The Pharma Innovation Journal 2022; 11(7): 2963-2966

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; 11(7): 2963-2966

www.thepharmajournal.com
Received: 20-04-2022
Accepted: 08-06-2022

Khushboo Sharma
Department of Floriculture and Landscape Architecture, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh, India

Tarsius Tirkey
Department of Floriculture and Landscape Architecture, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh, India

Corresponding Author:
Khushboo Sharma
Department of Floriculture and Landscape Architecture, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh, India

Effect of plant growth regulators on growth and flowering of *Gladiolus* Cv. Saffron

Khushboo Sharma and Tarsius Tirkey

Abstract
The present investigation was conducted to study the effect of plant growth regulators on growth, flowering and corm production of *Gladiolus* Cv. Saffron during 2020-21 at Department of Floriculture and Landscape Architecture, IGKV Raipur, Chhattisgarh. Three growth regulators with three concentration *viz*., GA3 (100 ppm, 200 ppm and 300 ppm), BAP (50 ppm, 100 ppm and 150 ppm) and MH (250 ppm, 500 ppm and 750 ppm) each at three concentration in addition to tap water spray as control. The experiment was laid out in Randomized block design (RBD) with ten treatments with three replication. The result revealed that the treatment of GA3 @ 200 ppm (T4) attributed to superior results regarding the plant height, number of shoots, length of spike, number of floret per spike and vase life over all other treatments.

Keywords: Gibberllic acid, benzyl amino purine, malic hydrazide

Introduction
Gladiolus is known as the "Queen of Bulbus Flowers" and is one of the most important bulbous flower crops. It is a member of the Iridaceae family and is native to South Africa's Cape region. The word "*Gladiolus*" is derived from the Latin word "gladius" meaning a "sword" shape leaves of the plants. *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) [7] *Gladiolus* is a monocotyledonous bulbous flowering plant. In the spike, the flowers open from the bottom to the top. Flowers can be frilly, ruffled or plain, multicolored or solid. *Gladiolus* is commonly used as a cut flower, herbaceous borders, beddings, rockeries and pot plants. Because of its long lasting action and excellent keeping quality, it is also used in bouquet and flower arrangements.
Gladiolus is a winter crop, but it can also be grown in the summer in areas with low rainfall and a mild climatic condition. *Gladiolus* can be grown in a variety of soil types and requires a pH of 6.0-7.0 for optimal growth and spike production. It has a high potential for export to European countries as a cut flower during the winter months, with earning valuable foreign exchange. *Gladiolus* is leading cut flower of India as well as world. *Gladiolus* is one of the four famous cut flower in the world. (Bai *et al*., 2009) [2]. It has 8th rank of cut flowers and 1st rank of bulbous flower in the world trade. (Pragya *et al*., 2010) [15].

Material and Methods
Present work was conducted at the Experimental area, Department of Floriculture and Landscape Architecture, IGKV Raipur, (Chhattisgarh), during the year of 2020-21. The experiment was set up in three replications using Randomized Block Design with 10 treatment. Soil of the experiment plot was medium black, uniform in texture and well drained. FYM was applied at the time of land preparation. The treatment comprised three plant growth regulators *viz*., GA3 (100 ppm, 200 ppm and 300 ppm), BAP (50 ppm, 100 ppm and 150 ppm) and MH (250 ppm, 500 ppm and 750 ppm) each at three concentration in addition to tap water spray as control. Healthy, uniform-sized corms diameter ranging from 3 to 5 cm were planted with a row spacing of 30×20 cm between the rows and plants, respectively One corm per hill about 5-6 cm depth, corm were planted. All chemical applied the plants 30 day after planting through foliar spray. The growth and flowering parameters for each treatments were observed in five tagged plants selected by random sampling method. The data were statistically analysed and critical differences were work out at five percent level to draw statistical conclusions as suggested by Panse and Sukhatme (1985).

Plant growth regulators and its importance

The use of plant growth regulators is a important practice for modifying the developmental processes of flowers and ornamental plants.

