

STUDY ON THE INFLUENCE OF GROWTH REGULATORS ON GROWTH AND FLOWERING OF *CHRYSANTHEMUM*

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Growth substances and various other chemicals have been found to regulate growth and flowering in *Chrysanthemum*. GA_3 has been found to show marked variation in response to growth and development depending mainly on the time of application and stage of growth. Different growth regulators like GA_3 , NAA and CCC are taken to study the effect on growth and flowering of *Chrysanthemum*. The application of GA_3 increases the plant height. NAA also increased the plant height in comparison to control but differences among the concentrations of NAA are non significant. Applications of CCC reduced the plant height and GA_3 increased the fresh weight of flowers but CCC reduced it. Enhanced effect of growth regulators are recorded with increasing concentrations.

Keywords : *Chrysanthemum*; Growth and flowering; Growth regulator.

Chrysanthemum is a perennial but it is raised as annual plant for commercial cultivation throughout the World¹. *Chrysanthemum* is commercially ideal for use as cut flowers. The plant can be successfully grown in pots as well as in beds. Due to its attractive colour and long vase life, *Chrysanthemum* has an important role in the preparation of garlands and decoration purposes. It is also very popular in south India. Light and temperature are the two important environmental factors influencing growth and flowering. Flower buds in *Chrysanthemum* have been found to develop above a critical temperature, below which only vegetative growth occurs². The growth and development of stock or production plants largely depend on proper feeding right from the beginning. Growth substances and various other chemicals have been found to regulate growth and flowering in *Chrysanthemum*. Factors have been found to show marked variation in response to growth and development depending mainly on the time at application and stage of growth³. Present investigations are undertaken with the object of studying the influence of growth regulators and plant nutrients on growth and flowering of *Chrysanthemum* under local conditions of India.

Materials and Method

The *Chrysanthemum* Cv, local are used for all the experiments. The seeds are sown in lines in well prepared nursery beds. The seed

beds of 0.5 m x 1.5 m are prepared and suitable amount of Farmyard manure (FYM) are also added. The seed beds are irrigated once every day in the morning till the seeds germinated and on every third day after germination of seeds. Healthy and uniform sized seedlings around one month old are selected, removed carefully and transplanted in 30 cm size pots. All experiments are conducted in these pots.

Experiment : Three growth regulators, Gibberellic acid (GA_3), alpha-Naphthalene acetic acid (NAA) and 2-Chloroethyltrimethyl ammonium chloride (CCC) were employed. Three concentrations of each growth regulators are used.

GA_3	-	10,	50 and 100 ppm
NAA	-	10,	50 and 100 ppm
CCC	-	500,	1000 and 1500 ppm
Control	-		Distilled water

The experiment was laid out in a "Complete randomized design" with three replications. Different concentration of growth regulators are prepared in distilled water. Two foliar sprays of each growth regulator are made on one month and two months after transplanting of the seedlings. The spraying consisted a complete drenching of individual plant by approximately 10 to 20 ml solution with the help of a sprayer. Tween 20 are added as wetting agent. Control plants are sprayed with distilled water plus tween 20. The spray treatment are done

in the evening⁴.

Results and Discussion

The following observations are recorded to study the effect of treatment of growth regulators on plants.

(A) Vegetative characters

- (i) *Height of the plant* :- The height of the plants are measured in cm from the ground level to the extreme top with the help of a meter scale and are computed (Table 1).
- (ii) *Diameter of stem* :- The stem diameters are measured by vernier calipers in centimeters. It is measured at 5 cm above the ground level.
- (iii) *Root length* :- The whole plants are uprooted and washed thoroughly in running water. The root length are measured.

(B) Floral characters :-

- (i) *Appearance of first flower bud* :- The date when the 1st flower bud appeared on the plants are recorded. Number of days required from transplantings to first bud appearance are calculated.
- (ii) *Time required for anthesis* :- Five flower buds in each plant are tagged. A regular watch is kept for their opening and average duration are recorded in days (Table 1).

(C) Physico - Chemical Characters :-

- (i) *Fresh & dry weight of flowers* :- Five flowers are selected randomly in each plant during the peak flowering time. Their fresh and dry weights are recorded and averaged in Table 1.

