Indian J. Hort. 67(Special Issue), November 2010: 467-469

Short communication

Performance of capsicum as influenced by bio-regulators and micronutrients inside polyhouse under Assam conditions

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Capsicum (*Capsicum annum* var. grossum) is one of the most important commercial vegetables that give maximum profit to the farmers besides having great potential for export. The bio-regulation for growth and yield by externally supplied chemicals is one of the most exciting research areas of the recent times. They are effective in several crops to balance the source sink ratio for increasing the yield. Use of plant growth regulators have been found beneficial in improving plant growth, fruit set, fruit development, yield and quality of various solanaceous crops (Bose and Som, 2) but efficacy varied with different climatic conditions. The plant growth regulator along with micronutrients has profound effect on the productivity of the crop and improving the quality of the crop as well as provides resistance against physiological disorder. However, information regarding the effectiveness of plant bio-regulators and micronutrients on growth, yield and quality of capsicum is meager under the agro climatic condition of Jorhat (Assam). Keeping this in view the present study was, therefore, conducted with suggested concentrations of NAA and Boron as foliar spray to determine the effective bio-regulator promoting growth, yield and quality of capsicum cultivar, California Wonder grown under polyhouse.

A field experiment was conducted at the Experimental Farm, Department of Horticulture, Assam Agricultural University, Jorhat during 2005 under naturally ventilated low-cost polyhouse. The low-cost polyhouse was oriented in the north-south direction, constructed with bamboo frame and covered with UV stabilized LDPE film of 200 micron thickness as cladding material. Seven treatments viz., T_1-NAA 10 ppm at first flowering, T_2- NAA 10 ppm at first flowering and 15 days after first application, T_3- NAA 10 ppm + boron 1ppm at first flowering, T_4- NAA 10 ppm + boron 1ppm at first flowering and 15 days after first application, T_5-Boron 1ppm at first flowering, T_6-Boron 1 ppm first flowering and 15 days after first application and T_7- water spray (control) were tested in randomized block design with three replication. One-month-old seedlings of capsicum variety California Wonder were transplanted inside the low cost polyhouse at a spacing of 45 cm x 45 cm between and within rows. Observations were recorded on different growth characters (plant height, branch number, days to first flowering and fruiting, days to 50% flowering and fruiting and fruit set percentage), yield attributing characters (fruits per plant, average fruit weight and yield per plant), seed characters (seed per fruit, 000 seed weight, seed yield per plant, seed yield per m^2) and quality characters (ascorbic acid, total soluble solid and fruit volume) form different treatments. The intercultural operations and plant protection measures were followed as per recommendation of the crop.

Table 1 elucidates the promotive effects of NAA and boron application on various vegetative and yield attributes of capsicum grown under cover. The growth characters studied showed significant differences among the treatments. Maximum plant height was obtained with NAA 10 ppm applied at first flowering and again 15 days after first application (T_2), which was closely followed by NAA 10 ppm and Boron 1 ppm applied at first flowering (T_3) and minimum plant height was obtained in the untreated control (water spray). The increase in plant height was due to fact that NAA promotes vegetative growth by cell division and cell elongation (Singh et. *al.* 10). Similarly maximum number of branches was recorded in T_2 (NAA 10 ppm at first flowering and 15 days after first application), which is at par with T_3 and T_5 but significantly superior to untreated control. This might be due to promotion of lateral branching and growth in the plants by NAA application besides increasing root elongation and shoot growth of the plant. Meena *et al.* (6) also reported increase in plant height and more branches in brinjal treated with 50 ppm NAA. Minimum days to first flowering and fruit setting were recorded with the single application of NAA 10 ppm whereas, minimum days to 50% flowering and 50% fruit setting were recorded with application of 10 ppm NAA at first flowering and again 15 days after first application, while maximum days to flowering and fruiting was recorded in

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Table 1. Effect of NAA and boron on growth and yield attributing characters of capsicum under polyhouse.

