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Effect of Plant Growth Regulators on Growth and Flowering of Gladiolus CV. Friendship

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ABSTRACT

A field experiment was conducted to study the effect of GA_3 (50, 100 ppm), CCC (250, 500 ppm) and TIBA (150, 300 ppm), NA (100, 200 ppm) on growth and flowering of gladiolus in a completely randomized design. The growth regulators were applied twice, first at six weeks after planting and second at eight weeks after planting. There was significant increase in plant height and leaf area by GA_3 100 ppm. GA_3 100 ppm also resulted in earliest flowering (nearly 10 days) and reduced the total crop duration (12.8 days). GA_3 50 ppm produced longest spike and rachis length and maximum number of florets per spike. Significant increase in floret diameter, was however, reported with GA_3 100 ppm, whereas various treatment failed to influence the length of spike.

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INTRODUCTION

Manipulation of production process with plant growth regulators may be one of the most important advances to be achieved in agriculture. The pratical use of growth substances in horticulture has assumed invariable significance due to revealed capacity of many compounds to exploit many significant mechanism in plant. The use of growth regulating substances viz. GA3 in gladiolus (Mukhopadhyay and Bankar, 1986; and Ravidas *et al.*, 1992) NAA in tuberose (Pal and Das, 1990) CCC on tuberose (Hassan and Agina, 1980), B-9 in hippeastrum (Bhattacharjee, 1983a), TIBA in lily (Sujatha and Bhattacharjee, 1992) and MH in dahlia (Bhattacharjee, 1984a) affect the various physiological processes with in the plant and ultimately affecting growth and flowering. In view of the increasingly important role of these growth substances an investigation was carried out on the effect of GA3, NAA, CCC and TIBA on growth and flowering of gladiolus cv. Friendship.

MATERIALS AND METHODS

The investigation was conducted at the Horticultural Demonstration Farm and Nursery, Department of Horticulture, Gujarat Agricultural University, Sardar Krushinagar during the year 1995-96. The experiments was laid out in completely randomized design with nine treatments replicated three times. The corms were planted during the first week of October by

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following ridge and furrow method at a spacing of 45 X 30 cm. The plant growth regulators, namely GA3, NAA, CCC and TIBA were used, each at two levels. Foliar sprays of growth regulators were given twice, first at six week after planting and second at eight weeks after planting. There were 20 plants per treatment. In order to access the effect of various treatments more precisely, all the plants were subjected to uniform cultural practices during the period of investigation. The observations on height of plant, leaf area, number of days taken from planting to emergence of spike, number of florets per spike, diameter of florets and length of florets were recorded.

RESULTS AND DISCUSSION

The data presented in tables indicate that all the plant characters studies showed significant results except length of floret. Maximum plant height and leaf area (58.88 cm and 628.38 cm^2, respectively) were recorded with GA_3 100 ppm (Table-1). This effect of GA_3 on plant height and leaf area is due to its action on cell division and cell enlargement. On the other hand growth retardants decreased the height of plant. The minimum plant height (41.98 cm) and leaf area (359.97 cm^2) were recorded in CCC 500 ppm. This effect of growth retardant is because they produced shorter stem length through inhibition of cell division and elongation of sub-apical meristems. Dua *et al.*, (1984) and Ravidas *et al.*, (1992) reported greater plant growth by GA_3 treatment in gladiolus. The earliest flowering and minimum total crop duration (78.60 and 102.86 days, respectively) were recorded in GA_3 100 ppm treatment, here as growth retardant at higher concentration delayed the flowering and incerased the total crop duration. This is because Gibberellins are quite effective in reducing the juvenile period of plants. Early flowering in gladiolus by GA_3 treatment was also reported by Auge (1982), Mukhopadhyay and Bankar (1986), and Ravidas *et al.* (1992). The delayed flowering by growth retardants may be due to the overall slower growth and development. Bhattacharjee (1983b) reported delayed flowering by CCC in lily.

TABLE 1

Effect of plant growth regulators on growth characters.

Treatments	*Plant height (cm)*	*Leaf area (cm^2)*	*Days taken from planting to spike emergence (days)*	*Total crop duration (days)*
GA_3 50 ppm	56.22	528.38	85.86	110.52
GA_3 100 ppm	58.86	628.38	78.60	102.86
NAA 100 ppm	46.28	610.98	96.86	122.40
NAA 200 ppm	48.82	596.86	96.00	122.40
CCC 250 ppm	46.80	444.50	87.72	113.00
CCC 500 ppm	41.98	359.97	98.60	123.74
TIBA 150 ppm	44.44	450.38	86.40	111.86
TIBA 300 ppm	42.32	409.28	95.20	121.06
Control	49.96	407.10	88.46	114.06
S.Em.±	0.988	9.087	1.058	1.557
C.D. (0.05)	2.936	19.092	3.143	4.627

Maximum spike and rachis length were produced by GA_3 50 ppm treatment (127.68 cm and 59.98 cm, respectively) and the minimum spike and rechis length 83.04 and 29.01 cm, respectively, were produced by TIBA 150 ppm (Table 2). The increased effect may be due to that the GA_3 might have increased auxin content in tissue as it is involved in auxin synthesis. However, the effect vice-versa was recorded under the influence of NAA. Bhattacharjee (1984b) and Ravidas *et al.* (1992) also reported incerased spike and rachis length by GA_3 50 ppm resulted in maximum number of florets per spike (16.93), which was at par with GA_3 100 ppm (16.66). Whereas minimum number of florets per spike were recorded in CCC 250 ppm. Ravidas *et al.* (1992) and Mahesh amd Misra (1983) also reported the positive influence of GA_3 treatment in incerasing the number of florets per plant in gladiolus, and Biswas *et al.* (1983) in tuberose. Maximim diameter of floret (12.56 cm) was produced by GA_3 100 ppm, which was at par with GA_3 50 ppm (12.04 cm), whereas minimum diameter was observed in control (9.78 cm). The treatments failed to influence the length of florets. This increased diameter of floret is due to increase in petal size by incerasing cell size. Bhattacharjee (1984b) and Dua *et al.* (1984) in gladiolus also reported very similar results.

TABLE 2

Effect of plant growth regulators on spike characters.

Treatment	*Spike length (cm)*	*Rachis length (cm)*	*No. of florets/spike*	*Floret diameter (cm)*	*Length of florets (cm)*
GA_3 50 ppm	127.68	59.98	16.93	12.04	12.20
GA_3 100 ppm	121.10	56.46	16.66	12.56	12.30
NAA 100 ppm	108.56	41.62	14.53	11.16	11.68
NAA 200 ppm	110.48	42.80	14.66	10.52	10.70
CCC 250 ppm	92.97	34.60	10.26	11.88	10.82
CCC 500 ppm	113.06	44.92	15.46	10.18	12.04
TIBA 150 ppm	83.04	29.01	12.06	11.48	10.98
TIBA 300 ppm	119.36	49.05	15.06	10.36	11.36
Control	115.57	48.75	13.73	9.78	12.12
S.Em. ±	2.861	1.05	0.189	0.378	1.063
C.D. (0.05)	8.501	3.121	0.560	1.124	N.S.

Conclusion

GA_3 100 ppm had significantly incerased plant height and leaf area in Gladiolus cv. Friendship. This level was proved to responsible for early flowering (10 days), to reduce the total crop duration (12.8 days) and to increase floret diameter. But GA_3 50 ppm produced the longest spike and rachis; and highest number of florets per spike.

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