

# Effect of Spray Treatment of Plant Growth Substances at Different Stages on Growth and Yield of Sweet Pepper (*Capsicum Annum* L.) CV. Indra under Green House

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**Abstract:** The results revealed that among different spray treatment of plant growth substances, the maximum height of plant at 30 days after transplanting (30.15 cm) was found significant with spray of GA<sub>3</sub> 50 ppm (P<sub>3</sub>). The minimum day taken for edible maturity was also superior with GA<sub>3</sub> 50 ppm. Whereas the maximum number of branches (5.52) and minimum days taken for initiation of flower (48.50 day) with ethrel 100 ppm (P<sub>7</sub>) treatment. The maximum fruit set (70.78 %) was recorded with spray of GA<sub>3</sub> 25 ppm (P<sub>2</sub>). Regarding yield parameter, spray treatment of GA<sub>3</sub> 50 ppm (P<sub>3</sub>) was superior with respect to average weight of fruit (96.58 gm), yield/plant (1.84 kg) and yield/ha (244.65 q/ha). Among two stages of spray, S<sub>2</sub> (Spray at 20 days after transplanting) was recorded the maximum girth thickness of stem at 30 days after transplanting (0.47 cm). Whereas S<sub>1</sub> (Spray at 20 days after sowing) was recorded initiation of first flower (49.96 day). No any beneficial effect on yield parameters.

**Keywords:** Plant growth substances, Stages of spray, Sweet pepper.

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## I. INTRODUCTION

The genus capsicum belongs to the family solanaceae which is grown in several parts of the world. Sweet pepper is believed to be originated in Tropical South America. Sweet pepper (*Capsicum annum* L.) also known as 'shimla mirch' or 'bell pepper' or 'capsicum' is an important solanaceous vegetable. They supply good levels of carbohydrates and are rich in vitamins A and C (Burt 2005). The hormonal use in the plant system and their importance is the outstanding discovery and achievement of plant sciences. A number of techniques for application of growth substances have been tried on various vegetables. The method adopted successfully have been seed treatment, seedling treatment before transplanting as spray or mixed with irrigation water, cluster spray, injection etc. Moore (1950) and Rappaport (1957) found whole plant spray to be most effective method of plant growth sub

## II. MATERIAL METHOD

The experiment was carried out during the year 2011-12 at Naturally Ventilated Greenhouse, Department of vegetable science, College of Horticulture, S. D. Agricultural University, Sardarkrushinagar. The experiment was laid out in Completely Randomized Design with Factorial concept. There were sixteen (16) treatment combination comprised eight levels of plant growth substances viz. P<sub>0</sub> (Control), P<sub>1</sub> (Water spray), P<sub>2</sub> (GA<sub>3</sub> 25 ppm), P<sub>3</sub> (GA<sub>3</sub> 50 ppm), P<sub>4</sub> (NAA 20 ppm), P<sub>5</sub> (NAA 40 ppm), P<sub>6</sub> (Ethrel 50 ppm), P<sub>7</sub> (Ethrel 100 ppm) and two stages of spray viz. S<sub>1</sub> (spray at 20 days after sowing) and S<sub>2</sub> (spray at 20 days after transplanting). A number of observation viz. height of plant and girth thickness of stem at 30, 60, 90 and 120 days after transplanting (cm), number of branches, days taken for first initiation flower after transplanting, percentage fruit set per plant, days taken for flowering to edible maturity, days taken for first picking, total number of fruits per plant, average weight of fruit (gm), yield of fruits per plant (kg), yield per hectare (q/ha) were recorded.