Plant growth regulators are organic substances which have important functions in regulating plant growth, acting as inhabitants or stimulants, depending on its concentration and other intrinsic characteristics of the plant.

Plants produce hormones include Auxins, Gibberellins, Cytokinins, Ethylene and some inhibitors which increasingly being used. In *Gladiolus*, plant growth regulators help to enhance inflorescence, shoot and better corms production.

Plant growth regulators are synthetic or biological compounds that positively benefit and modify the plant growth and development.

In *Gladiolus*, plant growth regulators are enhanced inflorescence, shoot and better corms production.

Synthetic compounds are not produced naturally but both (natural and synthetic) growth substances regulate or influence physiological processes like cell division, differentiation, root and shoot growth, flowering, senescence and nucleic acid synthesis reported by Danneberger and Street (1990).

There are several growth hormones used in the *Gladiolus* cultivation during the last half century. Reasons to alter growth is present in the plant by plant growth regulators for the public interest in the different corner of the world.

Discussion about plant growth regulators and their impact in *Gladiolus* Gibberellic acid Gibberellic acid used in the cultivation of ornamental plants in order to accelerate the flowering, increase the flower yield and improves flower quality. Gibberellins are known to exhibit dramatic effect to cause flowering in large number. In case of bulbous ornamental plants, gibberellins stimulate the height of the plant, length of flower stalk, flower size, duration of flowering, induce early flowering, increase the number of roots, corm size, weight, including more cormels production and also lengthening the life of the spike to a significant extent.

Banzyl amino purine

Benzyl adenine is a growth regulator reported to be useful for enhancing sprouting of bulbous flowers. 6-benzylaminopurine, Benzyl adenine (BAP or BA) is a first generation synthetic Cytokinin that elicits plant growth and development responses, setting blossoms. It is responsible for multiple sprouting hence increasing number of shoots and formation of multiple corms.

Malic hydrazide

Maleic hydrazide is a plant growth regulators, which has inhibitory effect on biosynthetic activity. It is also used as induce dormancy. The uses of gibberellic acid and maleic hydrazide have been reported to be remarkably successful in quality bloom production with several flower and ornamental crops (Sharifuzzaman, *et al*. 2011) [23].

Result and Discussion

The result presented in table 01, revealed that the growth and flowering parameters of *Gladiolus* plant were significantly altred due to the application of growth regulators. The maximum plant height, number of shoots, number of leaves per plant, length of spike, number of spike per plant.

Table 1: Effect of plant growth regulators on growth and flowering attributes of *Gladiolus*

Treatment	Plant height (cm)	Number of Shoots/plant	Number of leaves/per	Length of spike/plant	Length of rachis/plant	Number of spike/plant
T1-Control	69.47	1.10	5.21	68.9	38.33	1.00
T2-GA3@ 100 ppm	84.62	1.12	5.59	75.6	49.53	1.00
T3 -GA3 @ 200 ppm	87.80	1.33	6.11	80.1	48.27	1.20
T4 -GA3 @ 300 ppm	85.27	1.40	5.89	74.7	50.00	2.20
T5 - BAP@ 50 ppm	78.62	1.80	4.78	70.5	40.13	2.10
T6 - BAP@ 100 ppm	79.01	2.00	5.01	71.5	39.73	1.30
T7 - BAP@ 150 ppm	76.53	2.10	5.11	71.2	39.33	1.80
T8 - MH @ 250 ppm	71.62	1.50	5.29	68.6	39.33	1.42
T9 - MH @ 500 ppm	69.61	2.03	5.11	63.3	41.40	2.12
T10 - MH @ 750 ppm	68.89	2.07	5.39	64.9	39.13	1.11
S.Em±	0.31	1.22	0.30	0.53	0.48	0.47
C.D. at 5%	0.91	3.61	0.88	1.57	1.43	1.41

