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# Effect of Foliar Application of Plant Growth Regulators on Growth and Flower Quality of Gladiolus Cv. 'H.B.Pitt'

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## Abstract

An investigation was undertaken to analyze the effect of plant growth regulators on growth and flower quality of gladiolus cv.'H.B.Pitt'. In the present study it was found that the maximum height of the plant (59.43 cm), number of leaves (13.9), leaf area (64.8 $cm^2$) were recorded by treatment $GA_3$ 200 ppm foliar spray. Lowest plant height was observed in treatment CCC 750 ppm spray. Minimum number of leaves/ plant (10.8) and leaf area (64.8 $cm^2$) were recorded in CCC 250 ppm/plant as foliar spray. In flower quality parameters, maximum number of florets/ spike (13.4), floret length (8.4 cm), length of spike (80.28 cm) and length of rachis (41.50 cm) were recorded with foliar spray of $GA_3$ 200 ppm. Maximum weight of floret (10.1 g), diameter of floret (9.5 cm) and girth of spike (2.60 cm) were produced by CCC 750 ppm foliar spray. Minimum number of florets/spike (8.2) and floret length (7.1 cm) were recorded in CCC 250 ppm foliar spray. Lowest weight of florets (8.3 g), diameter of florets (8.2 cm) and girth of spike (1.90 cm) were recorded in $GA_3$ 100 ppm spray. Lowest length of spike (74.20 cm) and length of rachis (35.09 cm) were recorded in CCC 750 ppm foliar spray.

**Keywords:** Foliar; Flower quality; Growth; Gladiolus; Plant growth regulators

## Introduction

Gladiolus (*Gladiolus grandiflora L.*) commonly called sword lilly or corn flag is the seventh most important flowers of the world. Gladiolus is native of South Africa belonging to family Iridaceae. In India, Gladiolus is cultivated on an area of about 500 ha. Gladiolus occupied about 0.05 per cent of the total cut flowers produced which is too much less. In Maharashtra, gladiolus is cultivated on large scale in Pune, Nashik, Solapur, Kolhapur, Aurangabad, Nagpur districts. In Maharashtra, the total area under floriculture was 16000 ha during 2008-09 with a production of 89.4 t of loose flowers and 5728 million cut flowers [1]. The latest technology of quality and flower production required to be adopted. The technologies are selection of corms, treatment to corms, judicious use of fertilizers and growth regulators, disease and pest control and post-harvest management etc. However, the yield and quality production of flower is low which needs to be increased by adopting improved horticultural techniques. Plant growth regulators have significant role in modifying the growth and flowering of plants. An investigation was therefore conducted to find out the effect of foliar application of plant growth regulators on growth and flower quality of gladiolus cv. 'H.B.Pitt'.

## Materials and Methods

The present investigation on effect of foliar application of plant growthregulators on growth and flower quality of gladiolus cv. 'H.B.Pitt' was conducted at Department of Horticulture , Late Vasantrao Naik Marathwada Agricultural University, Parbhani during kharif season 2004-2005. A field experiment was laid out in randomized block design with three replications and ten treatments (Table 1). The soil of the experimental plot was medium block cotton type with uniform texture and well drained. The treatment consisted were $T_1$-$GA_3$ 100 ppm spray, $T_2$-$GA_3$ 150 ppm spray, $T_3$-$GA_3$ 200 ppm spray, $T_4$-NAA 100 ppm spay, $T_5$-NAA 150 ppm spray, $T_6$-NAA 200 ppm spray. $T_7$-CCC250 ppm spay, $T_8$-CCC 500 ppm spray, $T_9$-CCC 750 ppm spray, $T_{10}$-Control (no any spray). The stock solution of $GA_3$ was prepared according to the method suggested by Hurtmann and Kester [2]. Spraying of different plant growth regulators were undertaken 45 and 60 days after plating. Corms were treated with Bavistin 0.1% to protect it from soil borne diseases. The crop was irrigated at 5-7 day interval. Manures was applied @8 kg/sqm 15 days before painting and NPK (40:20:20 g/sqm) in the form of urea, single superphospate and mutilate of potash respectively. Regular plant protection measures were carried out. Five plants were selected randomly from each treatment for recording observations. The observations were recorded and statistically analyzed as per method given by Panse and Sukhatme [3].