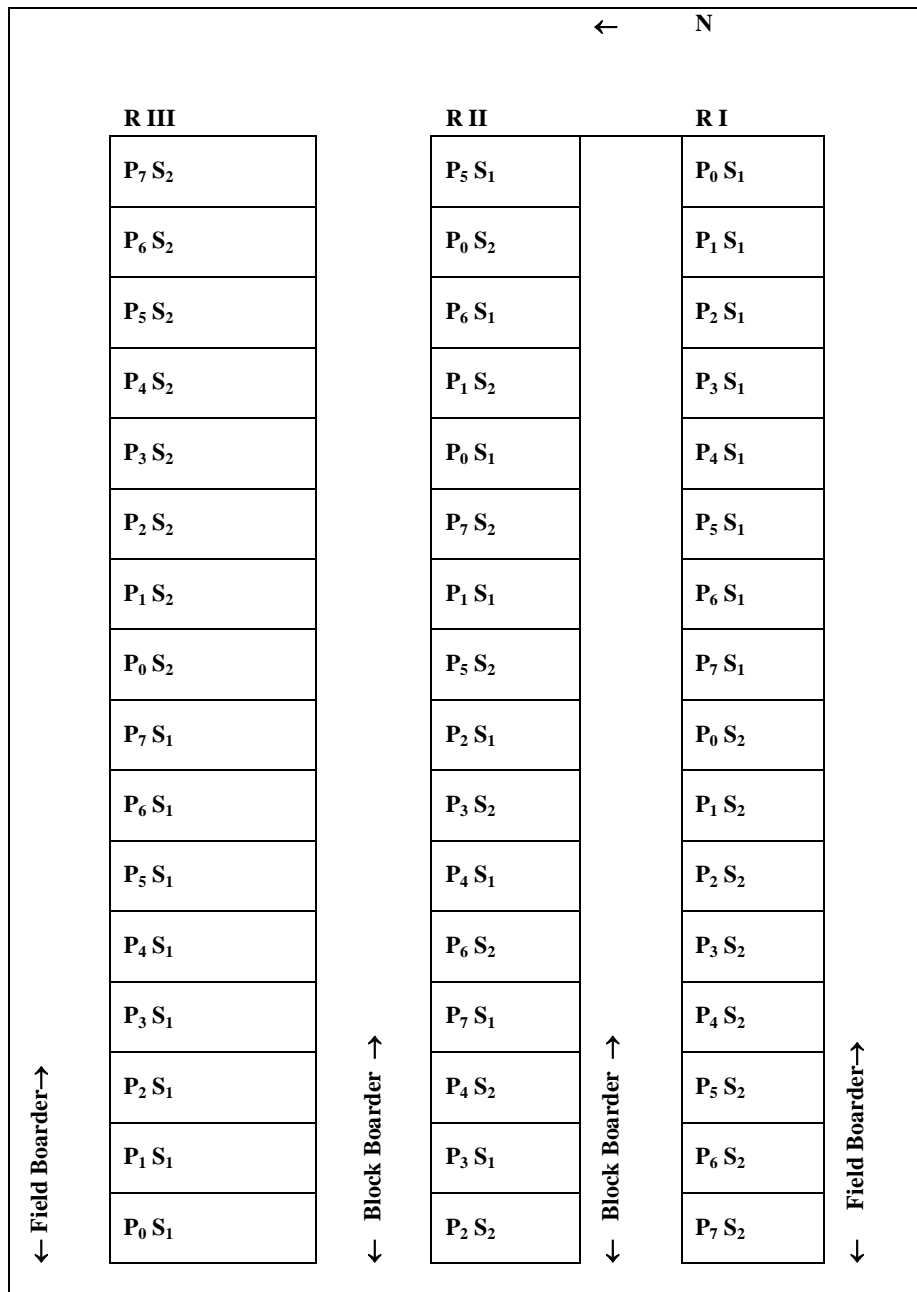


Fig.1 LAYOUT PLAN OF THE EXPERIMENT UNDER GREEN HOUSE

### III. RESULTS AND DISCUSSION

#### 1. Effect on growth:

In the present study, the height of sweet pepper plant has been found to increase with the advancement of development stages. It is clearly seen from the data that there has been increase in the height of plant due to application of GA<sub>3</sub> @ 50ppm. This increase in plant height is due to its effect on stem elongation by rapid cell elongation and multiplication of cells in sub-apical meristem. The rapid growth that occurs is a result of both the greater number of cells formed and elongation of individual cells. The increase in plant height by GA<sub>3</sub> application has also been reported by Patel (1998), Naruka and Paliwal (1999), Sorte et.al. (2001) in brinjal, Koreet. et.al. (2003) in bottle gourd and Natesh et.al. (2005) in chilli and the highest number of branches (5.52) was observed due to application of Ethrel. The above results were in consonance with those of Das and Das (1996) in pumpkin, Gopalbharadwaj et.al. (1998) in capsicum. Dixit et.al. (2001) in watermelon, Girde (2006) in sponge gourd and Hilli, et.al. (2010) in ridge gourd.

