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Effect of growth regulators on growth, flowering and yield of chrysanthemum (*Chrysanthemum morifolium* Ramat.) cv. "IIHR-6" under middle Gujarat conditions

S.R. PATEL, N.S. PAREKH, A.B. PARMAR* AND H.C.PATEL
Department of Horticulture, B.A. College of Agriculture, Anand Agricultural University, ANAND (GUJARAT) INDIA

ABSTRACT

A field experiment was carried out at the College Nursery, B. A. College of Agriculture, Anand Agricultural University, Anand during *Kharif* to *Rabi* season of the year 2007-2008 to study the "Effect of growth regulators on growth, flowering and yield of chrysanthemum (*Chrysanthemum morifolium* Ramat.) cv. 'IIHR-6' under middle Gujarat conditions". Nine treatment combinations comprised of three levels of growth regulators *i.e.* GA_3 (50, 100 and 150 ppm), CCC (250, 500 and 750 ppm) and MH (250, 500 and 750 ppm) with control (water spray) were tried in Randomized Block Design and replicated three times. Significantly maximum plant height (87.20 cm), plant spread (E-W 24.73 cm and N-S 24.96 cm) and number of branches per plant (18.57) were obtained in treatment T_3 GA_3 150 ppm. The treatment GA_3 150 ppm gave significantly minimum days required for first flower initiation (108.33 days) and 50% flowering (116.00 days). Significantly maximum flower diameter (8.76 cm), flower weight (5.93 g) and shelf life of flowers (8.00 days) were obtained in the treatment GA_3 150 ppm. Number of flowers per plant (48.30), flower yield per plant (170.77 g) and flower yield per hectare (12.65 t) were found significantly maximum in the same treatment.

Key words : Growth regulators, Chrysanthemum, GA_3, Growth, Yield

INTRODUCTION

Chrysanthemum (*Chrysanthemum morifolium* Ramat.) belongs to the family "Asteraceae" is one of the most wide cultivated garden flower and ranks second in popularity next to rose. The name 'Chrysanthemum' is derived from the Greek words "Chrysos" means 'Garden' and "Anthos" means 'Flower' by Linneaus in 1753 (Gortzing and Gillow, 1964). It is native to the northern hemisphere chiefly Europe and Asia. Among different flowers, Chrysanthemum enjoys worldwide popularity and its flower is in great demand throughout the world. It is leading commercial flower crop, grown for cut and loose flowers and also as pot plants. It is grown in many parts in the world owing to its excellent beauty and economic values. Today with the advancement of technology, grower's main objectives in flowers crop is perfection in the form of plants in the quality of flowers and increase in the flower production. Various chemicals are now-a-days being tried for controlling growth and flowering of chrysanthemum with a view to have compact plants and also to stretch out or retard the rate of plant growth. In recent year's scientist have given due attention to the idea of regulating plant growth as third most important factor in improving the growth, yield and quality with the application of growth regulators in various ways. The view of present experiment is to maximize flower production and to regulate the flower production as per market demands.

MATERIALS AND METHODS

The present investigation on "Effect of growth regulators on growth, flowering and yield of chrysanthemum (*Chrysanthemum morifolium* Ramat.) cv. "IIHR-6" under middle Gujarat conditions" was conducted at the College Nursery, Department of Horticulture, B.A. College of Agriculture, Anand Agricultural University, Anand during *Kharif* to *Rabi* season of the year 2007-08.The experiment was laid out in Randomized Block Design (RBD) with 10 treatments comprising of three levels of GA_3 at 50, 100 and 150 ppm, CCC at 250, 500, and 750 ppm and MH at 250, 500, and 750 ppm along with control (Water spray). All treatments were replicated thrice.

Chrysanthemum (*Chrysanthemum morifolium* Ramat.) is generally propagated through suckers. The suckers of "IIHR-6" cultivar were transplanted in the plot at the spacing of 45 x 30 cm. The recommended cultural practices were followed during the experimentation. Plant growth regulators *i.e.* GA_3, CCC and MH were applied by spraying method as per the treatments during morning hours at 30 and 45 days after transplanting. The data on plant growth, flowering and flower yield were recorded and statistically analyzed.