Application of growth regulators resulted in significant variation in plants

height in comparison to control (Table 1). The maximum plant height is recorded in GA₃ 100 ppm treatment, whereas minimum plant height is observed in CCC 1500 ppm. Application of GA₃ 100 ppm increased the plant height, whereas CCC 1500 ppm reduced plant height over the control. Differences among the concentrations of NAA are found to be non significant. Among GA₃ conc., 100 ppm gave significantly higher growth than 50 and 10 ppm. The differences between 50 and 10 ppm are also significant. Thus the application of GA₃ increased the plant height. Further increase in the conc. of GA₃ increased the plant height. NAA also increased the plant height in comparison to control but difference among the concentrations of NAA are non significant. Application of CCC reduced the plant height and an increase in conc. of CCC further reduced the plant height.

Growth regulators did not show any significant variation for the time required for anthesis in comparison to control (Table 1). GA₃ reduced the time required for flower opening whereas NAA and CCC delayed the same in comparison to the control. The differences between NAA and CCC are non significant. Maximum delay was recorded in CCC 1500 ppm and minimum time is taken by GA₃, 100 ppm in comparison to the control. Differences among the conc. of GA₃, NAA and CCC are non significant. The growth regulators did not affect the time required for anthesis. However, NAA and CCC delayed it while GA₃ favoured early opening of the flowers.

Application of growth regulators resulted in significant variation in fresh weight of flowers in comparison to control (Table 1) among the different growth regulators conc. Maximum fresh weight are recorded in GA₃ 100 ppm followed by GA₃ 50, NAA 100, GA₃ 10, NAA 50, 10 ppm and by the control. CCC concentration reduced fresh weight of the flower. Minimum fresh weight was recorded in 1500 ppm followed by 1000 and 500 ppm in

Table 1. Effect of growth regulators on plant height, time required for flower opening (anthesis) and fresh and dry weight of flowers.

Treatments (ppm)	Plant height (cm)	Flower opening (days)	Fresh weight of flowers (g)	Dry weight of flowers (g)
(A) GA ₃				
10	113.17	12.73	2.273	0.4224
50	119.40	12.60	2.287	0.4353
100	123.53	12.26	2.320	0.4647
"F" Test	Significant	Non significant	Significant	Significant
S.Em. ±	1.32	0.27	0.011	0.0052
C.D. at 5 Percent	3.91	-	0.034	0.152
(B) NAA				
10	101.57	12.86	2.193	0.4166
50	103.17	13.03	2.230	0.4086
100	104.90	13.20	2.277	0.4202
"F" Test	Non-Significant	Non significant	Significant	Non-Significant
S.Em. ±	1.32	0.27	0.011	0.0052
C.D. at 5 Percent	-	-	0.034	-
(C) CCC				
500	89.07	13.10	2.130	0.4098
1000	82.23	13.33	2.097	0.4026
1500	74.43	13.50	2.080	0.3900
"F" Test	Significant	Non significant	Significant	Non-Significant
S.Em. ±	1.32	0.27	0.011	0.0052
C.D. at 5 Percent	3.91	-	0.034	-
(D) A V/s B V/s C				
(A) GA ₃	118.70	12.53	2.293	0.4408
(B) NAA	103.21	13.03	2.233	0.4151
(C) CCC	81.91	13.31	2.102	0.4008
"F" Test	Significant	significant	Significant	Significant
S.Em. ±	0.76	0.15	0.007	0.0030
C.D. at 5 Percent	2.25	0.45	0.020	0.0080

comparison to the control. Among the different growth regulators GA₃ are significantly higher than NAA and CCC. Thus GA₃ and NAA increased the fresh weight of flower but CCC reduced it. Enhanced effect of growth regulators GA₃ are significantly higher than NAA and CCC. Thus GA₃ and NAA increased the fresh weight of flower but CCC reduced it. Enhanced effect of growth regulators are recorded with increasing concentrations.

Significant variation is observed in dry weight at flower in comparison to control (Table 1). Among the different concentrations of growth regulators, maximum dry weight is recorded in GA₃ 100 ppm followed by GA₃ 50, GA₃ 10, NAA 100 and 10 ppm in comparison to control. CCC concentration reduced the dry weight of flower. Minimum dry

weight is recorded in 1500 ppm followed by 1000 and 500 ppm in comparison to control. GA₃ significantly influenced the dry weight in comparison to NAA and CCC. Thus GA₃ increased the dry weight of flower, whereas CCC reduced it. Difference among NAA and CCC concentrations is non-significant. Increase in the concentration of GA₃ increased the dry weight of flowers.

References

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