

“Effect of Plant Growth Regulators Regulators on and the growth 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 a study to evaluate the influence of the plant growth regulators on the growth of Petunia compared to Grandiflora rose in the Experimental Farm, Department of Agriculture, Mata Gujri College, Fatehgarh Sahib, Punjab during in year 2023 with ten treatments comprising of viz: T₁ i.e., Control, T₂ i.e., GA₃ @ (250 ppm), T₃ i.e., GA₃ @ (350 ppm), T₄ i.e., GA₃ @ (450 ppm), T₅ i.e., CCC @ (450 ppm), T₆ i.e., CCC @ (550 ppm), T₇ i.e., CCC @ (650 ppm), T₈ i.e., NAA @ (40 ppm), T₉ i.e., NAA @ (50 ppm), and T₁₀ i.e., NAA @ (60 ppm) with three replications in randomized block design. The results revealed the maximum plant height (27.94 cm), plant spread (57.02 cm²), number of leaves/plant (651.04), number of branches/plant (21.96), Stem length (25.63), Leaf area (9.07 cm²) were recorded in T₃ i.e., (GA₃ @ at a rate of 350 ppm), while minimum plant height (19.05 cm) and Stem length (16.12 cm) was recorded under in T₆ i.e., (CCC @ at a rate of 550 ppm) and rest of the vegetative parameters was found minimum in T₁ i.e., Control.

Keywords: CCC, GA₃, NAA, petunia, plant growth regulators, GA₃, 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. Many ornamental crops have utilized various plant growth regulators with their effectiveness proven in nursery production, ornamental foliage plants, and other flower crops. Thus, we aimed to The primary objective of this study is to examine how growth regulators influence the growth of petunia plants compared to Grandiflora rose. Many ornamental crops have utilized various

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~~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~~ ten treatments with specific concentrations ~~viz;~~ T₁: Control, T₂: GA₃ (250 ppm), T₃: GA₃ (350 ppm), T₄: GA₃ (450 ppm), T₅: CCC (450 ppm), T₆: CCC (550 ppm), T₇: CCC (650 ppm), T₈: NAA (40 ppm), T₉: NAA (50 ppm), and T₁₀: NAA (60 ppm) ~~T₁ i.e., Control, T₂ i.e., GA₃ @ 250 ppm, T₃ i.e., GA₃ @ 350 ppm, T₄ i.e., GA₃ @ 450 ppm, T₅ i.e., CCC @ 450 ppm, T₆ i.e., CCC @ 550 ppm, T₇ i.e., CCC @ 650 ppm, T₈ i.e., NAA @ 40 ppm, T₉ i.e., NAA @ 50 ppm, T₁₀ i.e., NAA @ 60 ppm.~~ Seedlings of ~~petunia~~ 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.

We measured some growth parameters such as plant height, number of branches, plant spread, number of leaves, stem length, and leaf area.

Plant growth regulators were applied using the foliar method because of the quick response of growth regulators. It involves the direct spraying of growth regulators onto the plant. It was done 30 days post-transplanting. For foliar spray, solutions of GA₃ at rates of 250, 350, and 450 ppm, NAA at rates of 40, 50, and 60 ppm, and CCC at rates of 450, 550, and 650 ppm were prepared.

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 GA₃ @ 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 a significant ($P < 0.05$) effect on all the six parameters of growth. The tallest plants were noted in T₃ ~~i.e., GA₃ @ 350 ppm (27.94 cm)~~

which exhibited statistical superiority compared to the other treatments. The shortest plants ~~was were~~ noted in T₆ ~~i.e., CCC @ 550 ppm (19.05 cm)~~ which is statistically inferior to other treatments. The application of ~~the~~ optimum dose of the GA₃ 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 T₃ ~~i.e., GA₃ @ 350 ppm~~ displayed the highest ($P < 0.05$) number of branches (~~21.96~~), demonstrating statistical superiority over the other treatments. The lowest number of branches was found in T₁ (~~14.64~~) excluding the application of plant growth regulators which is statistically inferior to other treatments. The optimum dose of GA₃ ~~i.e., GA₃ @ (-350 ppm) enhancing enhances~~ 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).

