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Effect of Different Plant Growth Regulators and their Levels on Floral Yield and Economics of China Aster [*Callistephus chinensis* (L.) Nees] cv. Shashank

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A B S T R A C T

A field experiment was carried out to evaluate response of plant growth regulators on flowering and economics of China aster cv. Shashank under taken at Department of Horticulture, Naini Agriculture Institute, Sam Higginbottom university of Agriculture, Technology and Sciences (SHUATS), Allahabad during the year 2016-17. The experiment was laid out in RBD (Randomized Block Design) with 13 treatments combination consisting of the thirteen treatments comprised of control, GA_3 (50, 100, 150 and 200 ppm respectively), NAA (50, 100, 150 and 200 ppm) and CCC (500, 1000, 1500 and 2000 ppm respectively). The results of the study revealed that floral attributes like number of flowers per plant (71.54), flower weight (5.5g), flower yield per plant(393.42g), flower yield per plot(4,721.04g), flower yield per hectare (12.58t), Cost of cultivation (1,18,739Rs.ha^{-1}), Gross Return (6,29,473Rs.ha^{-1}), Net Return (5,10,734Rs.ha^{-1}) and Benefit Cost Ratio 5.30:1 respectively the best results was recorded by the application of GA_3 at 200 ppm.

Introduction

Callistephus chinensis is to be considered as one of the important commercial flower (2n=18) belongs to family Asteraceae and native to China. Its generic name Callistephus is derived from two Greek words Kallos-beauty and stephonusa crown allowing large colourful flower heads. Asters have been developed from single form of wild species *Callistephus chinensis* (Nandre *et al.*, 2009). The growth and yield of the plant is mainly influenced by two principle factors *viz.*, genetic and management factors. In recent years, scientists have paid due attention to the idea of regulating plant growth by means of growth regulators as third most important factor in improving growth, yield and flowers quality in various ways. These substances modify the plant system, which ultimately affects plant growth and development. Synthetic growth regulating chemicals are become very popular in order to enhance the growth and development of flower crops. Keeping these points in view, the present study was under taken to ascertain the most

suitable concentration of GA_3, NAA and CCC for better growth, yield and quality of China aster (Kumar *et al.*, 2017).

Materials and Methods

The present investigation entitled "Effect of different plant growth regulators and their levels on floral yield and Economics of China aster [*Callistephus chinensis* (L.) Nees] cv. Shashank" was carried out under Allahabad agro climatic conditions at the experimental field of the Department of Horticulture, Allahabad school of Agriculture, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad (U.P) in the month of November to March during the Rabi season of the year 2016-2017. It is located on latitude of 20^0 and 15^0 North and longitude of 60^0 and 30 East and at an altitude of 98 meters above mean sea level (MSL). The experimental plot was homogenous in fertility having assured irrigation and other required facilities. The soil of experimental field had sandy loam texture, acidic pH 7.2 and organic carbon content 0.44 %.

The experiment was laid out in randomized complete block design with three replications. The thirteen treatments comprised of control, GA_3 (50, 100, 150 and 200 ppm respectively), NAA (50, 100, 150 and 200 ppm) and CCC (500, 1000, 1500 and 2000 ppm respectively). One month old uniform sized seedlings of China aster were transplanted at a spacing of 40 cm x 60 cm with a twelve plants in each plot. Solutions of GA_3, NAA and CCC at different concentrations were prepared in 1000 ml volumetric flask by dissolving calculated quantity of chemicals in small quantity of ethyl alcohol and then volume was made up to one litre with distilled water. The prepared solutions were sprayed uniformly over the treatments immediately after preparation at 15 and 30 days after transplanting. Observations on different flowering attributes and quality were recorded and analyzed statistically.

Results and Discussion

Yield parameters like number of flowers per plant (71.54), flower weight (5.5g), flower yield per plant(393.42g), flower yield per plot(4,721.04g), flower yield per hectare (12.58t), Cost of cultivation (1,18,739Rs. ha^{-1}), Gross Return (6,29,473Rs.ha^{-1}), Net Return (5,10,734Rs.ha^{-1}) and Benefit Cost Ratio 5.30:1 respectively the best results was recorded by the application of GA_3 at 200 ppm. Increase in weight of flower in treated plants may be attributed to the fact that GA_3 promotes the efficacy of plants in terms of photosynthetic activity, uptake of nutrients and their translocation, better partitioning of assimilates into reproductive parts.

