field experiment was conducted during *kharif* season of 2008-09 to assess the response of fertilizer application schedule for tomato under polytunnel. After investigation, it was found that the application of 100 % fertigation of RDF significantly improved tomato qualities in respect of the average fruit weight, total soluble salts and acidity of tomato. Whereas highest residual nitrogen, phosphorous and potassium in soil after harvest of crop was observed with soil application of RDF with surface irrigation.

INTRODUCTION

Tomato is one of the most important protective foods both due to its special nutritive value and wide production. Tomato crop cultivation provides a good source of income to farmers besides contributing to the nutrition of consumers. Tomato is a high value vegetable crop for off season and main season production under polyhouses.

Polyhouse cultivation is becoming popular to promote off-season farming. Growing crops in polyhouses produces higher yield and better quality which fetch high prices due to controlled climatic condition. There is an improvement in the quality and the size of the produce.

Irrigation is the most important aspect in tomato cultivation. Drip irrigation system reduces losses of water about 50-60%. Drip irrigation system maintains water-air balance in soil which increases number of micro-organisms in soil. These micro-organisms are helpful in mobilizing nutrients for plant uptake. The favorable growth of roots due to drip irrigation ultimately increases yield of crop. The production of tomato in India could be considerably increased if fertigation is done with better understanding of soil-plant relationship.

Meeting the specific nutrient requirement of crops, results in optimum growth which ultimately manifest into quality fruit production. Among the various inputs applied for increasing crop yield, judicious application of nitrogenous fertilizers assumes a greater significance.

It was, therefore, felt necessary to undertake a study on tomato crop in relation to fertigation schedule according to different growth stages of crop under polyhouse condition.

MATERIAL AND METHODS

The field investigation to study the effect of fertigation on tomato (*Lycopersicon esculentum* Mill.) under polytunnel condition was undertaken during *Kharif*-2008 at the Agronomy farm, College of Agriculture, Pune. The soil of experimental field was medium black, well drained, clayey in texture, with low in available nitrogen

and phosphorous and very low in available potassium. Soil was basic in reaction with pH 8.1. The experiment was laid out in a Randomized Block Design. There were four replications and five treatments under study. The treatments were F_1 - 100 % fertigation of RDF, F_2 - 75 % fertigation of RDF, F_3 - 50 % fertigation of RDF, F_4 - N applied through fertigation and P_2O_5 and K_2O applied through soil application. F_5 – Soil application of RDF with surface irrigation. Where RDF is 300:150:150 kg N, P_2O_5, K_2O ha^{-1}. Fertilizers were applied through water soluble fertilizers such as urea, mono potassium phosphate, mono ammonium phosphate, potassium sulphate at different critical growth stages of tomato as per treatments. The seed of new tomato hybrid *Phule Raja* developed by M.P.K.V., Rahuri was collected from the Tomato Improvement Scheme, Rahuri and used in this experiment. Well grown seedlings were transplanted at 90 x 45 cm^2 spacing in polytunnel. The observations in respect of average fruit weight, total soluble solids, acidity and residual soil nitrogen, phosphorous and potassium (kg ha^{-1}) after harvest of tomato crop were recorded.

RESULTS AND DISCUSSION

Effect of fertigation on Fruit quality of Tomato

The average fruit weight differed significantly due to different treatments. The maximum average fruit weight was obtained with the application of fertigation of 100% RDF which was significantly superior over other treatments. The lowest average fruit weight was obtained with soil application of RDF through surface irrigation. These results are in accordance with Sharma *et al*. (1997) and Singh and Sharma (1999).

The total soluble solids differed significantly due to different treatments. The maximum percentage of total soluble solids was obtained with the application of fertigation of 100 % RDF. The minimum percentage of total soluble solids was observed with soil application of RDF through surface irrigation. Higher fertility level increases uptake and utilize more nutrients which increases total soluble solids content of fruit. Similar results have been reported by Hashad *et al.* (1958), Lingle *et al.* (1960) and Pansare *et al.* (1994).

