

Effect of Pinching and Growth Regulators on Vegetative growth, Flowering and Pot Presentability of Chrysanthemum (*Dendranthema grandiflorum*) cv. Pusa Shwet

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ABSTRACT

The current investigation titled "Effect of pinching and growth regulators on vegetative, flowering and pot presentability of Chrysanthemum (*Dendranthema grandiflorum*) cv. Pusa Shwet was conducted in the winter of 2022–2023. The experiment was laid out in factorial CRD with 12 treatment combinations such as P₀G₀, P₀G₁, P₀G₂, P₀G₃, P₁G₀, P₁G₁, P₁G₂, P₁G₃, P₂G₀, P₂G₁, P₂G₂ and P₂G₃. The findings revealed that longest plant height (45.40cm), internodal distance (1.85cm), early flower bud appearance (70.26 days) found in P₀ and maximum number of branches (8.66), number of flowers per stem (4.53) in P₂. GA₃ at 100 ppm has promising effect on vegetative and flowering parameters. In case of interaction P₀G₁ gave the maximum plant height (53.67cm), number of branches (9.66). Early flower bud appearance (68.89) in P₀G₃, number of flowers per stem (5.13) in P₂G₂ and pot presentability (90.33) was found best in P₁G₁.

Key words: Chrysanthemum, Pinching, Growth regulators.

Introduction

The chrysanthemum plant, *Dendranthema grandiflorum*, is sometimes referred to as "Gul-e-Daudi" or "Queen of the East" in popular culture. It belongs to the Asteraceae family. It is a very lovely short-day plant that appears as a perennial flowering herb as well as an annual flowering herb (Ghafoor and Khan, 2002). This adorable flower's chromosomal number is 2n = 18. The Greek words "Chryos" which means "gold" and "Anthemion" which means "flower" are the source of the name "chrysanthemum" which is indigenous to Northern Europe and Asian nations. Chrysanthemums are well-liked decorative plants that are distinguished

by their brilliant and varied flower styles and colours. They are commonly grown for ornamental uses such flower arrangements, landscaping and the production of cut flowers. The phrase "pot presentability" probably relates to the aesthetic value and general attractiveness of Chrysanthemum plants when grown in pots or other containers. This factor is crucial for decorative horticulture, which uses potted plants for retail, gifting and home decor.

Materials and Methods

The experiment was carried out at Experimental Farm, Department of Agriculture, Mata Gujri College, Fatehgarh Sahib, Punjab. The experiment was

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laid out in factorial CRD with 12 treatment combinations such as pinching treatments (no pinching, single pinching and double pinching) and GA₃ treatments (no GA₃, 100 ppm GA₃, 200 ppm GA₃ and 300 ppm GA₃). The plants were never pinched out during the experiment in the event of no pinching, single pinching was done after 20 days of transplanting and double pinching after 50 days of transplanting. The first spray of GA₃ was applied at 25 days after transplanting and second spray at 50 days after transplanting.

Results and Discussion

Plant height and internodal distance (cm)

It was observed that plants with no pinching treatment attained the maximum plant height (45.40cm) as well as internodal distance (1.85cm) at 90 days after transplanting due to presence of auxin in the apical region of plant and this is what causes apical dominance. The same effect was reported by Khobragade *et al.* (2012) in China aster and Dalal *et*

al. (2006) reported in carnation. GA₃ at 100 ppm attain the maximum plant height (45.52 cm) at 90 days after transplanting due to hyper-extension of internodal distance, cell division, cell elongation, stimulation of protein production as well as higher apical dominance. The reports of Godha *et al.*, (2000) and Dalvi *et al.*, (2021) provide support for these conclusions. GA₃ gave non-significant influence on maximal internodal distance at 90 days after transplanting. In case of interaction plants that weren't pinched along with spraying GA₃ at 100 ppm having maximum plant height (53.67cm) as well as internodal distance (2.14 cm) at 90 days after transplanting. These findings were nearly supported by Deshmukh *et al.*, (2014) in African marigold, Sharma and Joshi (2015) in China aster and Muniandi *et al.* (2018) in kenaf plants.