RESULTS AND DISCUSSION

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

*** Author for correspondence.**

Effect of plant growth regulators on growth parameters :

The results showed in Table 1 and 2 that application of GA_3 150 ppm (T_3) recorded significantly maximum plant height (54.80 cm, 77.50 cm and 87.20 cm), maximum plant spread in East-West direction (20.67, 22.73 and 24.73 cm), maximum plant spread in North-South direction (20.90, 22.97 and 24.96 cm), maximum branches per plant (7.77, 16.17 and 18.57) at 60, 90 and 120 DAP, respectively. The minimum plant height and plant spread was recorded in treatment T_6 (CCC 750 ppm) in all growth stages. Whereas, minimum number of branches was recorded in treatment T_{10} (control) as compared to other treatments.The better plant growth observed may be due to the GA_3 which enhanced cell division and cell enlargement, promotion of protein synthesis coupled with dry matter accumulation. Stimulation of branching may be possible due to the breakage of apical dominance. This finding of plant height and plant spread were in accordance with the results obtained by Gupta and Dutta (2000), Padampriya and Chezhiyan (2002), and Singhrot *et al.* (2003) in chrysanthemum.

Effect of plant growth regulators on flowering parameters :

A perusal of the data (Table 2) indicated that

Table 1 : Effect of plant growth regulators on growth parameters of chrysanthemum (*Chrysanthemum morifolium* Ramat) cv. IIHR-6

Treatments	Plant height (cm)			No. of branches/plant			Plant spread (cm)					
	60 days	90 days	120 days	60 days	90 days	120 days	60 days		90 days		120 days	
							E-W	N-S	E-W	N-S	E-W	N-S
T_1: GA_3 50 ppm	51.83	74.33	84.80	6.67	14.47	16.87	19.07	19.27	20.97	21.20	22.97	23.20
T_2: GA_3 100 ppm	52.80	75.60	85.60	7.00	14.90	17.27	19.97	20.10	21.60	21.90	23.60	23.90
T_3: GA_3 150 ppm	54.80	77.50	87.20	7.77	16.17	18.57	20.67	20.90	22.73	22.97	24.73	24.96
T_4: CCC 250 ppm	48.20	68.43	70.96	7.20	15.20	17.60	17.63	17.90	17.33	17.50	19.33	19.50
T_5: CCC 500 ppm	47.30	67.50	68.90	7.30	15.40	17.73	16.37	16.67	16.63	16.94	18.63	18.93
T_6: CCC 750 ppm	46.83	66.70	67.83	7.57	15.63	17.90	15.40	15.73	16.13	16.20	18.13	18.20
T_7: MH 250 ppm	50.43	70.93	72.83	7.03	15.03	17.43	18.07	18.07	19.63	19.80	21.63	21.80
T_8: MH 500 ppm	49.93	69.16	71.83	7.20	15.10	17.50	18.97	18.97	20.23	20.70	22.23	22.70
T_9: MH 750 ppm	48.20	67.30	69.93	7.47	15.60	18.00	19.77	20.07	21.20	21.50	23.20	23.50
T_{10}: Control (water Spray)	52.26	73.03	75.90	6.37	10.70	12.30	18.30	18.30	18.80	18.97	20.80	20.97
S. E ±	1.41	1.70	2.85	0.25	0.58	0.62	0.77	0.70	0.88	0.83	0.90	0.87
C.D. (P=0.05)	4.19	5.04	8.48	0.75	1.73	1.84	2.29	2.09	2.63	2.48	2.68	2.59
C.V.%	4.83	4.14	6.59	6.14	6.80	6.23	7.25	6.56	7.85	7.31	7.26	6.92

Table 2 : Effect of plant growth regulators on flowering and yield parameters of chrysanthemum (*Chrysanthemum morifolium* Ramat) cv. IIHR-6