Plant height

In case of *Gladiolus* at 60 DAP the maximum plant height (87.47 cm) was recorded with application of treatment T3 (GA3 200 ppm foliar spray) and the minimum plant height (68.89 cm) was observed when plant was treated with treatment T10 (MH @ 750 ppm foliar spray). The increased height of the plant might be associated with the application of GA3 that plant an boost in the endogenous level of gibberellins in various stages of plant growth and development, which encourage vegetative growth by inducing active cell division and cell elongation in the apical meristem. Another possible justification for the considerable increase in plant height could be the effect of gibberellins on photosynthetic activity, which resulted in the plants efficiently utilizing photosynthetic products that enhance the plant growth and development. These results are also consistent with the findings of Sharma *et al*. (2006), Kumar *et al*. (2008) and Chopde *et al*. (2013) [24, 10, 5] in *Gladiolus*.

Number of shoots per plant

A significant influence of various concentration of BAP The result indicate that maximum number of shoots (2.07) per mother corm was found in the Treatment T7 (BAP @ 150 ppm foliar spray) which was showed at par with the treatment T6 (BAP @ 100 ppm) and T9 (MH @ 500 ppm) and the minimum number of shoots was found with treatment T1 control with tap water (1.10). The maximum number of shoots under the treatment T7 may be due to BA induced early sprouting of corms and cytokinin induce good branching responses. Another probable reason for more number of

shoots BA is responsible for multiple shooting may be due to that cytokinin stimulates cell division and lateral bud development which leads to multiple shooting. These findings are in consonance with the reports of Richards and Wilkinson (1984), Murti and Upreti (1995), Pal and Chowdhury (1998), Baskaran and Misra (2007) [21, 12, 14, 4] in *Gladiolus*.

Number of leaves per plant

The maximum number of leaves per plant at 60 DAP is (6.10) was observed in treatment T3 (GA3 @ 200 ppm) which was at par with treatment T3 (GA3 @ 200 ppm), T4 (GA3 @ 300 ppm), T8 (MH @ 250 ppm) and T10 (MH @ 750 ppm) and the minimum number of leaves per plant (4.80) was recorded in treatment T5 (BAP @ 50 ppm). A critical assessment of observations of the number of leaves per plant at various stages of growth revealed that in *Gladiolus* might be due to the better development of leaves was positively related to plant height increase. The application of GA3 may have resulted in an increase in the number of leaves due to the promotory action of gibberellic acid on *Gladiolus* corm, as well as increased cell division in the shoot tip and cell elongation. These results are in close conformity with the findings of Ravidas *et al*. (1992), Umarao *et al*. (2007), Ramachandrudu and Thangam (2007) and Sudhakar *et al*. (2012) [20, 28, 19, 25] in *Gladiolus.*

Length of spike per plant

The data in respect to *Gladiolus*, length of the spike (cm) as influenced by application of GA3 The data revealed that the maximum spike length (80.01 cm) was recorded in treatment T3 (GA3 @ 200 ppm), which was significantly superior to all other treatments. However, Treatment T9 (MH @ 500 ppm foliar spray) produced the shortest spike length (63.3cm).

The fact that optimal levels of GA3 promoted plant efficacy in terms of photosynthetic activity, enhanced nutrient uptake and translocation into reproductive parts may explain the increased spike length. Another probable reason may be due to rapid Internodal elongation as a result of increased cell division and cell elongation. These findings are in consonance with the reports of Singh *et al*., (2007), Chopde *et al*., (2013) and Padmalata *et al*., (2013) and Sauter and Kende (1992) [5, 13] in *Gladiolus*.

Length of rachis (cm)

The data show that the maximum length of the rachis (50.00 cm) found with Treatment T3 (GA3 @ 200 ppm). Which was showed statistically at par value with treatment T2 (GA3 @ 100 ppm). However, produced the shortest rachis length (38.33 cm) with treatment T9 (MH @ 500 ppm foliar spray).

