"Effect of Plant growth regulators on growth of Petunia (*Petunia hybrida*) var. Grandiflora Rose"

Abstract

The present investigation entitled "Effect of Plant growth regulators on growth and flowering of Petunia (*Petunia hybrida*) Grandiflora Rose" was conducted in the Experimental Farm, Department of Agriculture, Mata Gujri College, Fatehgarh Sahib, Punjab during year 2023 with ten treatments comprising of *viz*: T_1 i.e., Control, T_2 i.e., GA_3 @ 250 ppm, T_3 i.e., GA_3 @ 350 ppm, T_4 i.e., GA_3 @ 450 ppm. T_5 i.e., CCC @ 450 ppm, T_6 i.e., CCC @ 550 ppm, T_7 i.e., CCC @ 650 ppm, T_8 i.e., NAA @ 40 ppm, T_9 i.e., NAA @ 50 ppm and T_{10} i.e., NAA @ 60 ppm with three replications in randomized block design. The maximum plant height (27.94 cm), plant spread (57.02 cm^2), number of leaves/plant (651.04), number of branches/plant (21.96), Stem length (25.63), Leaf area (9.07 cm^2) were recorded in T_3 i.e., GA_3 @ 350 ppm, while minimum plant height (19.05 cm) and Stem length (16.12 cm) was recorded under T_6 i.e., CCC @ 550 ppm and rest of the vegetative parameters was found minimum in T_1 i.e., Control.

Keywords: *plant growth regulators, GA_3, CCC, NAA, petunia.*

1. INTRODUCTION

Petunias (*Petunia hybrid* L.), belonging to the Solanaceae family, are well-liked flowering plants due to their vibrant colours and diverse cultivars. Originating from South America, these ornamental plants are widely cultivated for their striking trumpet-shaped flowers, available in an array of colours such as pink, purple, white, and red. They are frequently utilized in gardens, hanging baskets, and containers to enhance the visual appeal of outdoor areas. Their adaptability to different climates and soil types makes petunias a popular option for both amateur and professional gardeners. The primary objective of this study is to examine how growth regulators influence the growth of petunia plants. Many ornamental crops have utilized various plant growth regulators with their effectiveness proven in nursery production, ornamental foliage plants, and other flower crops.

2. MATERIALS AND METHODS

The study comprises of different treatments with specific concentrations *viz*; T_1 i.e., Control, T_2 i.e., GA_3 @ 250 ppm, T_3 i.e., GA_3 @ 350 ppm, T_4 i.e., GA_3 @ 450 ppm, T_5 i.e., CCC @ 450 ppm, T_6 i.e., CCC @ 550 ppm, T_7 i.e., CCC @ 650 ppm, T_8 i.e., NAA @ 40 ppm, T_9 i.e., NAA @ 50 ppm, T_{10} i.e., NAA @ 60 ppm. Seedlings of petunia var. Grandiflora rose was planted in a randomized block design with three replications at the experimental farm, Department of Agriculture, Mata Gujri College, Fatehgarh Sahib, Punjab, during the winter season of 2023. The plant spacing was maintained at 30 × 25 cm, and all recommended practices were followed to ensure the healthy growth of the plants.

3. RESULTS AND DISCUSSION

Plant growth regulators were applied using the foliar method because of quick response of growth regulators. It involves the direct spraying of growth regulators onto the plant. It was done after 30 days of transplanting. For foliar spray, solutions of GA_3 @ 250 ppm, 350 ppm and 450 ppm. NAA @ 40 ppm, 50 ppm and 60 ppm. CCC @ 450 ppm, 550 ppm and 650 ppm were prepared.

a) Vegetative parameters

All the vegetative treatments showed significant effect on all the six parameters of growth. The tallest plants were noted in T_3 i.e., GA_3 @ 350 ppm (27.94 cm) which exhibited statistical superiority compared to the other treatments. The shortest plants was noted in T_6 i.e., CCC @ 550 ppm (19.05 cm) which is statistically inferior to other treatments. The application of optimum dose of the GA_3 might have increased the plant height through the acceleration of cell division, cell elongation, stem elongation and internodal distance which helped the plants to grow taller. The findings of the present research are consistent with the results of Sharma and Collis (2017), Surabhi *et. al.*, (2018), Alhajhoj (2017) and Manimaran *et al.* (2017).

Treatment T_3 i.e., GA_3 @ 350 ppm displayed the highest number of branches (21.96), demonstrating statistical superiority over the other treatments. The lowest number of branches was found in T_1 (14.64) excluding the application of plant growth regulators which is statistically inferior to other treatments. The optimum dose of GA_3 i.e., GA_3 @ 350 ppm enhancing the cell growth which encourages the formation of more branches. The observations and findings in the present investigation are consistent with the results obtained by Delvadia *et al.* (2009) and Shinde *et al.* (2010).