## Results and Discussion

**Growth parameters:** From data presented in Table 1 there was significant difference in respect of height of the plant, number of leaves and leaf area as affected by different treatments.

**Height of the plant:** Data recorded at 90 days after planting indicate that maximum plant height (59.43 cm) was recorded in $GA_3$ 150 ppm spray (56.70 cm). Lowest plant height (49.13 cm) was recorded under CCC 750 ppm foliar spray. The increase in height in $GA_3$ treated plant might be due to rapid elongation, increased cell division and cell enlargement, which would have increased internodal distance. The results were in agreement with Sindhu and Verma [4] in gladiolus.

**Number of leaves:** At 90 days after planting, treatment $T_3$ ($GA_3$ 200 ppm) produced maximum number of leaves (13.9) followed by treatment $T_2$ ($GA_3$ 150 ppm) and $T_1$ ($GA_3$ 100 ppm) respectively. Minimum numbers of leaves (10.8) noticed with treatment $T_7$ (CCC

250 ppm). The increase in number of leaves may be due to increase in height and $GA_3$ encourage the more vegetative growth in view of more number of leaves. Above findings are in close confirmity with the findings of Dutta and Ramdas [5] in chrysanthemum.

**Leaf area:** The data regarding leaf area are presented in Table 1. Maximum leaf area (86.05 $cm^2$) was recorded with treatment $T_3$ ($GA_3$ 200 ppm) and it was at par with treatment $T_2$ (82.73 $cm^2$). Minimum leaf area (64.81 $cm^2$) was noticed with treatment $T_7$ (CCC 250 ppm). The $GA_3$ increased the height of the plant and number of leaves per plant consequently. There was increase in the total leaf area with the increase in number of leaves. The results of the present findings are in conformity with the findings of Singh and Sharma [6] in calendula.

## Quality parameters

**Number of floret per spike:** The data presented in Table 1 indicated that maximum floret spike (13.4) was observed under treatment $T_3$ ($GA_3$ 200 ppm) followed by treatment $T_2$ ($GA_3$ 150 ppm). The least number of florets/spike (8.2) was observed under treatment $T_7$ (CCC 250 ppm). Increase in number of florets using $GA_3$ had been reported by Dua et al. [7] in gladiolus.

**Length of floret:** It is evident from the data presented in Table 1 that maximum floret length (8.6 cm) was obtained in treatment $T_3$ ($GA_3$ 200 ppm) followed by $T_2$ and $T_1$. Treatment $T_3$ was significantly superior over the all other treatments. Minimum floret length (7.1 cm) was produced in treatment $T_7$ (CCC 250 ppm). The increase in length of floret in $GA_3$ treated plant is might be due to rapid elongation, increased cell divisions and cell enlargement. The results are in close agreement with the findings of Dataram et al. [8] in gladiolus.