The data of enhance in rachis length could be attributed to an increased plant height and spike length as influenced by the GA3 treatment. An additional possible justification for increase in rachis length may be due to direct growth regulating action of GA3. The presence of GA3 might have increased the activity of growth promoting enzymes thereby synthesizing more nucleic acid and other compound, that may be promote to increases the rachis length of *Gladiolus*. This is in accordance with the findings of Tawar *et al*., 2002, Chopde *et al*., (2013) [26, 5].

Number of spike per plant

The result reveals that the maximum number of spike per plant (2.20) was counted in the treatment T3 (GA3 @ 200 ppm) and it was showed statically at par value with treatments T5 (BAP @ 75 ppm), T7 (BAP @ 150 ppm), and T9 (MH @ 500 ppm) and the minimum number of spike per plant (1.00) was observed in the treatment T1 (control with tap water).

The superiority of treatment T4 (GA3 @ 200 ppm) might be due to the activity of gibberellic acid that optimum level promoted the auxiliary buds to grow vigorously and their maximum number of spike. Another probable reason for more number of floret may be the availability of optimum quantity of GA3 under these treatments as a result spike length and rachis length are increased which are positively related to number of spike. Similar views have also been expressed by Mohanty *et al*. (1994), Kumar *et al*. (2005) and Chopde *et al*. (2013) [11, 8, 5] in *Gladiolus*.

Conclusion

Based on the present research work, it is concluded that Gibberellic acid (GA3 @ 200 ppm foliar spray) improve the growth and floral variables; increase the plant height, number of leaves per plant, length of spike per plant, length of rachis per plant and number of spike per plant as well as (BAP @ 150 ppm foliar spray produce more number of shoots per plant.

Recommendation

GA3 @ 200 ppm could be recommended for reasonable plant height and batter flower production in *Gladiolus*.

Reference

1. Aier S, Langthasa S, Hazarika DN, Gautam BP, Goswami RK. Influence of GA_3 and BA on Morphological, Phonological and Yield Attributes In *Gladiolus* cv. Red Candyman. Journal of Agriculture and Veterinary Sci. 2015;8(6):37-42.
2. Bai JG, Xu PL, Zong CS, Wang CY. Effect of exogenous calcium on some post harvest characterstics of cut *Gladiolus*. Agri. Sci. china. 2009;8(3):293-303.
3. Baladha RF, Viradia RR, Bhuva SK, Kava. Effect of plant growth retardants on growth and flowering of *Gladiolus* (*Gladiolus grandiflorus* L.) cv. 'American beauty'. The Bioscan. 2016;10(4):2335-2337.
4. Baskaran V, Misra RL. Effect of plant growth regulators on growth and flowering of *Gladiolus*. Indian J Hort. 2007;64(4):479-482.
5. Chopde N, Gonge VS, Warade AD. Influence of growth regulators on *Gladiolus* varieties. Journal of Agriculture Research and Technology. 2013;38(3):369-374.
6. Dua IS, Sehgal OP, Chark KS. Gibberellic acid induced earliness and increased production in *Gladiolus*. Gartenbauwissenschaft. 1984;49(2):91-94, 13 ref.
7. Lepcha B, Nautiyal MC, Rao VK. Variability studies in *Gladiolus* under mid hill conditions of Uttarakhand. Journal of ornamental horticulture. 2007;10(3):169-172.
8. Kumar V, Singh RP. Effect of soaking of mother corms with plant growth regulators on vegetative growth, flowering and corm production in *Gladiolus*. J Ornamental Hort. 2005;8(4):306-308.
9. Kumar P, Verma LS, Sharma G, Netam M, Kumar H. Study the effect of plant growth regulators on vase-life of *Gladiolus*. J. Pharma. Phytochem. 2020;9(6):564-570.
10. Kumar PS, Bhagawati R, Kumar R, Ronya T. Effect of plant growth regulators on vegetative growth, flowering and corm production of *Gladiolus* in Arunachal Pradesh.