Treatments (ppm)	Days required for first flower initiation	Days required for 50% flowering	Flower diameter (cm)	Shelf life of flowers (days)	No. of flowers per plant	Weight of flower (g)	Yield of flowers per plant (g)	Yield of flowers per hectare (t)
T_1: GA_3 50 ppm	109.33	119.31	8.50	7.73	33.27	5.43	161.60	11.82
T_2: GA_3 100 ppm	108.66	118.69	8.60	7.66	35.77	5.53	164.97	12.07
T_3: GA_3 150 ppm	108.33	116.00	8.76	8.00	48.30	5.93	170.77	12.65
T_4: CCC 250 ppm	121.00	128.33	7.33	6.32	26.57	5.33	159.06	11.78
T_5: CCC 500 ppm	121.34	129.35	7.66	6.66	27.47	4.86	157.70	11.68
T_6: CCC 750 ppm	122.65	129.66	7.69	5.33	29.30	4.99	154.30	11.43
T_7: MH 250 ppm	120.66	127.67	8.46	6.79	30.47	4.85	153.40	11.36
T_8: MH 500 ppm	120.33	128.30	8.33	7.00	32.17	5.36	151.30	11.21
T_9: MH 750 ppm	119.64	129.63	8.29	7.16	33.53	5.37	149.43	11.07
T_{10}: Control (water spray)	117.00	122.00	8.13	7.66	26.97	4.70	146.00	10.81
S. E ±	11.66	11.26	0.07	0.22	1.14	0.04	2.82	0.25
C.D. (P=0.05)	4.82	4.74	0.38	0.66	3.37	0.30	8.38	0.33
C.V.%	5.05	4.65	5.82	11.58	6.29	7.20	3.36	4.05

application of GA_3 150 ppm (T_3) remarkably took minimum days for first flower initiation (108.33 days) and for 50% flowering (116.00 days) after planting. Maximum diameter of flowers (8.76 cm), maximum weight of flower (5.93 g) as well as maximum days in shelf life of flowers *i.e.*, 8.00 days were recorded in the same treatment The results of first flower initiation may be due to the reason that application of growth regulators keeps the flower soft and succulent in texture and this type of texture of flower resulted in higher and faster respiration and dehydration. The results of first flower initiation were comparable with the results obtained by Gupta and Dutta (2000) in chrysanthemum.The results of days taken for 50% flowering were comparable with results obtained by Gupta and Dutta (2000) and Padampriya and Chezhiyan (2002) in chrysanthemum.The results obtained in diameter of flower were comparable with the observations made by Gupta and Dutta (2000), Padampriya and Chezhiyan (2002), Singhrot *et al*. (2003), Moond *et al*. (2006) in chrysanthemum.The weight of flower were corroborative with the results reported by Padmapriya and Chezhiyan (2002) in chrysanthemum.In the result of shelf life of flowers were compared with the results obtained by Dahale (1991) and Dutta *et al*. (1993) in chrysanthemum.

Effect of plant growth regulators on yield parameters:

It is clear from the Table 2 that the treatment T_3 recorded maximum number of flowers per plant (48.30), maximum yield of flowers per plant (170.77 g) and maximum flower yield per hectare (12.65 t).The increase in yield attributes might be due to the fact that growth regulators stimulated vegetative growth and induced changes in vegetative morphology. The increased flower production could be ascribed to accelerate growth parameters like number of branches etc. registered under the present investigation. The results of the present study are in conformity with those of Gupta and Dutta (2000), Padmapriya and Chezhiyan (2003) and Singhrot *et al*. (2003) in chrysanthemum.

REFERENCES

Dahale, M.H.(1991). Growth, yield and quality of selected varieties of chrysanthemum as influenced by foliar spray of GA. M.Sc. Thesis, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola (M.S.).

Dutta, J.P., Ramdas, S. and Abdhul Khader, M.D.(1993). Regulation of flowering by growth regulators in chrysanthemum (*chrysanthemum indicum* L.) cv. CO-1. *South Indian J. Hort.*, **41** (5): 293-299.

Gortzing, C. and Gillow, I. (1964). Chrysanthemum: a manual of the culture. *The New York State*, Extension Bulletin, pp: 9-17

Gupta, V. and Dutta, S.K. (2000). Influence of Gibberellic acid (GA_3) on growth and flowering in chrysanthemum (*Chrysanthemum morifolium* Ramat.) cv. 'JAYANTI'. *Indian J. Pl. Physiol.*, **6** (4): 420 – 422.

Moond, S.K., Khandelwal, S. K., Virendra. S. and Rakesh (2006). Effect of GA_3, CCC and MH on quality and yield of flowers in chrysanthemum. *Crop Res.* **32**(1): 63-65.

Padmapriya, S. and Chezhiyan, N. (2002). Influence of Gibberellic Acid (GA_3) and certain other chemicals on flowering characters of chrysanthemum (*Dendrathema grandiflora* Tzvelev.) cultivars. *South Indian J. Hort*., **50** (4-6): 437-434.

Singhrot, R.S., Beniwal, B. S. and Moond, S. K. (2003). Effect of GA3 and pinching on growth and yield in chrysanthemum, *Haryana J. Hort. Sci.*, **32** (1 & 2): 224 – 226.

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