



EFFECT OF NITROGEN, PHOSPHORUS AND POTASSIUM ON GROWTH, YIELD AND QUALITY OF TOMATO GROWN IN OPEN CONDITION

Manmohan Mishra*, Pranjal Singh Rajput, Ashish Kumar Dubey, Devi Singh and Vijay Bahadur

Department of Horticulture, Sam Higginbottom Institute of Agriculture, Technology and Sciences, Allahabad- 211 007 (U.P.)

*Corresponding Author's E-mail: manmohan0959@gmail.com

ABSTRACT : The experiment on effect of NPK on growth, yield and quality of tomato (*Solanum lycopersicum* L.) grown under open condition was conducted at Department of Horticulture, SHIATS, Allahabad, (U.P.) during Rabi season 2014-15. The seedling of cultivar undertaken for research was Hybrid GS-600 and fertilizers applied in the experiment were Urea, SSP and MOP. The experiment was laid out in RBD with 3 replications and 9 treatments. The results revealed that significantly maximum plant height (165.70 cm), number of leaves/plant (114.52) and number of fruit clusters (7.31) were produced in T₇ (140:80:60 kg/ha NPK). Number of fruits/ cluster (7.30), number of fruits/plant (52.85), fruit weight (76.41g) and fruit yield/ plant (4.03 kg) and per hectare (0.952 t/ha) were recorded maximum in T₅ (120:80:75 kg/ha NPK). Maximum TSS (4.29 °Brix) and shelf life (18.70 days) were recorded in T₆ (120:80:90 kg/ha NPK) under Allahabad agro climatic conditions.

Keywords : *Solanum lycopersicum*, NPK, growth, yield, quality.

Tomato (*Solanum lycopersicum* L.) is one of the most popular and widely grown vegetable crops throughout the world and treated as "protective food" universally. It is rich source of vitamins, vegetable protein and minerals and holds a glorious position among vegetables after the potato and sweet potato. Tomato is used as soup, salad, pickles, ketchup, puree, sauces, tomato paste, tomato juice and other products. Tomato is a rich source of vitamin, minerals, organic acids, sugars, ascorbic acid, titratable acidity and lycopene. Nutrition of plant affect ultimate growth, yield and quality any plant. Macro nutrients play important role in production of quality fruits & vegetables. Therefore, present experiment on tomato was conducted in open field condition to assess the effect of some primary plant nutrients.

MATERIAL AND METHODS

The field experiment on effect of nitrogen, phosphorus and potassium on growth yield and quality of tomato (*Solanum lycopersicum* L.) grown under open condition was conducted at Department of Horticulture, Sam Higginbottom Institute of Agriculture, Technology and Sciences, Allahabad, (U.P.) during Rabi season of 2014-15. The experiment was laid out in Randomized Block design (R.B.D.) having 3 replications and 9 treatments and variety selected for research was GS-600 (I.A.R.I., New Delhi). The

treatment combination viz. T₁ (100 : 60 : 60 kg/ha NPK), T₂ (100 : 60 : 90 kg/ha NPK), T₃ (100:80:75 kg/ha NPK), T₄ (120 : 60 : 60 kg/ha NPK), T₅ (120 : 80 : 75kg/ha NPK), T₆ (120 : 80 : 90 kg/ha NPK) T₇ (140 : 80 : 75 kg/ha NPK), T₈(140 : 100 : 60 kg/ha NPK) and T₉ (140 : 100 : 90 kg/ha NPK) were applied. The fertilizers were applied in four split doses (at transplanting and 30, 60 and 90 DAT). The soil of the experimental field was sandy loam in texture, poor in nitrogen, comparatively rich in phosphorus and medium in potash with slightly alkaline reaction. Levels of phosphorus and potash were given through single super phosphate (SSP) through Murate of Potash (MOP), respectively at the time of seedling transplanting as a basal dose. Whereas, the nitrogen was supplied through urea, half dose at the time of transplanting split doses and remaining in two at 30 days interval as top dressing. The seedlings were transplanted on 3rd December 2014 at 60 x 45 cm spacing. Statistical analysis of data was done as per standard statistical methods.

RESULTS AND DISCUSSION

The outcome of the investigation (Table 1) revealed that maximum plant height (78.40 cm, 127.30 cm and 165.70 cm) and maximum number of leaves/plant (51.56, 85.04, 114.52) at 60, 90 and 120 DAT, respectively was found in T₇ (140 : 80 : 75 kg/ha NPK) followed by T₅ (120 : 80 : 75 kg/ha NPK). The

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similar observations have been reported by Akhtar *et al.* (1), Chaurasia *et al.* (2), Raghav (6) and Singh (8).

