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Research Article

EFFECT OF GROWTH REGULATORS ON GROWTH, FLOWERING AND CORM PRODUCTION OF GLADIOLUS (*GLADIOLUS GRANDIFLORUS* L.) CV. WHITE FRIENDSHIP

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ABSTRACT
An experiment was carried out to study the effect of growth regulators on growth, flowering and corm production of Gladiolus *Gladiolus grandiflorus* L. cv. white friendship during 2011 in floriculture yard, Department of Horticulture, Faculty of Agriculture, Annamalai Nagar. Four growth regulators viz., GA_3, NAA, CCC and MH each at three concentrations in addition to water spray as control comprised thirteen treatments of this experiment. The experiment was laid out in a Randomized Block Design (RBD) with three replication. All the growth and yield parameters were periodicaly observed. The results revealed that the growth regulators application significantly influenced the growtrh and yield of Gladiolus sp cv. white friendship. The maximum No. of florets/spike, spike length (cm) and flower length (cm) were obtained were obtained with GA_3 @100ppm as compared to rest of the treatments. Whereas CCC @500 ppm was found the best interms of corms and cormels production.

Key Words: *Gladiolus, Gibberellic acid, NAA, CCC, MH, Regulators*

INTRODUCTION
Gladiolus is a flower of glamour and perfection which is known as the queen of bulbous flowers due to its flower spikes with florets of massive form, brilliant colours, attractive shapes, varying size and excellent shelf life. Gladiolus is grown as flower bed in gardens and used in floral arrangements for interior decoration as well as making high quality bouquets (Lepcha *et al.,* 2007). To enhance of yield and quality of any flower crop various cultural management practices like good planting material, spacing, irrigation, plant protection etc., are required. The planting material *i.e.* corm is the important factor which governs the growth and development of gladiolus. The physiological functions inside the corms are controlled by plant growth regulators. Plant growth regulators are the organic chemical compounds which modify or regulate physiological processes in an appreciable measure in plants when used in small concentrations. They are readily absorbed and move rapidly through tissues when applied to different parts of the plant. It has generally been accepted that many plant processes including senescence, are controlled through a balance between plant hormones interacting with each other and with other and with other internal factors (Mayak and Halevy, 1980). Although growth retarding chemicals did not increase the number of flowers, they produced flowers with compact shape, developed short stalk, flowers remained fresh for a longer period and they suppressed the height of the plant (Bhattacharjee *et al.*, 1974). It is known fact that application of growth regulators such GA_3, NAA, CCC and MH had positive effects on growth and development of gladiolus plants at different concentrations. The reports indicate that the growth and yield of gladiolus was enhanced by application of GA_3 (Umrao Vijai *et al.,* 2007 and Rana Peanav *et al.,* 2005), NAA (Suresh Kumar *et al.,* 2008), CCC by (Jinesh patel *et al.,* 2010 and Leena Ravidas *et al.,* 1992) and MH by (De *et al.,* 2002). Hence the present study was conducted to find the effect of growth regulators on growth, flowering and corm production of gladiolus *Gladiolus grandiflorus* L. cv. White friendship.

MATERIALS AND METHODS
This experiment was conducted in floriculture unit, Department of Horticulture, Faculty of Agriculture, Annamalai University, Annamalai nagar, India during 2011. Soil of the experimental plot was sandy

loamy, uniform in texture and well drained. FYM was applied @ 8 kg/m^2 at the time of land preparation. The experiment was laid at Randomized Block Deign (RBD) with three replications. In total thirteen treatments comprised of four growth regulators at three levels of each *viz.*, GA_3 (@50, 100 and 150 ppm), NAA (@50, 75 and 100 ppm), CCC (@500, 750 and 1000 ppm) and MH (@500, 750 and 1000 ppm) with control (only water) were adopted. The cold stored Gladiolus cv. White friendship corms of above 5.5 cm diameter were purchased from Bangalore and placed at room temperature for 15 days. The shade dried corms were planted at a spacing 30x30 cm in raised beds of 2x2m dimentions. The plants were sprayed with aquas solution of the growth regulators as per treatments schedule at 30^{th} and 60^{th} day after planting. The intercultural operations were followed as and when required. The growth and yield parameters for each treatments were observed in five plants selected by random sampling method. The data were statistically analysed and critical differences were worked out at five percent level to draw statistical conclusions as suggested by Panse and Sakhatme (1978).