T_3 i.e., GA_3 @ 350 ppm (57.02 cm^2) resulted in the plant achieving its maximum spread, which is statistically at par with T_2 i.e., GA_3 @ 250ppm (56.63 cm^2), T_4 i.e., GA_3 @ 450ppm (51.19 cm^2). The minimum plant spread was found in T_1 i.e., control (44.60 cm^2) which is statistically at par with T_6 i.e., CCC @ 650 ppm (50.17 cm^2), T_9 i.e., NAA @ 50 ppm (50.17 cm^2), T_5 i.e., CCC @ 450ppm (50.52 cm^2), T_7 i.e., CCC @ 650 ppm (50.61 cm^2). The increased spread of plants was due to the application of GA_3 which is responsible for promotion of cell elongation and division, ultimately leading to comprehensive plant growth and development. Similar results were also noted by Guatam *et al.* (2006) and Naresh Kumar *et al.* (2016).

The highest number of leaves was seen in the T_3 i.e., GA_3 @ 350 ppm (651.04) which is statistically at par with T_9 i.e., NAA @ 50 ppm (639.08), T_2 i.e., GA_3 @ 250ppm (632.66), T_7 i.e., CCC @ 650 ppm (632.61), T_5 i.e., CCC @ 450 ppm (607.53), T_4 i.e., GA_3 @ 450 ppm (605.93). T_{10} i.e., NAA @ 60 ppm (476.57), T_6 i.e., CCC @ 550 ppm (462.44). At optimum concentration GA_3, it will accelerate plant growth and improve the uptake of nutrients which leads to more number of leaves per plant. The shortest number of leaves was seen in T_1 i.e., control (315.73) which is statistically at par with T_8 i.e., NAA @ 40 ppm (369.87). The studies conducted by Amit Kumar *et al.* (2011) and Sharma and Joshi (2015).

The T_3 i.e., GA_3 @ 350 ppm exhibited the longest stem length (25.63cm) which is statistical superior over the other treatments. The stem length was increased due to the application of GA_3 to the plants, a significant increase in stem length can be observed due to the activation of cell elongation processes. The shortest stem length was found in T_6 i.e., CCC @ 550 ppm (16.12 cm) which is statistically inferior to other treatments. These results are similar with Tyagi and Kumar (2006) and Dhaduk *et al.* (2007).

Treatment T_3 i.e., GA_3 @ 350 ppm (9.07cm^2) exhibited the greatest leaf area compared to the other treatments, demonstrating statistical superiority. The minimum leaf area was found in T_1 i.e., control (7.19 cm^2) which is statistically inferior to other than treatments. The rise in leaf area as a result of foliar GA_3 spray can be attributed to the stimulation of increased cell division and elongation. The outcomes of the present investigation are consistent with the studies carried out by Shrinivasa (2005) and Chandrappa *et al.* (2006).

Table 1: Performance of different treatment for various character of Petunia

Treatment	Plant height (cm)	Number of leaves/plant	Plant spread (cm^2)	Number of branches/plant	Stem length (cm)	Leaf area (cm^2)
T_1 Control	19.42	315.73	44.60	14.64	17.31	7.19
T_2 GA_3@250 ppm	25.66	632.66	56.63	19.13	23.34	7.73
T_3 GA_3@350 ppm	27.94	651.04	57.02	21.96	25.63	9.07
T_4 GA_3@450 ppm	23.79	605.93	51.19	17.53	21.48	7.57
T_5 CCC@450 ppm	19.40	607.53	50.52	16.69	16.63	7.41
T_6 CCC@550 ppm	19.05	462.44	50.17	17.20	16.12	7.62
T_7 CCC@650 ppm	20.80	632.61	50.61	17.22	18.62	7.61
T_8 NAA@40 ppm	17.99	369.87	50.88	17.09	17.28	7.45
T_9 NAA@50 ppm	22.00	639.08	50.17	17.31	19.81	7.59
T_{10} NAA@60 ppm	20.65	476.57	50.84	17.20	18.44	7.42
Sem±	**0.28**	**20.80**	**2.03**	**0.34**	**0.37**	**0.06**
$CD_{0.05}$	**0.84**	**61.79**	**6.03**	**1.01**	**1.10**	**0.18**

4. CONCLUSION

From the above results it can be concluded that GA_3 @ 350 ppm performed best in various vegetative parameters plant height (27.94 cm), number of branches per plant (21.96), plant spread (57.02 cm^2), number of leaves per plant (651.04), stem length (25.63 cm) and leaf area (9.07 cm^2).

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