International Journal of Advanced Biochemistry Research

ISSN Print: 2617-4693
ISSN Online: 2617-4707
IJABR 2024; 8(6): 468-471
www.biochemjournal.com
Received: 09-04-2024
Accepted: 20-05-2024

Aman Jha
M.Sc. Scholar, Department of Horticulture, SHUATS, Prayagraj, Uttar Pradesh, India

Samir E Topno
Assistant Professor, Department of Horticulture, SHUATS, Prayagraj, Uttar Pradesh, India

Corresponding Author:
Aman Jha
M.Sc. Scholar, Department of Horticulture, SHUATS, Prayagraj, Uttar Pradesh, India

Effect of different plant growth regulators on the growth, flowering, flower yield and quality of Jasmine (*Jasminum sambac*) under Prayagraj agro climatic conditions

Aman Jha and Samir E Topno

DOI: https://doi.org/10.33545/26174693.2024.v8.i6f.1350

Abstract
An experiment entitled 'Effect of different plant growth regulators on the growth, flowering, flower yield and quality of Jasmine (*Jasminum sambac*) under Prayagraj agro- climatic conditions' was conducted in Horticulture Research Field, Faculty of Agriculture, Department of Horticulture, Naini Agricultural Institute, SHUATS, Prayagraj during October 2022-May 2023 with an aim to identify the most suitable plant growth regulator under the agro climatic conditions of Prayagraj. There were ten treatment replicated thrice in spacing of 1 m x 1 m randomly. Significant difference in different treatments of tuberose were recorded for all the parameters observed**.** From the present investigation, it is concluded that among the different treatments, experiment is performed in randomized block design, From the present investigation, it is concluded that among the different treatments, the treatment T_1- GA3@ 25ppm was found in superior in terms of plant height (151.33cm), plant spread (115.42 cm^2), Leaf area (452.7 m2). However treatment T_9- CCC@ 2000ppm performed best in terms of Days to bud initiation (91.33days), 50% flowering (20.78 days), No. of flowers per plant (1989.33), Flower yield per plant (512.98 g), Flower yield per hectare(5.13 t) whereas T_7- CCC@ 1000ppm performed best in terms of flower quality in flower Diameter (4.44 cm), Flower weight (0.41 g), Shelf life (2.67 days) and Self life (7.22 days). Treatment-9 had highest benefit cost ratio (2.90).

Keywords: Jasmine, Treatment, PGRs

Introduction
Jasminum is a genus of shrubs and vines in the olive family (Oleaceae), containing around 200 species native to tropical and warm temperate regions of Eurasia, Africa, and Oceania. Jasmines are cultivated for the characteristic fragrance of their flowers. Some unrelated plants also have "Jasmine" in their common names. Jasmines can be deciduous (leaves falling in autumn) or evergreen (green all year round), and can be erect, spreading, or climbing shrubs and vines. Their leaves are borne in opposing or alternating arrangements and can be simple, trifoliate, or pinnate. The flowers, about 2.5 cm in diameter, are typically white or yellow, though rarely slightly reddish. They are borne in cymose clusters with a minimum of three flowers or can be solitary on the ends of branchlets. Each flower has four to nine petals, two locules, and one to four ovules. They have two stamens with short filaments, linear or ovate bracts, and a bell-shaped calyx. The flowers are usually very fragrant.

Jasmine fruits are berries that turn black when ripe. The basic chromosome number is 13, and most species are diploid (2n=26), though natural polyploidy exists in species like Jasminum sambac (triploid 3n=39), Jasminum flexile (tetraploid 4n=52), Jasminum mesnyi (triploid 3n=39), and Jasminum angustifolium (tetraploid 4n=52). Jasmine flowers are popular in gardens, and tea can be made from them. Some species are used to produce oil, perfumes, or incense, and jasmine flowers are often worn by women in Asia.

Jasmine cultivation is significant in Tamil Nadu and Karnataka, contributing substantially to the national economy in India. Jasmine flowers are used in making flower strings, garlands, floral decorations, essential oils for high-grade perfumes and colognes, and flavoring beverages. They also have medicinal uses. Jasmine is cultivated commercially in Coimbatore, Madurai, Dindigul (Tamil Nadu), Bangalore, Bellary, Mysore, Kolar

(Karnataka), Knnauj, Jaunpur, Gazipur (Uttar Pradesh), Udaipur, Jaipur, Ajmer, and Kota (Rajasthan). Jasmine prefers a mild and tropical climate, with an ideal annual rainfall of 800 to 1000 mm.