## 2. Effect on flowering and fruit setting:

The first initiation of flower was found due to the application of Ethrel. The above results were in agreement with those of Krishanappa, (2002) in tomato, Kooner et.al. (2000) in bottlegourd and Dixit et.al. (2001) in watermelon and the maximum per cent of fruit setting (70 %) was recorded that application of GA<sub>3</sub> whereas, the minimum fruit setting (39.44%) was recorded in control. Similar finding have also been obtained by Irulappan and Muthukrishnan (1974) in tomato, Chattopadhyay and Sen (1974) in chilli, Nair et.al. (1974) in tomato, Sorte et.al.(2001) in okra and Natesh et.al. (2005) in chilli.

The earlier edible maturity (26.55 days) was obtained by application of GA<sub>3</sub>. Similar beneficial effect of growth substances has been reported by Dixit et.al. (2001) in watermelon, Bisaria and Bhatnagar (1978) in brinjal. Whereas, the effect of plant growth substances was found significant on earlier picking. The earlier picking of fruits was increased due to application of plant growth substances like GA<sub>3</sub>. Similar finding have also been obtained by Natesh et.al. (2005) in chilli.

## 3. Effect on yield attributes and yield:

The maximum yield attributes viz. average weight of fruit (96.58 gm), yield of fruit per plant (1.83 kg) and yield per hectare (244.64 q/ha) was obtained in GA<sub>3</sub> 50 ppm treatment. An increase in average fruit weight treated plants may further attributed to the reason that plants remain physiologically more active to build up sufficient food stock for the developing flowers and fruits. The above results were in agreement with Nimje et.al. (1990), Kumar and Ray (2000) in cauliflower, El-Helaly (2009) in potato, Naruka and Paliwal (1999) and Kore et.al. (2003) in okra.

**Table 1: Effect of spray treatment of plant growth substances at different stages on height of plant, girth thickness of stem, number of branches and days taken for initiation of first flower.**

Treatments	Height of plant at 30 DAT (cm)	Girth thickness of stem at 30 DAT(cm)	Number of branches	first initiation flowering
<b>plant growth substances(P)</b>				
1. P <sub>0</sub> - Control ( No spray)	28.17	0.47	4.33	49.00
2. P <sub>1</sub> - Water spray	28.03	0.47	3.67	48.56
3. P <sub>2</sub> - GA <sub>3</sub> -25 ppm	29.08	0.44	4.87	52.83
4. P <sub>3</sub> - GA <sub>3</sub> -50 ppm	30.15	0.46	4.28	56.61
5. P <sub>4</sub> - NAA-20 ppm	20.89	0.42	4.33	54.06
6. P <sub>5</sub> - NAA-40 ppm	21.72	0.46	4.11	55.04
7. P <sub>6</sub> - Ethrel-50 ppm	28.87	0.48	5.21	48.50
8. P <sub>7</sub> - Ethrel-100 ppm	26.57	0.46	5.52	48.50
S.Em. ±	1.69	0.02	0.21	1.22
C.D. at 5%	4.88	NS	0.60	3.52
<b>Stages of spray(S)</b>				
S <sub>1</sub> - At Seedling stage ( 20 day after seed sowing)	26.56	0.44	4.50	49.96
S <sub>2</sub> -After transplanting ( 20 day after transplanting)	26.81	0.47	4.58	53.32
S.Em. ±	0.85	0.01	0.10	0.61
C.D. at 5%	NS	0.03	NS	1.76
<b>Interaction ( P X S)</b>				
S.Em. ±	2.39	0.03	0.30	1.73
C.D. at 5%	NS	NS	NS	4.98
C.V.%	15.53	9.62	11.28	5.79