The acidity differed significantly due to different treatments. The maximum acidity was obtained with the application of 100 % RDF through fertigation which was significantly higher than all other treatments except 75 % RDF through fertigation. The minimum acidity was recorded with the soil application of RDF through surface irrigation which was at par with rest of the treatments except 100 % RDF through fertigation. These results are in agreement with Garrison *et al.* (1967) and Pandey *et al.* (1998).

Effect of fertigation on residual soil nitrogen, phosphorous and potassium (kg ha^{-1}) after harvest of tomato crop

Accumulation of nitrogen, phosphorous and potassium in soil after harvest of crop was significantly influenced by different treatments. Highest residual nitrogen, phosphorous and potassium in soil after harvest of crop was observed with soil application of RDF with surface irrigation which was significantly higher than rest of the treatments. Minimum values of residual nitrogen, phosphorous and potassium in soil after harvest of crop were recorded with application of 50 % RDF through fertigation. This might be due to more uptake and utilization of these nutrients when added through fertigation as compare to soil application with surface irrigation. These results are in conformity with Mitsuhide *et al.* (2005).

Table 1: Fruit quality of Tomato as influenced by different treatments.

Treatments	Avg. fruit weight (g)	Total soluble solids (%)	Acidity (%)
F_1 100 % fertigation of RDF	86.60	4.06	0.42
F_2 75 % fertigation of RDF	84.37	3.85	0.40
F_3 50 % fertigation of RDF	81.80	3.65	0.38
F_4 N through fertigation and P_2O_5 and K_2O through soil application	81.03	3.51	0.38
F_5 Soil application of RDF with surface irrigation	79.22	3.44	0.38
GM	82.60	3.70	0.39
SE (m)±	0.41	0.03	0.01
CD at 0.05	1.16	0.09	0.02

Table 2: Residual soil nitrogen, phosphorous and potassium (kg ha^{-1}) after harvest of tomato crop.

Treatments		Nitrogen (kg ha^{-1})	Phosphorus (kg ha^{-1})	Potassium (kg ha^{-1})
F_1	100 % fertigation of RDF	204	9.8	580
F_2	75 % fertigation of RDF	198	9.4	579.5
F_3	50 % fertigation of RDF	200	9.1	587
F_4	N through fertigation and P_2O_5 and K_2O through soil application	223	19	591
F_5	Soil application of RDF with surface irrigation	234	23	595
GM		211.8	14.06	586.5
SE (m)±		1.39	0.55	1.15
CD at 0.05		3.91	1.54	3.23
Initial value		215	11	602

References

Garrison, S. A., Taylor, G. A. and Drinkwater, W. O. (1967). The influence of lime and the rate of N application on the raw product quality of processing tomatoes. *Proc. Amer. Soc. Hort. Sci.* **91**: 885-893.

Hashad, M. N., Moursi, M. A. and Gomma, A. (1958). Effect of fertilizers on some chemical properties of tomatoes. *Ann. Agric. Sci. Cairo*. **3** (1): 11-18.

Lingle, J. C., Flocker, W. J. and MacGillivray, J. H. (1960). Progress report on the effect of irrigation and fertilizer on canning tomatoes. *Veg. Crops. Ser. Univ. Calif. Davis*. **101**: 12.

Mitsuhide, T., Tadashi, O. and Kenji, O. (2005). Drip fertigation culture on cucumber and tomato. *Bulletin of the Oita Pretectural Agric. Res. Center*. **35**: 1-12.

Pandey, R. P., Saraf, R. K. and Parihar, M. S. (1998). Effect of nitrogen, phosphorous and varieties on quality of tomato. *Punjab Vegetable Grower*. **31**: 15-18.

Pansare. P. D., Desai, B. B. and Chavan, U. D. (1994). Effects of different N, P, K ratios on yield and quality of tomato. *J. Maharashtra Agric. Univ.* **19** (3): 462-463.

Sharma, K. C., Thakur, D. R. and Singh, A. K. (1997). Response of tomato hybrids to nitrogen and phosphorous. *Himachal J. Agric. Res*. **23** (1-2): 33-39.

Singh, A. K. and Sharma, J. P. (1999). Studies on the effect of variety and level of nitrogen on plant growth and development and yield of tomato hybrids. *Ann. Agric. Res.* **20** (4): 502-503.