Number of branches per plant

At 90 days it was observed that double-pinched plants had the highest number of branches, i.e. 8.66 per plant. It might be due to the reason that the apical bud is pinched to reduce apical dominance, that

Table 1. Effect of pinching, growth regulators and their interaction on different parameters at 90 DAT

	Plant height (cm)	Internodal distance (cm)	Number of branches per plant	Days taken to bud appearance	Number of flowers per stem	Pot presentability
Pinching						
P ₀	45.40	1.85	8.51	70.26	2.90	79.66
P ₁	42.79	1.05	7.26	70.62	4.48	84.11
P ₂	36.46	0.91	8.66	74.44	4.53	81.55
CD _{0.05%}	4.14	0.58	1.20	2.84	0.89	4.43
Growth regulators						
G ₀	34.05	1.35	6.50	71.98	4.06	80.81
G ₁	45.52	1.33	8.44	72.00	3.94	84.41
G ₂	43.03	1.03	8.87	71.80	4.32	84.66
G ₃	43.59	1.37	8.77	71.33	3.55	77.22
CD _{0.05%}	4.78	0.67	1.39	3.28	0.92	5.11
Interaction						
P ₀ G ₀	40.33	1.88	8.77	70.05	3.29	76.89
P ₀ G ₁	53.67	2.14	9.66	71.00	2.48	81.77
P ₀ G ₂	46.50	1.66	8.50	71.11	3.25	90.11
P ₀ G ₃	41.11	1.72	7.11	68.89	2.59	69.89
P ₁ G ₀	33.11	1.22	3.83	70.55	4.58	84.11
P ₁ G ₁	43.33	1.00	7.22	70.33	4.67	90.33
P ₁ G ₂	44.33	0.72	8.44	70.50	4.59	82.89
P ₁ G ₃	50.39	1.28	9.55	71.11	4.06	79.11
P ₂ G ₀	28.72	0.94	6.89	75.33	4.31	81.44
P ₂ G ₁	39.55	0.86	8.44	74.67	4.68	81.11
P ₂ G ₂	38.28	0.72	9.66	73.78	5.13	81.00
P ₂ G ₃	39.59	1.11	9.66	74.00	4.00	82.66
CD _{0.05%}	8.29	1.17	2.41	5.69	1.59	8.86

increases synthesis of cytokinin in plant which promote the out growth of buds. Previous investigations of Grawal *et al.*, (2004) in chrysanthemum and Pathania *et al.*, (2000) in carnation supported the current findings. GA₃ at 200 ppm GA₃ had the most count of branches such as 8.87 per plant due to the hyper elongation of the internode and the subsequent rise in the number of nodes on the main axis may be the cause of the increased number of branches with GA₃ treatment. The findings of Rakesh *et al.*, (2003) in chrysanthemum and Deshmukh *et al.*, (2014) in African marigold evident to current results. In case of interaction plants with double pinching and 200 ppm GA₃ attain the maximum number of branches such as 9.66 branches at 90 days after transplantation. These findings are quite similar to those in the study of the African marigold by Kumar *et al.* (2020).

Flower bud appearance

Plants without any pinching show the earliest bud appearance took 70.26 days due to the apical bud is preserved in plants that have not been pinched throughout their whole growth phase. Kumar *et al.* (2002) in carnation and Shweta *et al.* (2022) in zinnia supported these findings. On the other side, it was found that GA₃ had little to no impact on how long it took for the first flower bud to open. In case of interaction the earliest bud appearance taking 68.89 days recorded in plants that had not been pinched but sprayed with 300 ppm GA₃. The findings of Shirsat *et al.* (2021) in gaillardia are evident to current findings.

Number of flowers per stem

The plants that had been pinched twice had a maximum count of 4.53 flowers per stem due to the increased branching, there may be more stems and hence greater opportunities for bloom formation. This is evident by Singh *et al.*, (2016) in carnation under protected conditions. GA₃ had no significant impact on the maximum number of blooms per stem. In case of interaction plants that had been pinched twice and the administration of GA₃ at a concentration of 200 ppm observed the maximum number of blooms per stem, i.e. 5.13. The findings of Pandey *et al.*, (2015) in African marigold support those of current findings in chrysanthemum.

Pot presentability

The maximum score was found in plants with single

pinching, i.e. 84.11 due to the reason that pinching enhances branching and increases the number of lateral shoots, the flowers produced and responded to growth in balanced way. On the other side, it was observed that GA₃ had no discernible impact on the floral chrysanthemum's pot presentability. Furthermore, the interaction shows that the maximum points, i.e. 90.33 was obtained in plants that had been single pinched and sprayed with 100 ppm GA₃ due to the reason that the production of branches and flowers may have been boosted by pinching and the addition of GA₃ may have further accelerated flower development, resulting in a more even and intense display of flowers.

Conclusion

From the current findings it is concluded that the different parameters such as maximum plant height, internodal distances and early flower bud appearance found in without any pinching treatment and maximum number of branches as well as number of flowers per stem in double pinching treatment. GA₃ at 100 ppm has promising effect on vegetative and flowering parameters. In case of interaction P₀G₁ gave the maximum plant height, inter nodal distance and maximum number of branches were found in P₂G₂. Early flower bud appearance in P₀G₃, number of flowers per stem in P₂G₂ and pot presentability found best in P₁G₁, i.e. single pinching and 100 ppm GA₃.

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Conflict of interest: I have no personal motivation to have my paper published. For professional reasons, I wish to publicise it.