**Table 2: Effect of spray treatment of plant growth substances at different stages on per cent fruit set, days taken for flowering to edible maturity and days taken for first picking**

Treatments	Fruit set per plant (%)	Days taken for flowering to edible maturity	Days taken for first picking.
<b>Plant growth substances (P)</b>			
1. P <sub>0</sub> -Control ( No spray)	39.44	38.72	87.72
2. P <sub>1</sub> -Water spray	41.67	33.17	82.22
3. P <sub>2</sub> -GA <sub>3</sub> -25 ppm	70.78	27.94	80.61
4. P <sub>3</sub> -GA <sub>3</sub> -50 ppm	60.89	26.55	82.94
5. P <sub>4</sub> -NAA-2 ppm	61.95	36.94	90.89
6. P <sub>5</sub> -NAA-40ppm	62.83	36.67	91.44
7. P <sub>6</sub> -Ethrel-5 ppm	60.28	37.28	85.61
8. P <sub>7</sub> -Ethrel-100 ppm	58.06	35.77	84.27
S.Em. ±	4.61	1.83	2.23
C.D. at 5%	13.27	5.27	6.43
<b>Stages of spray (S)</b>			
S <sub>1</sub> -At Seedling stage ( 20 day after seed sowing)	56.40	34.35	84.26
S <sub>2</sub> -After transplanting (20dayaftertransplanting)	57.57	33.91	87.16
S.Em. ±	2.30	0.91	1.12
C.D. at 5%	NS	NS	NS
<b>Interaction ( P X S)</b>			
S.Em. ±	6.52	2.58	3.16
C.D. at 5%	NS	7.45	9.10
C.V.%	19.80	13.11	6.38

**Table 3: Effect of spray treatment of plant growth substances at different stages on total number of fruits per plant, average weight of fruit (gm), yield of fruits per plant (kg) and yield per hectare (q/ha)**

Treatments	Total No. of fruits/ plant	Average wt. of fruit (gm)	Yield of fruits/plant (kg)	Yield / hectare (q/ha)
<b>plant growth substances(P)</b>				
1. P <sub>0</sub> - Control (No spray)	10.10	71.96	0.68	90.86
2. P <sub>1</sub> - Water spray	10.78	77.75	0.61	81.02
3. P <sub>2</sub> - GA <sub>3</sub> -25 ppm	15.05	88.82	0.71	94.56
4. P <sub>3</sub> - GA <sub>3</sub> -50 ppm	10.61	96.58	1.83	244.64
5. P <sub>4</sub> - NAA-20 ppm	11.34	90.63	0.56	74.56
6. P <sub>5</sub> - NAA-40 ppm	12.00	84.18	0.85	113.71
7. P <sub>6</sub> - Ethrel-50 ppm	11.61	88.63	0.76	101.23
8. P <sub>7</sub> - Ethrel-100 ppm	11.22	93.00	0.66	88.16
S.Em. ±	1.10	4.80	0.06	8.04
C.D. at 5%	NS	13.83	0.17	23.17
<b>Stages of spray(S)</b>				
S <sub>1</sub> -At Seedling stag (20 day after seed sowing)	12.57	85.79	0.84	112.18
S <sub>2</sub> -After transplanting (20 day after transplanting)	10.83	87.10	0.83	110.00
S.Em. ±	0.55	2.40	0.03	4.02
C.D. at 5%	1.59	NS	NS	NS
<b>Interaction ( P X S )</b>				
S.Em. ±	1.56	6.78	0.09	11.37
C.D. at 5%	NS	NS	0.25	32.77
C.V.%	23.10	13.60	17.69	17.73

#### IV. CONCLUSION

In the view of the above results obtained from the investigation, it could be concluded that to have better optimum growth and yield of sweet pepper, the application of spray treatment of 50 ppm GA<sub>3</sub> at 20 days after transplanting is very useful.

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