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Effect of NAA and GA_3 on Yield and Quality of Tomato (*Lycopersicon esculentum* Mill.)

P. SAHA, N. DAS, P. DEB* AND C. P. SURESH

Faculty of Horticulture,Uttar Banga Krishi Viswavidyalaya
Pundibari 736101, India
E-mail : debprld@yahoo.com
**Correspondence*

Abstract

A field experiment was conducted during 2006-2007 to evaluate the effect of various growth regulators namely NAA (0, 25, 50 and 75 ppm) and GA_3(0, 15, 40 and 60 ppm) in factorial randomized block design on yield and fruit quality of tomato. Significant response of NAA (25 ppm) with respect to number of fruits/plant, fruit weight/plant, total soluble solid (TSS) and Vitamin C and yield was obtained over the control. Similarly maximum yield and vitamin C was obtained with the application of 40 ppm GA_3. Combined application of NAA (25 ppm) and GA_3 (40 ppm) was more effective than their individual application in terms of yield, TSS and vitamin C content respectively.
Key words : Tomato, NAA, GA_3, Quality.

Tomato (*Lycopersicon esculentum* Mill) is one of the most widely grown vegetable in the world both for fresh market and for the processed food industries. It is of tropical origin and most genotypes suffer from chilling injury when exposed to low temperature. Poor fruit set in tomato which is caused by adverse weather condition during flowering. Night temperature is a critical factor for poor fruit set in tomato (1). Growth and development of plants play pivotal role in determining the yield of fruits. When poor fruit setting occurs due to failure of pollination or fertilization, use of growth regulators can substitute pollination and ensure better fruit set (2). However, the improvement in yield and quality of tomato varies greatly depending upon the type of plant, growth regulator and their concentration. Their concentration varies with climate, crop and season (3,4). Therefore, the present study was undertaken to identify suitable growth regulator for increasing yield and quality of tomato.

Methods

A field experiment was conducted at the farmers field under the jurisdiction of Department of pomology and Post Harvest Technology, Uttar Banga Krishi Viswavidyalaya, Pundibari, Cooch Behar, West Bengal during 2005-2006. The experiment was laid out in factorial randomized block design with four levels of NAA (0, 25, 50 and 75 ppm) and four levels of GA_3 (0, 15, 40 and 60 ppm) having three replications . Thus, 16 treatment combinations were laid out. One month tomato (cv Pusa Gourav) seedlings were transplanted in 2.4 × 1.8 m plot with a spacing of 60 × 45 cm. There were four rows of four plants in each plot. The recommended packge of practices was followed. Different concentrations of growth regulatos viz. NAA (25, 50 and 75 ppm) and GA_3 (15, 40 and 60 ppm) were sprayed at 30 days after transplanting. In control plots distilled water was sprayed. Data were recorded for plant height, number of branches/plant , number of fruits/plant, number of locules/fruit, and yield/plant. Vitamin C and TSS of fruit were estimated after harvesting of the fruits. The data were analyzed statistically as suggested by Panse and Sukhatme (5).

Results and Discussion

Effect of NAA

Table 1 shows that there was significant difference for most of the characters. The plant height was significantly decreased with the application of 50 ppm NAA. This result is in agreement with the findings of Singh and Lal (6). The number of fruits/plant (33.16), number of locules/fruit (4.55) and yield/plant (1.72 g)

Table 1. Effect of NAA and GA_3 on yield and quality of tomato.

Treatments	Plant height (cm)	Number of branches/ plant	Number of fruits/ plant	Number of locules/ fruit	Yield/ plant (kg/plant)	Total soluble solid (%)	Vitamin C (mg/100g)
N_0	56.97	9.63	30.95	4.25	1.34	4.16	20.60
N_1	56.27	8.22	33.16	4.55	1.72	4.27	24.32
N_2	53.32	9.36	29.96	3.80	1.45	4.19	22.38
N_3	57.80	7.93	27.47	3.50	1.37	4.01	19.81
CD at 5%	1.40	0.45	0.65	0.51	0.30	0.16	0.84
G_0	56.03	8.15	31.33	3.47	1.33	4.12	20.84
G_1	55.90	9.07	30.00	3.80	1.35	4.11	22.19
G_2	55.30	10.02	31.99	5.10	1.75	4.29	23.06
G_3	57.13	7.90	28.23	3.73	1.45	4.10	21.01
CD at 5%	1.40	0.45	0.65	0.51	0.30	0.16	0.84

were significantly higher with the application of 50 ppm NAA while maximum number of branches was more (9.63) in control. This might be due to high accumulation of photosynthates in the fruit. This result is in accordance with the findings of Singh and Singh (7) and Chonker and Singh (8). The maximum TSS (4.27%) and vitamin C (24.32 mg/100g) were obtained with the application 25 ppm NAA whereas higher dose reduces the quality parameter. This result is in conformity with the findings of Pan- dita et al. (9).