Figure.1 Effect of different plant growth regulators on Flower weight (g) of China aster cv. Shashank

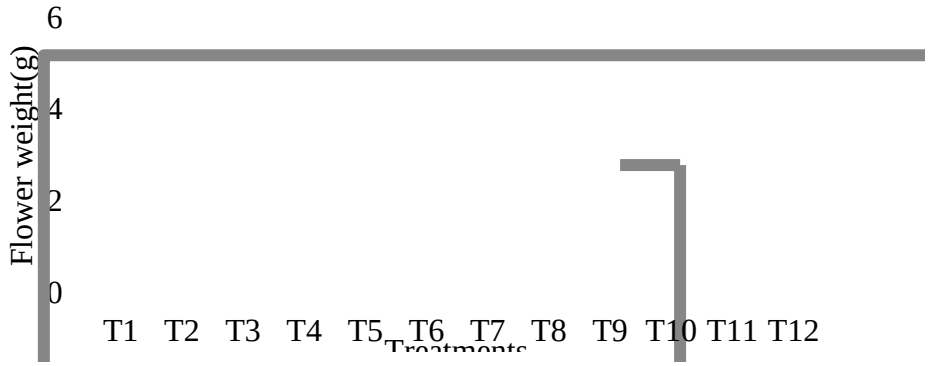

Figure.2 Effect of different plant growth regulators on Number of flowers per plant of China aster cv. Shashank

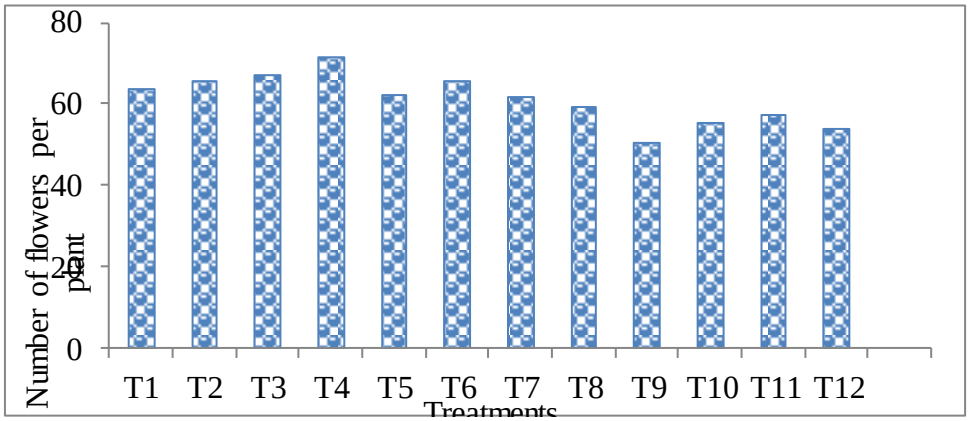

Figure.2 Effect of different plant growth regulators on Number of flowers per plant of China aster cv. Shashank

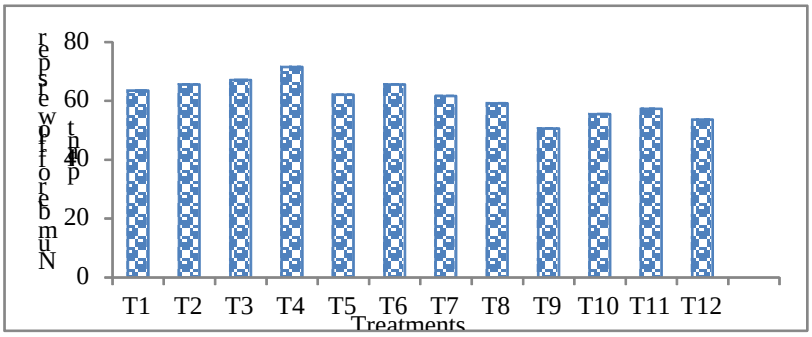

Figure.3 Effect of different plant growth regulators on Flower yield per hectare (t/h) of China aster cv. Shashank

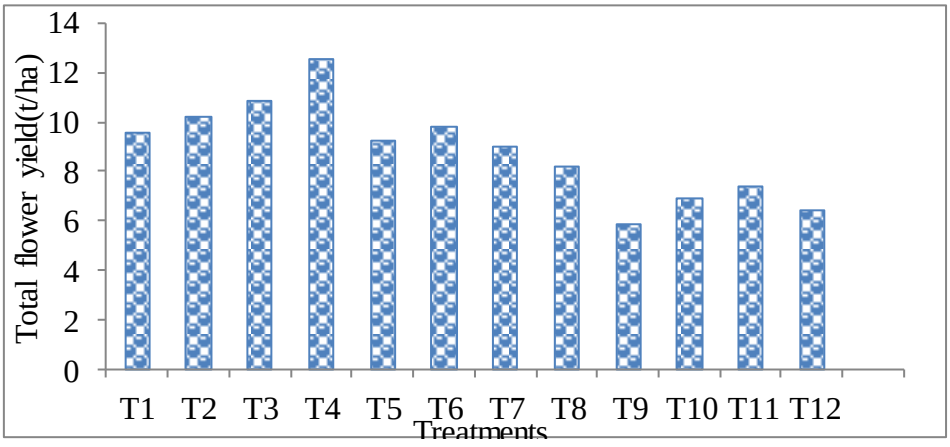

Table.1 Effect of different plant growth regulators on yield of China aster cv. Shashank