Jasminum sambac, known as Arabian jasmine or Sambac jasmine, is native to tropical Asia and cultivated in many regions. It grows as a small shrub or vine up to 0.5 to 3 m in height. The flowers are attractive and sweetly fragrant, used in perfumes and jasmine tea. It is the national flower of the Philippines and one of the national flowers of Indonesia.

Plant Growth Regulators (PGRs) are organic compounds, other than nutrients, that in small amounts promote, inhibit, or modify physiological processes in plants. Key uses in horticulture and floriculture include regulating plant height, promoting branching, propagating cuttings, controlling flowering, enhancing stress tolerance, increasing post-harvest longevity, and improving the display of flowers and potted plants.

Material and Methods

A field experiment entitled "Effect of different plant growth regulators on growth, flowering, flower yield and quality (*Jasminum sambac*.) under Prayagraj agro climatic conditions" have been describes in this chapter. Experiment was carried out at the experimental field of the Department of Horticulture, Naini Agriculture Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, U.P to find out most suitable plant growth regulator on growth, flowering and yield of tuberose. All nine treatment combination will be applied in three replication in a Randomized Block Design (RBD) during the season of 2023-2024. Prayagraj is situated at an elevation of 98 meters above sea level at 25.45 °N altitude and 81.84°. E longitudes. This region has a sub-tropical climate prevailing in the south-east part of U.P. The area of Prayagraj district comes under subtropical belt in the South East of Uttar Pradesh, which experience extremely hot summer and fairly cold winter. The maximum temperature reaches upto 46 °C – 48 °C and seldom falls as low as 4 °C – 5 °C. The relative humidity ranges between 20 to 94percent. The average rainfall in this area is around 1013.4 mm annually.

Results and Discussion

Vegetative Parameters of Different Treatments on jasmine Variety Plant height and plant spread:

The investigation conducted at the Horticulture Research Field, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology And Sciences, Prayagraj (U.P.) from April 2023 to March 2024 revealed significant differences among tuberose varieties concerning plant height, and plant spread.

Among the treatments, treatment GA3 @ 25 ppm recorded significantly taller (151.33 cm), which was found to be at par with GA3 @ 50 ppm (133.83 cm) whereas, shorter plants (93.00 cm)was recorded in Control (water spray).

Among the treatments, treatment GA3 @ 25 ppm recorded significantly more plant spread (50.47 cm^2), which was found to be at par with GA 3@ 50 ppm (48.47 cm^2) whereas, lesser plant spread (33.03 cm2) was recorded in Control (water spray).

By promoting cell division and elongation, foliar treatment of GA3 may have affected the stem lengthening and canopy expansion. Additionally under the impact of GA3, which retains the swelling force against with the softening of cell wall and increases plant height, growth may be accelerated by osmotic uptake of water nutrients. Similar observation were also made by (Yadav *et al*., 2015) [9].

Leaf Area (cm2)

The maximum Leaf Area was observed with T_1- GA3 @ 25ppm (452.7) which was at par with T_2- GA3 @50 ppm (423.43) whereas, maximum was reported in T_0- Water spray (200.31).The more no. of leaf area was observed in a plant treated with the GA3, which may be due to an increase in cell division and cell elongation and tissue differentiation. (Moond *et al*., 2006) [4] Floral parameters of different varieties of tuberose

Days to bud Initiation and 50% flowering

The minimum Days to bud initiation was observed with T_9-CCC @ 2000ppm (91.33) whichwas at par with T_7-CCC@1000ppm (95.44) whereas, maximum was reported in T_0- Water spray (121.22).

The minimum Days to 50% flowering After initiation was observed with T_9 - CCC @ 2000ppm (20.78) which was at par with T_7-CCC@1000ppm (22.78) whereas, minimum was reported in T_0- Water spray (35.56).

Early days to bud initiation and 50% flowering may be attributed in plants which ae treated with CCC, it is growth retardant it reduces the level of the endogenous gibberellins which could help in reducing and Vegetative growth but enhance the flowering. (Priyanka *et al*., 2023) [7].

Number of Flower per plant

The maximum Number of flowers per plant was observed with T_9-CCC @ 2000 ppm (1989.33) which was at par with T_6- MH @800ppm (1253.03) whereas, minimum was reported in T_0- Water spray (858.05).