Results revealed that maximum number of fruit clusters/ plant (3.28, 5.45, 7.31) was recorded in T₇ (140 : 80 : 75 kg/ha NPK) followed by 2.81, 4.98, 6.84 clusters/plant in T₅ (120 : 80 : 75 kg/ha NPK) at 60, 90 and 120 DAT, respectively. The maximum number of fruits per cluster (7.30) was recorded in T₇ followed by 6.97 in T₉. The maximum number of fruits/ plant (52.85) was observed in T₅ (120 : 80 : 75 kg/ha NPK) followed by 50.25 fruits/plant in T₉ (140 : 100 : 90 kg/ha

NPK). The maximum fruit weight (76.41g) was recorded in T₆ (120 : 80 : 90 kg/ha NPK) followed by 76.38 g in T₅ (120 : 80 : 75 kg/ha NPK). The maximum fruit yield (4.03 kg/plant and 302.25 q/ha) was recorded in T₅ (120 : 80 : 75 kg/ha NPK) followed by 3.82 kg in T₉ (140 : 100 : 90 kg/ha NPK). Present results corroborate the reports of Akhtar *et al.* (1), Kadam *et al.* (5), Sahoo *et al.* (7), Singh *et al.* (9) and Singh *et al.* (10). Among the quality parameters, maximum TSS (4.29°Brix) and maximum shelf life (18.70 days) was found in T₆ (120 : 80 : 90 kg/ha NPK) followed by T₅ (120 : 80 : 75 kg/ha NPK). The maximum ascorbic acid content (17.10

Table 1 : Growth parameters of tomato as influenced by different doses of NPK in open condition.

Treatments	Plant height (cm)			No. of leaves/ plant		
	60 DAT	90 DAT	120 DAT	60 DAT	90 DAT	120 DAT
T ₁ -100:60:60 kg/ha NPK	69.33	118.53	156.63	44.28	77.75	107.09
T ₂ -100:60:90 kg/ha NPK	72.50	121.60	160.00	46.90	80.37	109.71
T ₃ -100:80:75 kg/ha NPK	73.10	122.00	160.50	47.38	80.62	109.96
T ₄ -120:60:60 kg/ha NPK	73.63	122.70	161.17	47.82	81.29	110.63
T ₅ -120:80:75 kg/ha NPK	77.10	126.00	164.43	50.64	84.12	113.46
T ₆ -120:80:90 kg/ha NPK	73.90	122.90	161.30	47.93	81.40	110.74
T ₇ -140:80:75 kg/ha NPK	78.40	127.30	165.70	51.56	85.04	114.52
T ₈ -140:100:60 kg/ha NPK	74.53	123.47	161.87	48.53	82.00	111.34
T ₉ -140:100:90 kg/ha NPK	76.37	125.27	163.67	50.05	83.52	112.86
C.D. (P=0.05)	2.19	2.16	2.14	1.79	1.69	1.70

*DAT-Days after transplanting

Table 2 : Yield and quality parameters of tomato as influenced by different doses of NPK in open condition.

Treatments	Yield parameters							Quality parameters			
	No. of fruit clusters/plant			No. of fruits/ cluster	No. of fruits/ plant	Fruit weight (g)	Yield /plant (kg)	Yield (q/ha)	Shelf life (days)	TSS (°Brix)	Ascorbic acid (mg/100g)
	60 DAT	90 DAT	120 DAT								
T ₁ -100:60:60 kg/ha NPK	2.81	4.98	6.84	5.77	39.46	67.32	2.65	198.75	13.60	2.94	14.51
T ₂ -100:60:90 kg/ha NPK	2.99	5.15	7.01	6.77	47.45	71.39	3.38	253.5	16.20	3.46	16.10
T ₃ -100:80:75 kg/ha NPK	3.00	5.17	7.04	6.53	45.97	72.68	3.33	249.75	15.30	3.15	15.54
T ₄ -120:60:60 kg/ha NPK	3.03	5.21	7.07	6.13	43.33	73.39	3.17	237.75	14.20	2.97	16.43
T ₅ -120:80:75 kg/ha NPK	3.21	5.38	7.24	7.30	52.85	76.38	4.03	302.25	17.40	4.14	15.03
T ₆ -120:80:90 kg/ha NPK	3.04	5.22	7.08	6.83	48.35	76.41	3.68	276.00	18.70	4.29	17.10
T ₇ -140:80:75 kg/ha NPK	3.28	5.45	7.31	6.63	48.46	75.80	3.66	274.5	15.80	3.28	16.13
T ₈ -140:100:60kg/ha NPK	3.09	5.25	7.12	6.23	44.35	76.20	3.37	252.75	14.70	3.04	16.60
T ₉ -140:100:90kg/ha NPK	3.17	5.34	7.21	6.97	50.25	76.31	3.82	286.50	16.90	3.97	16.71
CD (P = 0.05)	0.11	0.10	0.12	0.63	1.46	0.78	0.20	1.32	0.86	0.02	0.47

mg/100g fruit pulp) was found maximum in T₆ (120 : 80 : 90 kg/ha NPK) followed by 16.71mg in T₉ 140 : 100 : 90 kg/ha NPK which are in line of Chapagain *et al.* (3), Dubey *et al.* (4) and Singh *et al.* (9).

CONCLUSION

It is concluded that the treatment combination of 140 : 80 : 75 kg/ha NPK was found superior overall other treatments in relation to growth parameters but low in production and quality, while T₅ (120:80:75 kg/ha NPK) was superior in terms of yield and T₆ (120 : 80 : 90 kg/ha NPK) was superior in relation to quality parameters.

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