Treatment No.	Treatments	Number of flowers per plant	Flower weight (g)	Flower yield/plant (g)	Flower yield/plot (g)	Total flower yield(t/ha)
T_0	Control	33.89	2.93	99.275	1191.3	3.17
T_1	GA_3 @ 50 ppm	63.5	4.73	300.63	3607.62	9.62
T_2	GA_3 @ 100 ppm	65.50	4.9	320.65	3847.88	10.26
T_3	GA_3 @ 150 ppm	67.01	5.06	339.40	4072.84	10.86
T_4	GA_3 @ 200 ppm	**71.54**	**5.5**	**393.42**	**4721.04**	**12.58**
T_5	NAA @ 50 ppm	62.09	4.65	289.08	3469.04	9.25
T_6	NAA @ 100 ppm	65.49	4.7	307.14	3685.76	9.82
T_7	NAA @ 150 ppm	61.63	4.56	281.35	3376.21	9.00
T_8	NAA @ 200 ppm	59.16	4.36	258.46	3101.62	8.27
T_9	CCC @ 500 ppm	50.58	3.63	183.59	2203.08	5.87
T_{10}	CCC @ 1000 ppm	55.4	3.9	215.94	2591.34	6.91
T_{11}	CCC @ 1500 ppm	57.29	4.06	232.94	2795.35	7.45
T_{12}	CCC @ 2000 ppm	53.62	3.75	201.29	2415.59	6.44
	F-test	S	**S**	**S**	**S**	**S**
	S.Ed.(±)	0.86	0.48	30.49	365.93	0.98
	C.D.at 5%	1.78	0.98	62.94	755.25	2.01

Table.2 Economics for different treatments of China aster cv. Shashank

Treatment No.	**Treatment**	**Cost of cultivation (Rs.ha^{-1})**	**Gross Return (Rs.ha^{-1})**	**Net Return (Rs.ha^{-1})**	**Benefit Cost Ratio**
T_0	Control	1,13,439	1,58,840	45,401	1.4:1
T_1	GA_3 @ 50 ppm	1,14,764	4,81,016	3,66,252	4.19:1
T_2	GA_3 @ 100 ppm	1,16,089	5,13,051	3,96,963	4.41:1
T_3	GA_3 @ 150 ppm	c1,17,414	5,43,045	4,25,632	4.62:1
T_4	GA_3 @ 200 ppm	**1,18,739**	**6,29,473**	**5,10,734**	**5.30:1**
T_5	NAA @ 50 ppm	1,13,868	4,62,538	3,48,670	4.06:1
T_6	NAA @ 100 ppm	1,22,052	4,91,435	3,69,384	4.02:1
T_7	NAA @ 150 ppm	1,14,727	4,50,162	3,35,435	3.92:1
T_8	NAA @ 200 ppm	1,15,156	4,13,549	2,98,393	3.59:1
T_9	CCC @ 500 ppm	1,13,704	2,93,744	1,80,040	2.58:1
T_{10}	CCC @ 1000 ppm	1,13,969	3,45,512	2,31,543	3.03:1
T_{11}	CCC @ 1500 ppm	1,14,234	3,72,713	2,58,480	3.26:1
T_{12}	CCC @ 2000 ppm	1,14,287	3,22,079	2,07,792	2.81:1

These results are in agreement with those reported by Rakesh *et al.,* (2003) in chrysanthemum. The increase in yield and yield parameters with GA_3 spraying was due to better crop growth, thus increased the number of flowers per plant and ultimately increased the flower yield. This can be attributed to translocation of source to sink. Similar results were reported by Doddagoudar (2002), kumar *et al.,* (2003), Nandre *et al.,* (2009), Shrikanth *et al.,* (2011) and Kumar (2012) in China aster.

In conclusion, among all the treatments applied the treatment GA_3 at 200 ppm registered as the best in all the characters than other treatments, so application of GA_3 at 200 ppm will lead to get higher yield.

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