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Effect of growth regulators on growth and flowering of tuberose var. Mexican single

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Abstract

The present research ‘‘Effect of growth regulator on growth and flowering of Tuberose (*Polianthes tuberosa* L.) var. Mexican Single was carried out at Experimental Farm, Department of Agriculture, Mata Gujri College, Fatehgarh Sahib, Punjab during summer season 2022-2023. The experiment was laid out in randomized block design with seven treatments such as no growth regulators, GA_3 @ 50 ppm, GA_3 @ 100 ppm, GA_3 @ 150 ppm, CCC @ 1250 ppm, CCC @ 1500 ppm and CCC @ 1750 ppm and the treatments were replicated thrice. It can be concluded that maximum plant height, number of leaves was observed in GA_3 @ 150 ppm. Growth regulator influenced significantly on flowering characteristic of tuberose. Early spike initiation and early opening to 1st floret was found in GA_3 @ 150 ppm. Maximum number of spikes/ plot was observed in CCC @ 1750 ppm. The maximum vase life of tuberose spike was noticed in CCC @ 1500 ppm.

Keywords: Tuberose, growth, flowering, GA_3, CCC and growth regulators

Introduction

Tuberose is an important bulbus plant, or (*Polianthes tuberosa* L.), and belong to Amaryllidaceae family and is indigenous to Mexico. Commercial tuberose cultivation is done to produce cut and loose flowers. Flowers are used in bouquets, wedding ceremonies, garland making, and other traditional rituals. Essential oils can be found in abundance in the flowers. (Yadav *et al*., 2005) [14].

India has four widely grown tuberose cultivars: single, double, semi-double, and variegated. The cultivar alone holds the highest place over the others. Single flowered tuberose cultivars with waxy white flowering spikes and sweet, lingering fragrance are very popular. Since the demand for cut and loose tuberose flowers has been rising quickly in recent years, it is essential to investigate the possibility of standardizing this crop's production technology. It is widely acknowledged that growth-regulating chemicals play a crucial role in floriculture. According to reports, synthetic plant growth regulators can coordinate and control different growth stages, flowering, and bulb production in tuberose at the right concentrations. It is widely accepted that exogenously applied growth regulators work by changing the concentration of naturally occurring hormones, which then affect the plant's growth and development. Numerous plant growth regulators have been successfully used in numerous ornamental crops, including nursery production, ornamental foliage plants, and numerous other flower crops. (Sanap *et al*., 2002) [10]. So the research was done to determine how plant growth regulators (GA_3 and CCC) affected tuberose. Plants manufacture the hormone gibberellic acid in their plastids, which are found in all plant cells. It is a white to pale-yellow solid after purification. They are acid by nature, which is believed to encourage growth. They are soluble in ethanol but insoluble in water. Gibberellins require very small quantities i.e. in (ppm). Gibberellins promote division of cells and elongation, hence they also play a crucial function in inhance plant height and the quantity and length of leaves. (Tyagi *et al*., 2006) [13]. The growth inhibitor Cycocel significantly improves the tuberose flower quality and flower stalk output. (Ponnuswami and Sowmeya, 2015) [9].

Material and Methods

The experiment entitled ‘‘Effect of growth regulators on growth and flowering of Tuberose var. Mexican single” was carried out during March 2022- May 2023 at Research Farm of Mata Gujri College, Fatehgarh Sahib, Punjab. Field of experimental site lies at 30.6435° North latitude and 76.3970° East longitudes. The altitude of the location is 246 meter above the mean sea level.

The bulb of uniform size (1-3 cm) used for planting in the beds (2×2 m) with a spacing of 30 cm row to row and 30 cm bulb to bulb. Foliar application of plant growth regulators on tuberose was done during 2022. In this experiments, plants of Mexican single variety were treated with various plant growth regulators doses such as no growth regulators, GA_3 @ 50 ppm, GA_3 @ 100 ppm, GA_3 @ 150 ppm, CCC @ 1250 ppm, CCC @ 1500 ppm and CCC @ 1750 ppm. The experiment was laid out in Randomized Block Design (RBD) with three replications.