The maximum no. of flowers per plant found more in the plant which are treated with CCC and hence cycocel helps in enhancing then flowering so it helps in producing more no. of flowers. Variation in number of florets among the treatments was also reported (Dissanayake *et al*., 2022) [3] and (Ahmad *et al*., 2019) [1]

Diameter of flower

The maximum Diameter of flower was observed with T_7-CCC @ 1000 ppm (4.44) which was at par with T_6- MH @ 800 ppm (3.39) whereas, minimum was reported in T_0-Water spray (1.9). Diameter of flower found more in plants which are treated with CCC due to reducing the vegetative growth of plant may have been result flower diameter. Variation in number of florets among the treatments was also reported (Yadav *et al*., 2015) [9].

Weight of flower

The maximum Weight of flower was observed with T_7-CCC @ 1000 ppm (0.41) which was at par with T_6- MH @800ppm (0.35) whereas, minimum was reported in T_0-Water spray (0.17). Weight of flower was found more in plants which are sprayed with CCC as it is growth retardant it reduces the level of the endogenous gibberellins which could help in reducing and Vegetative growth but enhance the flower weight. Variation in number of florets among the treatments was also reported.

Shelf Life

The maximum Self life was observed with T_7- CCC @ 1000 ppm (7.22) which was at par with T_9–CCC@ 2000ppm (6.44) whereas, minimum was reported in T_0- Water spray (4.22).

The variation in shelf life and self-life might be due to temperature that reduces the entire metabolism of the tissues, slows down the respiration and transpiration, ethylene action and retards the multiplication of bacteria and fungi. This observation is in the accountancy with the (Barma *et al.*, 2004) [2]

Total no. of flower yield per plant (g): The maximum Flower yield per plant was observed with T_9- CCC @ 2000 ppm (512.98) which was at par with T_6 – MH @ 800ppm (441.3) whereas, minimum was reported in T_0-Water spray (144.9). The variation in the total number of flower yield per Plant might be attributed to the difference in utilization of nutrients by plants or the effect of cultural practices like hoeing and the genetic composition and environmental circumstances may also be directly connected to the variance in the number of flower yield per hectare (Kundu *et al.*, 2019) [5].

Table 1: Vegetative Parameters of Different Treatments on tuberose Variety

Treatments	Plant Height	Plant Spread	Leaf Area (cm2)
WATER SPRAY	93.00	82.54	200.31
GA3 @ 25 ppm	151.33	115.42	452.7
GA3 @ 50 ppm	133.83	104.21	423.43
GA3 @ 75 ppm	125.08	92.38	329.55
MH@400ppm	116.67	87.75	335.28
MH@600ppm	110.67	88.58	244.41
MH@800ppm	107.83	91.83	329.07
CCC @ 1000 ppm	119.25	83.25	322.39
CCC @ 1500 ppm	105.17	85.88	318.57
CCC @ 2000 ppm	110.83	91.79	358.16
F-Test	S	S	S
SE(d)	9.97	4.84	25.12
CD (5%)	20.95	10.16	52.57
CV	10.40	6.42	9.28

Table 2: Floral Parameters of Different Treatments on tuberose Variety

Treatments	Days to bud initiation after treatment	Days to 50% flowering after treatment	No. of flowers per plant	Weight of flower(g)	Shelf life	Diameter of flower (cm)
CONTROL	121.22	156.78	858.05	0.17	1.44	1.9
GA3 @100ppm	105.44	131.33	981.42	0.25	2.33	3.13
GA3@200ppm	110.22	139.55	1073.6	0.20	1.67	3.18
GA3@300ppm	113.56	141.34	1180.16	0.27	1.44	3.03
CCC@1000ppm	99.56	125.23	923.0	0.23	1.88	2.47
CCC@1500ppm	103.11	131.67	1186.33	0.26	1.44	2.81
CCC@2000ppm	101.22	131.0	1253.03	0.35	1.67	3.39
TRIA@4ppm	95.44	118.22	1012.33	0.41	2.67	4.44
TRIA@6ppm	98.56	122.67	1162.0	0.22	1.56	2.89
TRIA@8ppm	91.33	112.11	1989.33	0.26	1.89	2.67
F-Test	S	S	S	S	S	S
SE(d)	1.04	0.49	12.24	0.01	0.20	0.07
CD (5%)	2.19	1.03	25.71	0.02	0.41	0.16
CV	1.23	2.22	1.29	5.32	13.38	3.05

