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Effect of plant growth hormone and fertilizer on growth and yield parameters in chilli (*Capsicum annum L.*) cv. PUSA JWALA

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Abstract : A study was conducted at Horticulture Research Farm, Department of Horticulture, Choudhary Charan Singh University, Meerut during the year 2008-2009. The experiment was laid out in Randomized Block Design, consisted 9 treatments combinations, replicated three times. Plant growth hormone NAA each at 50 and 75 ppm and nitrogen 100 and 150 kg/ha concentration was used individually as well as in all possible combinations. The combined application of plant growth hormone and fertilizer each at higher concentration (75ppm NAA, 150 kg N/ha) gave the maximum growth and yield. The result revealed that a maximum increase was found in vegetative growth parameters as plant height 58.43 cm, no. of branch/plant 82.65, no. of leaves/plant 998.72 and yield parameters *i.e.* length of fruit 5.64 cm, yield of green fruit 68.49 q/ha, yield of dry fruit 6.74 q/ha with the combined application of plant growth hormone and fertilizer (75 ppm NAA and 150 kg N/ha) in comparisons to other treatment combination and control.

Key words : Chilli, *Capsicum annum L.*, NAA, Nitrogen, Growth, Yield

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Chilli (*Capsicum annum L.*) is the fruit vegetable and belongs to the family Solanaceae. The genus capsicum is derived from Greek word “Kapsimo” meaning “tabite” chilli is an indispensable spice as basic ingredient in everyday cuisine all over the world. The world’s hottest chilli “Naga Jolokia” is cultivated in hilly Terrain of Assam in a small town Tejpur, India. Chilli has many medicinal properties such as stimulating good digestion and endorphins a natural pain killer to relieve pains. This crop requires heavy fertilizers for fruits especially the quantities on nitrogen for its high yields. Nitrogen accelerated the vegetative growth for fruit formation, plant height, fresh weight and leaves as green vegetable. Application of nitrogen ranging from 50-120 kg/ha. was found for obtaining maximum fruit yield. (Rohal and Kalra, 1986; Palled *et al.*, 1988.). Growth parameter of chilli are mainly depends upon nitrogen supply and along with other nutrients. Similarly the plant growth and yield to harness maximum benefit from seed production. It is also

observed that exogenous foliar application of growth regulators stimulates flowering, pollination, fertilization and seed setting to get maximum seed yield.

RESEARCH METHODS

The field experiment was conducted during 2008-2009 at the Horticulture Research Farm, Department of Horticulture, C.C.S. University, Meerut (U.P) cv. PUSA JAWALA. The experiment was laid out in Randomized Block Design, consisted 9 treatments combinations. Plant growth hormone NAA each at 50 and 75 ppm and nitrogen 100 and 150 kg/ha concentration was used individually as well as in all possible combinations. The soil of the experiment field was sandy loam (fine sand-55.6%, silt-22.3%, and clay-20.6%) with organic carbon (0.41%), N (0.052%), P (0.0079%), and K (0.0202%) and pH (7.4). Seeds of Pusa Jawala were sown in the nursery bed and after 25 days, seedlings of uniform vigour and size were transplanted in the field at a distance of 60 cm × 45cm

(row to row and plant to plant). A light irrigation was done just after transplanting. FYM 40 tonnes/ha was applied at the time of field preparation. The half dose of nitrogen was applied at the time of transplanting and remaining dose of nitrogen was applied in two split dose at 10 and 20 days after transplanting in the form of urea. Plant growth hormone (NAA) was applied by spraying with hand sprayer after 30 days of transplanting. No treatment was applied on control.

RESEARCH FINDINGS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been summarised under following heads:

Plant height (cm.):

The data from Table 1 and 2 reveal that the maximum plant height (53.65 cm) was recorded under the treatment N₂ where nitrogen was applied @ 150 kg/ha. followed by G₂ where NAA was applied @ 75 ppm. The minimum plant height (46.12 cm) was recorded under the control. The data presented Table 1(b) reveals that the Interaction effect of plant growth hormone and fertilizer on plant height had non significant result. The plant height significantly affected with the application NAA alone has no Significant influence on the growth of plant while N plays an important role in nucleic acid and Chlorophyll.

Increase in plant height was reported with the application of N in chilli by Laxman and Mukherjee (2000) and tomato (Gupta *et al.*, 2003).

Number of branches per plant:

Table 1 and 2 showed that maximum no. of branches/plant (72.96) was recorded under the treatment N₂ where nitrogen was applied @ 150 kg / ha. followed by G₂ (75 ppm NAA), while the minimum number of branches/plant (63.46) was recorded under the control. Interaction effect of plant growth hormone and nitrogen on no of branches/plant it is clear that maximum number of branches /plant (82.62) was recorded under the treatment combination G₂N₂ (NAA @ 75 ppm and nitrogen @ 150 kg/ha) followed by G₁N₁. The minimum number of branches/plant (63.46) was recorded under the control. The application of nitrogen and NAA increased 20 - 25 per cent number of branches/plant, because NAA and nitrogen play a role in enhancement of all division and photosynthesis. Increase in the number of branches was reported in chilli (Singh and Singh, 1974, Wally *et al.*, 1973, Gupta *et al.*, 2001) by combined application of N x NAA.