Treatments	Plant height (cm)	No. of branches	Days to first flowering	Days to first fruiting	Days to 50% flowering	Days to 50% fruiting	Fruit set (%)	Number of fruits plant $^{-1}$	Fruit weight (g)	Yield /plant (g)
T_1-NAA 10 ppm at first flowering	58.26	6.86	45.71	53.04	72.00	77.45	46.89	5.80	49.25	284.47
T_2- NAA 10 ppm at first flowering & 15 days after first application	62.93	8.10	46.44	53.11	59.75	66.53	59.58	9.73	53.44	522.33
T_3-NAA 10 ppm + Boron 1 ppm at first flowering	60.66	7.26	46.52	53.86	60.34	67.01	69.06	11.26	54.37	613.33
T_4- NAA 10 ppm + boron 1 ppm at first flowering & 15 days after first application	49.00	6.66	52.41	59.75	60.78	67.91	48.50	9.47	44.06	421.33
T_5- Boron 1 ppm at first flowering	59.00	7.33	49.47	57.07	65.20	72.15	52.88	9.80	46.44	458.33
T_6- Boron 1 ppm at first flowering & 15 days after first application	52.86	6.60	52.66	59.66	62.51	69.29	39.88	5.53	43.40	237.00
T_7- water spray (control)	44.86	5.30	58.02	65.35	64.05	67.78	24.69	4.20	42.64	210.00
$CD_{0.05}$	3.29	1.09	3.07	3.67	3.15	3.98	5.34	1.22	9.61	101.25

Table 2. Effect of NAA and boron on seed yield and quality characters of capsicum under polyhouse.

Treatments	Number of seeds fruit $^{-1}$	1000 seed weight (g)	Seed yield plant $^{-1}$ (g)	Seed yield (g/m^2)	Ascorbic acid (mg/100g)	TSS (^{o}Brix)	Fruit volume (gm/cc)
T_1-NAA 10 ppm at first flowering	229.67	4.66	6.24	30.82	43.96	3.66	130.00
T_2- NAA 10 ppm at first flowering & 15 days after first application	264.33	4.96	12.73	62.88	63.80	3.00	153.33
T_3-NAA 10 ppm + Boron 1 ppm at first flowering	323.33	4.94	17.23	79.70	33.87	4.00	223.33
T_4- NAA 10 ppm + Boron 1 ppm at first flowering & 15 days after first application	239.33	4.87	11.04	54.57	41.37	3.00	125.00
T_5- Boron 1 ppm at first flowering	252.67	4.86	12.02	59.38	37.26	3.66	216.66
T_6- Boron 1 ppm at first flowering & 15 days after first application	197.67	4.87	5.33	26.33	43.60	3.00	130.00
T_7- water spray (control)	131.67	4.25	2.33	11.56	15.32	2.66	110.00
$CD_{0.05}$	25.63	0.41	2.73	9.90	4.33	0.67	27.00

untreated control. Supportive findings were also reported by Hussaini *et el.* (5) in bhendi and Sharma *et al*. (9) in litchi. This may be due to effect of auxins in change of meristem from vegetative to reproductive stage (Chhonkar and Singh, 3). NAA 10 ppm and boron 1 ppm applied at first flowering recorded maximum fruit set percentage among all the treatments whereas, untreated control (water spray) recorded lowest fruit set percentage.

Fruit number per plant and average fruit weight was recorded maximum with application of NAA 10 ppm and boron 1 ppm at first flowering (T_3). This might be due to increased fruit set with NAA application. From the result it is obvious that number of fruits per plant had greater influence on yield than those of other yield contributing factors. This increase in yield and yield attributing traits was due to improvement in the level of carbohydrates owing to greater photosynthesis and ultimately increased number and weight of fruit, which had positive correlation with maximum fruit yield per plant recorded by application of NAA 10 ppm and boron 1 ppm at first flowering. Pandita *et al.* (7) reported significantly increased number of fruits, fruit size and yield in tomato with spray of 50 ppm NAA. Besides boron also plays an important role in enhancing the translocation of carbohydrates from the site of their synthesis to the storage organ and helped in increasing yield. This result is in close agreement with and Sharma (8) in cauliflower.