J Ornamental Hort. 2008;11(4):265-270.
11. Mohanty CR, Sena DK, Das RC. Studies on the effect of corm size and preplanting chemical treatment of corms on growth and flowering of *Gladiolus*. Orissa J Hort. 1994;22(1/2):1-4.
12. Murti GSR, Upreti KK. Use of growth regulators in ornamental plants. In: K.L. Chadda and S.K. Bhattacharjee (eds.) Advance in Horticulture, Ornamental Plants. 1995;2:863-883.
13. Padmalatha T, Reddy GS, Chandrasekhar R, Shankar AS, Chaturvedi A. Effect of foliar sprays of bio regulators on growth and flowering in *Gladiolus*. Indian J Agricultural Research. 2013;47(3):192-199.
14. Pal P, Chowdhury T. Effect of growth regulators and duration of soaking on sprouting, growth, flowering and corm yield of *Gladiolus* cv. Tropic Sea. Horticultural Journal. 1998;11(2):69-77.
15. Pragya P, Bhat KV, Misra RL, Ranjan JK. Analysis of diversity and relationships among *Gladiolus cultivars* using morphological and RAPD markers. Indian journal of Agriculture sciences. 2010;80(9):766-772.
16. Prakash V, Jha KK. Effect of GA3 on the floral parameters of *Gladiolus cultivars*. J Applied Biology. 1998;8(2):24-28.
17. Ram R, Mukherjee D, Manuja S. Plant growth regulators affect the development of both corms and cormels in *Gladiolus*. Hortscience. 2002;37(2):343-344.
18. Rana P, Kumar J, Kumar M. Response of GA3, plant spacing and planting depth on growth, flowering and corm production in *Gladiolus*. J Ornamental Hort. 2005;8(1):41-44.
19. Ramachandrudu K, Thangam M. Response of plant growth regulators, coconut water and cow urine on vegetative growth, flowering and corm production in *Gladiolus*. J Ornamental Hort. 2007;10(1):38-41.
20. Ravidas L, Rajeevan PK, Valsalakumari PK. Effect of foliar application of growth regulators on the growth, flowering and corm yield of *Gladiolus* cv. Friendship. South Indian Hort. 1992;40(6):329-335.
21. Richards D, Wilkinson RI. Effect of manual pinching, potting-on and cytokinine on branching and flowering of Camellia, Rhododendron and Rosa. Scientia Horticulture. 1984;23(1):75-83.
22. Roy S, Fatmi U, Mishra S, Singh R. Effect of pre plant soaking of corms in growth regulators on sprouting, vegetative growth and corm formation in *Gladiolus* (*Gladiolus grandiflorus* L.) J. P. P. 2017;6(5):1135-1138.
23. Sharifuzzaman SM, Ara KA, Rahman MH, Kabir K, Talukdar MB. Effect of GA3, CCC and MH on vegetative growth, flower yield and quality of several flowers. Int. J Expt. Agric. 2011;2(1):17-20.
24. Sharma DP, Chattar YK, Nishith G. Effect of gibberellic acid on growth, flowering and corm yield in three cultivars of *Gladiolus*. J Ornament. Hort. 2006;9(2):106-109.
25. Sudhakar M, Kumar SR. Effect of growth regulators on growth, flowering and corm production of *Gladiolus* (*Gladiolus grandiflorus* L.) Cv. White friendship. Indian Journal of Plant Sci. 2012;1(2-3):133-136.
26. Tawar RV, Sable AS, Giri MD. Effect of growth regulators on growth and flowering of *Gladiolus* cv. Jester. Annals of Plant Physiology. 2002;16(2):109-111.
27. Tonecki J. Effect of the growth substance on plant growth and shoot apex differentiation in *Gladiolus* (*Gladiolus hortorum* cv. *Acca Laurentia*). Acta Horticulturae. 1979;91:201-206.
28. Umrao VK, Sharma V, Kumar B. Influence of gibberellic acid spraying on *Gladiolus* cv. Rose delight. Progressive Agriculture. 2007;7(1/2):187-188.