Results and Discussion

It is evident from the table 1 that the maximum plant height was observed in T_4 (35.07cm) i.e.GA_3 @ 150 ppm which was statistically at par with T_2 (32.40 cm) i.e. GA_3 @ 50 ppm. It is due to that gibberellin increased cell elongation, cell division, or both. According to Arun *et al*. (2000) [1], the increased size of the meristematic zone and the fraction of cells undergoing cell division are the reason of the improved growth. The maximum number of leaves per plant were found in T_4 (27.37) i.e.GA_3 @ 150 ppm which was statistically superior. It is due to that GA_3 helps in increasing apical dominance and cell elongation, and increase number of leaves per plant may be attribute to the elimination of apical dominance. In tuberose, Narayan *et al.* (2002), Manisha *et al.* (2002) [6, 7], Panwari *et al.* (2006) [8], and Kumar *et al.* (2011) [15] similarly showed similar outcomes.

Flowering parameters such as days to spike initiation was influenced significantly due to plant growth regulators. Early spike initiation was found in T_4 (147.40 days) i.e. GA_3 @ 150 ppm which was statistically superior. It might be because GA_3, which is a component of florigine and necessary for the development of flowers in the plant system, is produced more quickly in plants that have been treated with GA_3. These findings get the support from the reports of Singh and Srivastava (2009) [12] and Sanap *et al.* (2004) [11] in Tuberose. Maximum number of florets/spikes was observed in T_5 (41.78) i.e. CCC @ 1250 ppm which was statistically at par with T_6 (40.55) i.e. CCC @ 1500 ppm and T_2 (38.00) i.e. GA_3 @ 50 ppm. It is due to that CCC enhanced the sink potential, which may have contributed to its involvement in increasing the number of florets /spikes. Similar outcomes were seen by and Gawai *et al*. (2014) [4] in tuberose.

The maximum number of spikes/plots was observed in T_7 (45.67) i.e. CCC @ 1750 ppm which was statistically at par with T_4 (45.33) i.e. GA_3 @ 150 ppm and T_6 (44.33) i.e. CCC @ 1500 ppm. It is due to that CCC helps in retards the vegetative growth of plant and enhanced the sink potential, which may have contributed to its involvement in increasing the number of spikes per plot. These findings get the support from the report of Beyaskar *et al.* (2018) [3] in Chrysanthemum. Minimum number of spikes per plot was found in T_1 (32.67) i.e. no growth regulators treatments which was statistically superior.

Data presented in the Table 1 described that maximum vase life was recorded in T_6 (13.66 days) i.e. CCC @ 1500 ppm which was statistically superior. Higher concentrations of Cycocel (CCC) were shown to be more effective than GA_3 and Control for extending flowering spike vase life. This could be as a result of the growth inhibitory effects of CCC, which may lower cell size and stomatal opening and hence decrease the area for transpiration, maintaining better water balance. Similar result was found by Baskaran and Misra (2007) [2] in gladiolus and Katkar *et al*. (2005) [5] in china aster. The minimum vase life was found in T_3 (10.44 days) i.e. GA_3 @ 100 ppm which was statistically at par with T_4 (10.55 days) i.e. GA_3 @ 150 ppm.

Table 1: Effect of growth regulators on growth and flowering of tuberose var. Mexican single

Treatment	Plant height (cm)	Leaves per plant	Days to spike initiation	Number of florets/spike	Number of spikes/plot	Vase life (days)
T_1 no growth regulators	31.03	21.34	153.63	29.33	32.67	12.22
T_2 GA_3 @ 50 ppm	32.40	20.91	208.40	38.00	36.67	11.33
T_3 GA_3 @ 100 pmm	31.85	20.15	156.77	33.00	38.33	10.44
T_4 GA_3 @ 150 ppm	35.07	27.37	147.40	29.55	45.33	10.55
T_5 CCC @ 1250 ppm	22.73	16.38	244.07	41.78	42.33	12.33
T_6 CCC @ 1500 pmm	20.86	14.74	256.17	40.55	44.33	13.66
T_7 CCC @ 1750 ppm	21.05	19.39	235.30	29.78	45.67	11.44
Sem±	0.98	1.63	0.43	2.69	0.65	0.10
CD (0.05)	3.01	5.02	1.34	8.29	2.02	0.32

Conclusion

From the above study it is concluded that GA_3 @ 150 ppm and CCC @ 1750 ppm is best for growing Tuberose var. Mexican Single in field conditions. GA_3 @ 150 ppm and CCC @ 1750 ppm improves the vegetative and flowering parameters of tuberose.

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