Number of leaves / plant:

The data on number of leaves/plant are present in Table 1(a) and 1(b) clearly showed that the number of leaves/plant was affected by application of plant growth

Table 1 : Effect of plant growth hormone and fertilizer on growth and yield parameters in chilli (*Capsicum annum L.*) cv. PUSA JWALA

Treatments	Plant height (cm)	Number of branches per plant	No. of leaves/plant	Length of fruit (cm)	Yield of green fruit (q/ha)	Yield of dry fruit (q/ha)
NAA						
G ₁ (50ppm)	48.16	65.86	946.56	4.52	56.90	5.00
G ₂ (75ppm)	51.60	68.10	957.87	4.65	58.16	5.32
Nitrogen						
N ₁ (100 kg/ha)	50.64	67.46	949.56	4.63	57.57	5.06
N ₂ (150 kg/ha)	53.65	72.96	968.92	4.76	59.72	5.69
Control	46.12	63.46	935.74	4.10	48.46	5.05
S.E. ±	0.146	0.147	2.563	0.014	0.222	0.021
C.D. (P=0.05)	0.437	0.443	7.685	0.044	0.668	0.064

Table 2 : Interaction (NAA and Nitrogen)

Treatments	Plant height (cm.)	Number of branches per plant	No. of leaves/plant	Length of fruit (cm.)	Yield of green fruit (q/ha)	Yield of dry fruit (q/ha)
G ₁ N ₁	54.74	76.64	975.46	4.89	61.06	6.01
G ₁ N ₂	56.16	78.92	983.78	4.98	62.67	6.12
G ₂ N ₁	57.13	81.74	991.21	5.30	67.43	6.36
G ₂ N ₂	58.43	82.65	998.72	5.64	68.49	6.74
S.E. ±	0.252	0.255	4.439	0.025	0.386	0.037
C.D. (P=0.05)	NS	0.766	NS	0.076	1.157	0.111

NS=Non-significant

hormone and nitrogen. The maximum no. of leaves / plant (968.92) was recorded under the treatment N_2 , where nitrogen was applied @ 150 kg/ha followed by G_2 (NAA 75 ppm). The minimum number of leaves/plant (935.74) was recorded under the control. The interaction effect NAA and nitrogen on number of leaves per plant had not significant results. The number of leaves/plant was significantly affected by nitrogen and NAA due to the iron is involved in different oxidative reductive of photosynthesis, respiration, appear to be the requirement of chilli cultivar under study for increasing the number of leaves, their fresh and dry weight.

Length of fruit (cm):

The data on length of fruit presented in Table 1 and 2 clearly showed that the length of fruit was significantly affected by the application of plant growth hormone (PGH) and nitrogen. The maximum length of fruit (4.76 cm) was recorded under the treatment N_2 @ 150kg/ha in comparison to the G_2 (75 ppm NAA). The minimum length of fruit (4.10 cm) was recorded under the control. Interaction effect of NAA and nitrogen on length of fruit, it showed that maximum length of fruit (5.64 cm) was recorded under the combined treatment G_2N_2 (NAA @ 75 ppm and N150kg/ha) was more effective, followed by G_2N_1 (75 ppm NAA and N100 kg/ha). The minimum length of fruit (4.10 cm) was recorded under the control. Similar results were found by Laxman and Mukherjee (2000) who observed influence of combined application of N and NAA on fruit length in chilli and increase in fruit in okra.

Yield of green and dry fruit (q/ha):

The data on yield of green fruit and yield of dry fruit are presented in Table 1 and 2 which clearly showed that the yield of green fruit and dry fruit was significantly affected by the application of NAA and nitrogen. The maximum yield of green fruit (59.72 q/ha) and dry fruit (5.69q/ha) was recorded under the treatment N_2 , where nitrogen was applied @ 150 kg/ha followed by G_2 (75 ppm NAA), while the minimum yield of green fruit and dry fruit (48.46 q/ha and 5.05q/ha), respectively was recorded under the control. Interaction effect of NAA and nitrogen on yield of green fruit and dry fruit, clearly showed that maximum yield of green fruit and dry fruit

(68.49 and 6.74 q/ha), respectively was recorded under the treatment combination G_2N_2 (75 ppm NAA and 150 kg/ha. N), while the minimum yield of green fruit and dry fruit was recorded under the control. Similar result was found in chilli (Bagash and Shaikh, 1992). They used combined application of N and NAA found increased in yield of sweet paper cultivar California with increased in nitrogen application.

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