RESULTS AND DISCUSSION

Result presented in table 1, revealed that the growth and flowering parameters of gladiolus plants were significantly altered due to the application of growth regulators. The plant height, number of leaves, length of leaves, leaf width and length of spikes were significantly increased due to GA_3 and NAA application. Whereas CCC and MH application significantly reduced these parameters when compared with control. The maximum plant height (85.44 cm) was observed with NAA at 100 ppm was on par with GA_3@ 100 ppm (84.52 cm) whereas the lowest plant height was observed in the (68.15 cm) with MH at 1000 ppm increase in these growth parameter might be due to the fact that NAA and GA_3 promote vegetative growth by inducing active cell division in the apical meristem. These findings are in consonance with the reports of Sharma *et al.,* (2004) Suresh Kumar *et al.,* (2008), Neha Chopde *et al.,* (2012) and Arun Awasthi *et al.,* (2012) in gladiolus. The data showed that application of NAA and GA_3 have significantly hastened flowering as compared to control, CCC and MH have delayed flowering. Among all treatments GA_3@ 150 ppm (75.15 days) recorded the earliest flowering which was on par with GA_3 100 ppm (75.23 days). The flowering was very late in CCC 1000 ppm (91.52 days). Similarly the lengthiest spikes (71.59 cm) were recorded with 100 ppm GA_3 and shortest spikes (54.30 cm) were recorded with MH 1000 ppm. Application of GA_3 hastened the flower for abate 10 days hastening of flowering by 10 days earlier with GA_3 application might be attributed to the enhanced vegetative growth early phase due to increased photo synthesis and Co_2 fixation. Furthers exogenous application of GA_3 would have favoured the convenience of factors influencing floral initiation ie., carbohydrate pathway and photo periodic pathway with GA_3 pathway. The quality parameters of flowers like number of florets/spike and flower length were significantly increased by the application of all growth regulators. The highest number of florets / spike (11.52) and flower length (7.18 cm) recorded in GA_3@ 100 ppm was on par with GA_3@150 ppm. These quality parameter of flowers were in MH @ 1000 ppm was on par with control. The findings of present studies are in consonance with those of Barman and Rajni (2004), Pal and Chowdhary (1998) and Ravidas *et al.,* (1992), Jinesh Patel *et al.,* (2010) and Neha Chopde *et al.,* (2012) with GA_3 in gladiolus. The yield attributes related to corms and cormels are significantly increased by the application of growth retardants like CCC and MH in all the concentration when compared to control and other growth regulators. Significantly higher number of corms (1.58), number of cormels (26.00), weight of corms (39.21 g) and weight of comels (5.72 g) were notices under CCC@ 500 ppm among all other treatments. This might be due to influence of growth retardants in delaying floral initiation, which would have enhanced source to sink ratio by reducing the partition of carbohydrates to floral spike which is evident from the reduction in spike length due to CCC application when compared to control. These results are in accordance with findings of Ragaa (2012) in Irish plant and Jinegh Patel *et al.,* (2012) in gladiolus. From the above results it could be concluded that foliar application of GA_3@ 100 ppm on 30^{th} and 60^{th} day after planting was most effective to obtain early

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Table 1: Effect of Growth Regulators on Growth, Flowering and Corm Production of Gladiolus SP cv. white friendship

Treatment	Plant height (cm)	Number of leaves	Length of leaf (cm)	Width of leaf (cm)	No. of days required for first flowering	Length of spike (cm)	No. of Florets /spike	Flower length (cm)	No. of corms /plant	No. of cormels/ plant	Corm weight / plant	Cormels weight /plant
T_1: GA_3 50 ppm	80.51	5.70	42.32	3.28	76.13	68.70	10.50	6.56	1.09	16.70	27.80	4.30
T_2: GA_3 100 ppm	84.52	6.30	47.31	3.47	75.23	71.59	11.52	7.18	1.11	21.70	32.72	5.28
T_3: GA_3 150ppm	82.69	4.78	45.30	3.31	75.15	70.12	11.21	6.92	1.05	14.52	25.50	3.72
T_4: NAA 50 ppm	82.15	4.80	45.32	3.32	79.50	65.32	9.73	6.42	1.04	14.52	25.52	3.70
T_5: NAA 75 ppm	83.23	5.11	47.30	3.48	80.50	68.71	10.52	6.58	1.09	16.72	27.23	4.28
T_6: NAA100ppm	85.44	5.80	49.46	3.53	77.22	70.01	10.70	6.72	1.10	19.13	29.81	4.72
T_7: CCC 500ppm	76.65	7.10	37.23	3.21	87.66	63.12	9.38	5.99	1.58	26.00	39.21	5.72
T_8: CCC 750ppm	76.37	6.70	36.12	3.19	89.14	61.10	9.00	5.47	1.66	23.39	35.62	5.58
T_9:CCC1000ppm	74.22	6.62	35.31	3.19	91.52	60.75	8.72	5.38	1.45	22.58	34.72	5.42
T_{10}: MH 500ppm	71.37	6.82	35.30	3.15	87.15	58.41	8.51	5.30	1.27	24.41	34.80	5.50
T_{11}: MH 750ppm	69.01	6.31	33.93	3.11	88.70	54.51	8.50	4.46	1.42	21.72	32.75	5.30
T_{12}:MH1000ppm	68.15	5.81	32.18	3.00	89.52	54.30	7.52	4.42	1.44	19.10	29.80	4.70
T_{13}: Control	75.31	3.72	38.17	3.26	85.13	60.11	7.50	4.86	1.02	10.38	25.00	2.72
S.Ed.	1.05	0.12	1.02	0.02	0.23	0.70	0.42	0.16	0.11	1.08	0.75	0.18
CD	2.20	0.28	2.12	0.05	0.51	1.46	0.83	0.35	0.21	2.15	1.50	0.26

flowering and highest yield of good quality spikes. Applications of CCC@500 ppm was most effective to obtain highest yield of corms and cormels.

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