Treatments	Flower yield per plant (g)	Flower yield per Hectare (t)
Control	144.91	1.82
GA3 @ 100 ppm	241.01	2.41
GA3 @ 200 ppm	216.56	2.16
GA3 @ 300 ppm	319.92	3.19
CCC @ 1000 ppm	215.46	2.15
CCC @ 1500 ppm	313.96	3.14
CCC @ 2000 ppm	441.3	4.41
TRIA @ 4 ppm	416.12	4.16
TRIA @ 6 ppm	254.51	2.54
TRIA @ 8 ppm	512.98	5.13
F-Test	S	S
SE(d)	18.38	0.18
CD (5%)	38.61	0.38
CV	7.32	7.12

Total no. of flower yield per hectare (t)

The maximum Flower yield per hectare (ton.) was observed with T_9- CCC @ 2000 ppm (5.13) which was at par withT_6 – MH @ 800 ppm (4.41) whereas, minimum was reported inT_0- Water spray (1.82).

The variation in the total number of flower yield per hectare might be attributed to the difference in utilization of nutrients by plants or the effect of cultural practices like hoeing and the genetic composition and environmental circumstances may also be directly connected to the variance in the number of flower yield per hectare (Kundu *et al.*, 2019) [5].

Conclusion

From the present investigation, it is concluded that among the different treatments, the treatment T_1- GA3@ 25ppm was found in superior in terms of plant height (151.33cm), plant spread (115.42 cm2), Leaf area (452.7 m2). However treatment T_9- CCC@ 2000ppm performed best in terms of days to bud initiation (91.33days), 50% flowering (20.78 days), No. of flowers per plant (1989.33), flower yield per plant (512.98 g), flower yield per hectare (5.13 t) whereas T_7- CCC@ 1000ppm performed best in terms of flower quality in flower Diameter (4.44 cm), Flower weight (0.41 g), Shelf life (2.67 days) and Self life (7.22 days). Treatment-9 had highest benefit cost ratio of (2.9).

Acknowledgement

I express my gratitude to my Advisor Dr. SAMIR E.TOPNO for constant support, guidance and valuable suggestions for improving the quality of this research work and to all the faculty members of Department of Horticulture, SHUATS, Prayagraj, Uttar Pradesh for providing all necessary facilities, their cooperation, encouragement and support. For this research, a total of nine treatment of PGRs and one jasmine variety were used. Among the three PGRs were procured from Alopibagh, Prayagraj.

Competing Interests

Authors have declared that no competing interests exist.

References

1. Ahmad M, Ayaz S, Jadoon SA, Alam M, Rab A, Khalil IH, *et al*. Application of MH controlled plant height and ameliorate flower production in Local Dahlia. Bioscience Research. 2019;16(2):1882-1890.
2. Barma D, Rajni K. Effect of chemicals on dormancy breaking, growth, flowering and multiplication in gladiolus. Journal of Ornamental Horticulture. 2004;7(1):38-44.
3. Dissanayake Gunasekera HKLK, Senarathne MMDJ. Effect of application of growth regulators on growth and flower performance of *Jasminum sambac*. Asian Journal of Agriculture and Allied Sciences. 2022;5(1):50-57.
4. Khandelwal RC, Moond SK, Singh V. Effect of GA3, CCC and MH on quality and yield of flowers in chrysanthemum. Crop Research (HISAR) 2006;32(1):63-65.
5. Kundu M, Beniwal SB, Kumar S, Lathar R. The effect of growth retardant on growth, flowering and yield of African Merigold. International Journal of Aagricultural Science and Research. 2019;9(3):127-130.
6. Ahmad M, Ayaz S, Jadoon SA, Alam M, Rab A, Khalil IH, *et al*. Application of maleic hydrazide controlled plant height and ameliorate flower production in localdahlia. Bioscience research. 2019;16(2):1882-1890.
7. Kunjam P, Netam N, Sahu TL, Nishad D, Kumar SK, Mandavi G. The Pharma Innovation Journal. 2023;12(5):985-988.
8. Sekhar RC, Srividhya S. Development of foliar concoction for improving flower yield in jasmine (*Jasminum sambac*). Asian J Hort. 2019;9(1):183-186.
9. Yadav KS, Singh AK, Sisodia A. Effect of growth promoting chemicals on growth, flowering and seed attributes in marigold. Annals of plant and soil research. 2015;17(3):253-256.