Effect of GA_3

Application of GA_3 showed significant effect on yield and quality characteristics of tomato (Table 1). The number branches (10.02), number of fruits/plant (31.99) and number of locules/fruit (5.10) were significantly higher with the application of 40 ppm GA_3. This result is in conformity with the result of Singh and Lal (6). The total yield/plant was higher (1.75 kg) with the application of 40 ppm GA_3. This may be due to the higher fruit set and less fruit drop by the application of GA_3. There was no significant difference in plant height and TSS by the application of GA_3. However, vitamin C content was significantly increased with maximum vitamin C (23.06) was obtained with the application of 40 ppm GA_3.

Table 2. Effect of combined application of NAA and GA_3 on yield and quality of tomato.

Treatments	Plant height (cm)	Number of branches plant	Number of fruits/ plant	Number of locules/ fruit	Yield/ plant (kg/plant)	Total solute solid (%)	Vitamin C (mg/100g)
N_0G_0	60.50	7.20	27.96	3.20	1.24	3.98	19.46
N_0G_1	57.40	10.50	30.06	4.50	1.10	4.25	20.15
N_0G_2	53.20	12.73	33.83	5.20	1.60	4.31	21.81
N_1G_3	56.80	8.10	31.96	4.10	1.43	4.12	20.98
N_1G_0	56.76	8.60	36.96	3.50	1.20	4.12	22.16
N_1G_1	55.40	8.10	28.06	3.80	1.80	4.15	25.41
N_1G_2	55.03	8.30	37.86	6.30	2.10	4.45	26.61
N_2G_3	57.90	7.90	29.76	4.63	1.80	4.36	23.12
N_2G_0	52.60	9.20	31.83	3.80	1.50	4.21	21.61
N_2G_1	53.70	9.60	30.83	3.70	1.20	4.15	22.05
N_2G_2	52.20	10.86	30.26	4.60	1.60	4.38	24.18
N_2G_3	54.80	7.80	26.93	3.10	1.20	4.03	21.68
N_3G_0	54.26	7.63	28.56	3.40	1.33	4.20	20.14
N_3G_1	57.10	8.10	31.06	3.20	1.35	3.90	21.18
N_3G_2	60.80	8.20	26.00	4.30	1.75	4.03	19.67
N_3G_3	59.03	7.80	24.26	3.10	1.45	3.89	18.23
CD at 5%	2.80	0.90	1.30	1.03	0.61	0.32	1.69

Effect of Interaction Between NAA and GA_3

The combined effect of NAA and GA_3 was significant for most of the characters (Table 2). The maximum plant height was obtained with the application of 75 ppm NAA followed by 40 ppm GA_3. The number of fruits/plant (37.86) and vitamin C (26.61 mg/100g) content and yield (2.10 kg/plant) was higher with the combined application of 25 ppm NAA and 40 ppm GA_3 as compared to control and this is probably due to high fruit setting under the influence of plant bio-regulators. These results are in conformity with the result of Kar et al. (10). There was no significant difference in number of locules/fruit and TSS. The maximum vitamin C was obtained with the combined application of 25 ppm NAA and 40 ppm GA_3. This might be due to better utilization of photosynthates and nutrients by the plants. This result is in conformity with the results of Srivastava and Srivastava (11).

The yield and quality were increased markedly by the application of NAA and GA_3. The significant variation was noted due to the interaction between growth regulators than their individual application. Balanced application of NAA and GA_3 increase yield and quality where as excess dose was not found economical but also has detrimental effect on yield and quality. Hence combined application of NAA (25 ppm) and GA_3 (40 ppm) can be recommended to the farmers for higher production with high quality of fruits.

References

1. Kalloo G. and S. K. Arora. 1985. An appraisal of fruit set in tomato.Haryana J. Hort. Sci. 14 : 67—82.
2. Chaudhary B. 1987. Vegetables. National Book Trust, New Delhi, India.
3. Singh D. K., G. Lal and R. P. Singh. 1990. Effect of synthetic auxin in the performance of chilli cultivars under Tarai condition of U. P. Prog. Hort. 22 : 191—197.
4. Phookan D. B., A. Shadeque and P. J. Baruah. 1991. Effect of growth regulators on yield and quality of tomato. Veg. Sci. 18 : 93—96.
5. Panse V. G. and P. V. Sukhatme. 2000. Statistical methods for agricultural workers. ICAR Publ., New Delhi, India.
6. Singh D. K and G. Lal. 2001. Effect of plant bio-regulators on the growth and yield of tomato (*Lycopersicon esculentum* Mill). Prog. Hort. 33 : 61—66.
7. Singh D. K. and R. P. Singh. 1993. Varietal response to 2, 4-dichlorophenoxy acetic acid and methods of its application on summer tomato. Indian J. Agric.Sci. 63 : 276—282.
8. Chonker V. S and B. N. Singh. 1969. Effect of NAA on growth and yield of tomato. Indian J. Hort. 16 : 236—242.
9. Pandita M. L., S. K. Arora and K. Singh. 1976. Vegetable Crops. Naya Prokash, Calcutta, India.
10. Kar P. L., M. Longkumar and D. Sanyal. 1993. Effect of plant growth regulators and their methods of application on growth, flowering and yield of tomato (*Lycopersicon esculentum* Mill)cv. Pusa Early Dwarf. Hort. J. 6 : 45—49.
11. Srivastava R. P. and K. K. Srivastava. 1966. Vegetable crops. Naya Prokash, Calcutta, India.