| Tr. No | Treatments | Height of the plant (cm) | Number of leaves/ plant | leaf area ($cm^2$) | Number of florets/ spike | Length of floret (cm) | Length of spike (cm) | Length of rachis (cm) | Diameter of floret (cm) | Weight of floret (g) | Girth of spike (cm) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| $T_1$ | $GA_3$ 100 ppm | 55.43 | 12.4 | 78.72 | 12.7 | 8.2 | 77.35 | 41.04 | 8.2 | 8.3 | 1.90 |
| $T_2$ | $GA_3$ 150 ppm | 56.70 | 12.6 | 82.73 | 12.9 | 8.3 | 78.51 | 41.11 | 8.2 | 8.5 | 1.93 |
| $T_3$ | $GA_3$ 200 ppm | 59.43 | 13.9 | 86.05 | 13.4 | 8.6 | 80.28 | 41.50 | 8.3 | 8.7 | 2.00 |
| $T_4$ | NAA 100 ppm | 54.23 | 11.9 | 72.85 | 9.8 | 7.8 | 76.35 | 38.90 | 8.4 | 8.6 | 2.06 |
| $T_5$ | NAA 150 ppm | 53.10 | 11.6 | 72.91 | 10.0 | 7.9 | 75.23 | 38.43 | 8.6 | 8.8 | 2.13 |
| $T_6$ | NAA 200 ppm | 52.96 | 11.1 | 74.75 | 11.7 | 8.0 | 72.50 | 36.63 | 8.8 | 9.0 | 2.18 |
| $T_7$ | CCC 250 ppm | 50.06 | 10.8 | 64.81 | 8.2 | 7.1 | 75.15 | 37.06 | 9.2 | 9.6 | 2.30 |
| $T_8$ | CCC 500 ppm | 49.93 | 10.9 | 66.03 | 8.2 | 7.3 | 75.53 | 35.62 | 9.3 | 9.8 | 2.40 |
| $T_9$ | CCC 750 ppm | 49.13 | 11.6 | 68.83 | 8.6 | 7.6 | 74.20 | 35.09 | 9.5 | 10.1 | 2.60 |
| $T_{10}$ | Control (No spray ) | 52.40 | 12.1 | 75.51 | 10.1 | 8.1 | 77.36 | 39.66 | 8.8 | 8.7 | 1.90 |
| | SE+_ | 0.08 | 0.025 | 0.009 | 0.2 | 0.01 | 0.08 | 0.06 | 0.02 | 0.05 | 0.07 |
| | CD at 5% | 0.2 | 0.07 | 0.02 | 0.6 | 0.02 | 0.25 | 0.19 | 0.08 | 0.14 | 0.2 |

**Table 1:** Effect of foliar application of plant growth regulators on growth and flower quality of gladiolus cv. 'H.B.Pitt'.

**Length of spike:** Table 1 indicates the observations recorded in respect of length of spike, it is clear that treatment T3 ($GA_3$ 200 ppm) emerged statistically significant over control, which recorded maximum spike length (80.28 cm) followed by T2 (78.51 cm). Lowest spike length (74.20 cm) was observed in plants which received CCC 750 ppm (T9) as foliar spray. Effect of $GA_3$ 200 ppm treatment produced maximum length of gladiolus spike this is due to the effect of gibberellic acid sprayed which accelerate the elongation, growth of plant and production of better flowers. Similar results were observed by Sindhu and Verma [4] in gladiolus.

**Length of rachis:** Data from Table 1 clearly indicates that treatment T3 ($GA_3$ 200 ppm) exhibited maximum length of rachis (41.50 cm) followed by T2 and T1 minimum length of rachis (35.09 cm) was reported in treatment T9 (CCC 750 ppm). GA3 treatment resulted in maximum length of rachis due to increased translocation of organic material in treated plants and mobilization of nutrients into flowers by growth regulators. The above findings are in close conformity with the findings of Sanap et al. [9] in tuberose cv. 'Single.'

**Diameter of floret:** The results obtained in the present studies revealed that the treatment T9 (CCC 750 ppm) produced large size flower (9.5 cm) than other treatments followed by treatment T8 (CCC 500 ppm). Minimum diameter of flower was noticed in treatment T1 (8.2 cm). The enlargement of flower size caused by drawing photosynthats to the flower as a consequence of intensification of the sink. These results are in conformity with Narayana and Jayanti [10] in marigold.

**Weight of floret:** It is evident from the data presented in Table 1 that treatment T9 (CCC 750 ppm) produced maximum weight of floret (10.1 g) followed by T8 (9.8 g). Plant with minimum weight of floret (8.3 g) was registered by treatment T1 ($GA_3$ 100 ppm). The weight of flower might be increased due to the food materials produced by the plants used for nourishment of larger flower, resulted

in increase in weight of flower. The results of the present studies are in line with the findings of Dutta and Ramdas [5] in chrysanthemum.

**Girth of spike:** It is evident from the data recorded in Table 1 that treatment T9 (CCC 750 ppm) exhibited maximum girth of spike (2.40 cm) and treatment T1 ($GA_3$ 100 ppm) exhibited minimum girth of spike (1.90 cm). The increase in girth diameter with CCC might be due to decreased shoot length. Similar results were observed by Chakradhar et al. [11] in rose.

## Conclusion

On the basis of present studies it can be concluded that in respect of cultivation of gladiolus, exogenous application of $GA_3$ at 200 ppm was effective for enhancing growth and flower quality of gladiolus.

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