References

- Dalal, S.R., Nandre, D.R., Bharad, S.G., Utgikar, S. and Shinde, R.D. 2006. Effect of pinching on carnation cv. Yellow Solar under polyhouse condition. *International Journal of Agricultural Science*. 2(2): 356-357.
- Dalvi, N.V., Salvi, B.R., Pawar, C.D., Burondkar, M. M., Salvi, V. G., Dhekale, J. S. and Khandekar, R. G. 2021. Effect of growth regulators on production of tuberose (*Poloanthes tuberosa* L.) spikes cv. Prajwal. *The Pharma Innovation Journal*. 10(10): 1983-1988.

- Deshmukh, H.N., Ramdevputra M.V., Sahare, H.A. 2014. Effect of Spacing and gibberellic acid (GA3) on growth parameters and yield of African marigold (*Tagetes erecta* L.) cultivars. *Trends in biosciences*. 7(22): 3622-627.
- Deshmukh, H.N., Ramdevputra, M.V. and Sahare, H.A. 2014. Effect of spacing and gibberellic acid on growth parameters and yield of African marigold (*Tagetes erecta* L.) cultivars. *Trends in Biosciences*. 7(22): 3622-3627.
- Ghafoor, A. and Khan, R. 2002. Anthemideae. In: *Flora of Pakistan*, (Eds.): S.I Ali & M. Qaiser. University of Karachi, Missouri Botanical Garden, Press 207: 45-47.
- Godha, S., Sharma, L.K. and Kumar, A. 2000. Study the influence of growth regulators on growth and flowering of chrysanthemum. *Journal of Phytological Research*. 13(2): 175-178.
- Grawal, H.S., Ramesh, K. and Harmeet, S. 2004. Effect of nitrogen, planting time and pinching on flower production in chrysanthemum (*Dendranthema grandiflora* Ramat.) cv. Flirt. *Journal of Ornamental Horticulture*. 7: 196-199.
- Khobragade, R.K., Bisen, S. and Thakur, R.S. 2012. Effect of planting distance and pinching on growth, flowering and yield of China aster (*Callistephus chinensis*) cv. Poornima. *Indian Journal of Agricultural Sciences*. 82(4): 334-9.
- Kumar, M., Prasad, V.M. and Bhardwaj, R. 2020. Study on effect of pinching and gibberellic acid on growth, flowering and yield of African marigold (*Tagetes erecta* L.) under Prayagrajagro-climatic condition. *International Journal of Chemical Studies*. 8(5): 631-635.
- Kumar, R., Singh, K. and Reddy, B.S. 2002. Effect of planting time, photoperiod, GA3 and pinching in carnation. *Journal of Ornamental Horticulture*. 5(2): 20-23.
- Muniandi, S. K. M., Hossain, A., Abdullah, P. and Shukor, N. A. A. 2018. Gibberellic acid affects growth and development of some selected Kenaf (*Hibiscus cannabinus* L.) cultivars. In: *Industrial crops and Products* volume 118, pp.180-187.
- Pandey, H. P., Mishra, K., Pant, S. S. and Pun, U. 2015. Effect of pinching and levels of gibberellic acid on growth, flowering and yield of African marigold (*Tagetes erecta* L.). In: *Nepalese Horticulture* volume 10.
- Pathania, N.S., Sehgal, O.P. and Gupta, Y.C. 2000. Pinching for flower regulation in Sim carnation. *Journal of Ornamental Horticulture*. 3:114-117.
- Rakesh, S. and Beniwal, B.S. 2003. Effect of GA3 and pinching on the growth and yield of chrysanthemum. *Harayana Journal of Horticultural Sciences*. 32(1-2): 61-63.
- Sharma, M.K. and Joshi, K.I. 2015. Effect of foliar spray of GA3 and NAA on growth flowering and yield of China aster (*Callistephus chinensis* NEES.) cultivars. *International Journal of Agricultural Science and Research*. 5(4): 105-10.
- Shirsat, B. P., Malshe, K. V., Salvi, B. R., Mahadik, S. G. and Pawar, C. D. 2021. Effect of plant growth regulators and pinching on flowering characters in gaillardia (*Gaillardia pulchella*). *The Pharma Innovation Journal*. 10(11): 482-485.
- Shweta., Seenivasan, N., Lakshminarayana, D. and Kumar, S. P. 2022. Optimising pinching levels and plant density on flower yield and pot presentability of potted annual: *Zinnia elegans*. *The Pharma Innovation Journal*. 11(12): 5498-5503.
- Singh, S., Karetha, K. M., Singh, V. and Chourasia, A. 2016. To study the effect of pinching on yield and quality of carnation varieties grown under protected condition. *The Asian Journal of Horticulture*. 11(1): 168-171.
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