In regard to seed characters studied (Table 2) foliar spraying of NAA 10 ppm and boron 1 ppm at first flowering (T_3) ranked better in regard to number of seeds per fruit and thousand seed weight which had a positive effect in increasing the seed yield per sq. meter. Arora et. *al.* (1) also reported higher seed content in tomato treated with 1 ppm boron. The quality parameters of capsicum were also greatly influenced by exogenous application of bio-regulators (Table 2). Application of NAA 10 ppm at the time of first flowering and 15 days after first application exhibited maximum increase in ascorbic acid content, which differed significantly from rest of the treatments. The results are in agreement with the findings of Gupta *et al*. (4), who reported higher ascorbic acid content in tomato with application of 75 ppm NAA. Maximum total soluble solids and fruit volume were recorded by application of both NAA 10 ppm and boron 1 ppm at the time of first flowering while, untreated control recorded the lowest total soluble solid and fruit volume.

Therefore, based on the overall performance, it can be revealed that the combine application of NAA 10 ppm and boron 1 ppm at the time of flowering can be practiced for increasing both fruit and seed yield of capsicum inside low cost polyhouse under the agro-climatic conditions of Jorhat Assam).

REFERENCES

1. Arora, S.K., Pandita, M.L. and Singh, K. 1982. Effect of para-chlorophenoxy acetic acid, boron, copper, molybdenum and zinc on the fruit quality of tomato varieties in summer and the rainy season. *Indian J. Agric. Sci*. **52**: 648-52.
2. Bose, T. K. and Som, M. G. 1986. Vegetable crops in India. Naya Prakash, Calcutta, 309 p.
3. Chhonkar, V. S. and S. N. Singh. 1962. Effect of Alpha Naphthalene acetic acid on growth, quality and yield of tomato (*Lycopersicon esculentum* Mill.). *Indian J. Hort*. **16**: 236-242.
4. Gupta, P.K. and Gupta, A.K. 2004. Studies of PGR and micronutrient mixtures on vitamin C content in tomato (Lycopersicon esculentum Mill) products. *Indian J. Hort*. **61**: 102-103
5. Hussaini, M. G. Bala and Babu, K. Hari. 2004. Effect of plant bioregulators on yield and yield attributes of bhendi (Abelmoschus esculentum L. Moench) cv. Arka Abhay. *Orissa J Hort.* **32**: 108-09.
6. Meena, S.S. and Dhaka, R.S. 2003. Effect of protection materials and growth regulators on the production of early crop of tomato. *Haryana Agric. Univ. J. Res.* **13**: 61-69..
7. Pandita, M.L., Pandey, S.L. and Arora, S.K. 1983. Effect of plant regulators on the chemical composition of tomato (Lycopersicon esculentum Mill.) var. 'HS-101'. *Haryana J. Hort. Sci*. **5**: 65-72.
8. Sharma, S. K. 2002. Effect of boron and molybdenum on seed production of cauliflower. *Indian J. Hort*. **59**: 177-80.
9. Sharma, P., Singh, A.K. and Sharma, R.M. 2005. Effcet of plant bio-regulators (PBRs) and micronutrients on fruit set and quality of litchi cv. Dehradun. *Indian J. Hort.* **62**: 26-8.
10. Singh, D.K., Lal, G. and Singh, R.P. 1986. Effect of synthetic auxins on the performance of chilli (C*apsicum annuum* L.) cultivars under tarai condition of U.P. *Prog. Hort*. **22**: 191-97.

Received: October, 2008; Revised: March, 2010
Accepted: August, 2010