T₃ ~~i.e., GA₃ @ 350 ppm (57.02 cm²)~~ resulted in the plant achieving its maximum spread, which is statistically at par with T₂ ~~i.e., GA₃ @ 250 ppm (56.63 cm²)~~ and T₄ ~~i.e., GA₃ @ 450 ppm (51.19 cm²)~~. The minimum plant spread was found in T₁ ~~i.e., control (44.60 cm²)~~ which is statistically at par with T₆ ~~i.e., CCC @ 650 ppm (50.17 cm²)~~, T₉ ~~i.e., NAA @ 50 ppm (50.17 cm²)~~, T₅ ~~i.e., CCC @ 450 ppm (50.52 cm²)~~, and T₇ ~~i.e., CCC @ 650 ppm (50.61 cm²)~~. The increased spread of plants was due to the application of GA₃ which is responsible for ~~the~~ 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 ($P < 0.05$) number of leaves ~~was was~~ seen in the T₃ ~~i.e., GA₃ @ 350 ppm (651.04)~~ which is statistically at par with T₉ ~~i.e., NAA @ 50 ppm (639.08)~~, T₂ ~~i.e., GA₃ @ 250 ppm (632.66)~~, T₇ ~~i.e., CCC @ 650 ppm (632.61)~~, T₅ ~~i.e., CCC @ 450 ppm (607.53)~~, T₄ ~~i.e., GA₃ @ 450 ppm (605.93)~~, T₁₀ ~~i.e., NAA @ 60 ppm (476.57)~~, and T₆ ~~i.e., CCC @ 550 ppm (462.44)~~. At optimum concentration of GA₃, 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 T₁ ~~i.e., control (315.73)~~ which is statistically at par with T₈ ~~i.e., NAA @ 40 ppm (369.87)~~. The studies ~~were~~ conducted by Amit Kumar *et al.* (2011) and Sharma and Joshi (2015).

The T₃ i.e., GA₃ @ 350 ppm exhibited the longest (P<0.05) stem length (25.63cm) which is statistically superior over to the other treatments. The stem length was increased due to the application of GA₃ to the plants, a significant (P>0.05) increase in stem length can be observed due to the activation of cell elongation processes. The shortest stem length was found in T₆ i.e., CCC @ 550 ppm (16.12 cm) which is statistically inferior to other treatments. These results are similar with to Tyagi and Kumar (2006) and Dhaduk *et al.* (2007).

Treatment T₃ i.e., GA₃ @ 350 ppm (9.07cm²) exhibited the greatest (P<0.05) leaf area compared to the other treatments, demonstrating statistical superiority. The minimum leaf area was found in T₁ i.e., control (7.19 cm²) which is statistically inferior to other than treatments. The rise in leaf area as a result of foliar GA₃ 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 treatments for various characters 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

ppm T ₈						
NAA@40	17.99	369.87	50.88	17.09	17.28	7.45
ppm T ₉						
NAA@50	22.00	639.08	50.17	17.31	19.81	7.59
ppm T ₁₀						
NAA@60	20.65	476.57	50.84	17.20	18.44	7.42
ppm						
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

T₁: Control, T₂: GA₃ (250 ppm), T₃: GA₃ (350 ppm), T₄: GA₃ (450 ppm), T₅: CCC (450 ppm), T₆: CCC (550 ppm), T₇: CCC (650 ppm), T₈: NAA (40 ppm), T₉: NAA (50 ppm), and T₁₀: NAA (60 ppm).

4. CONCLUSION

From the above results it can be concluded that GA₃ @ a rate of 350 ppm performed best in various vegetative parameters plant height (27.94 cm), number of branches per plant (21.96), plant spread (57.02 cm²), number of leaves per plant (651.04), stem length (25.63 cm) and leaf area (9.07 cm²).

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