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Effect of Plant Growth Regulators on Growth and Yield of Tuberose (*Polianthes tuberosa* L.)

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ABSTRACT

An experimental study was carried out during kharif season of the year 2008-2009 at the farm of Horticulture Section, College of Agriculture, Nagpur. The experiment was laid out in Randomized Block Design (RBD) with three replications and ten treatments viz. GA_3 at 100, 150 and 200 ppm, NAA at 50, 100 and 150 ppm, CCC at 1000, 1500 and 2000 ppm and control (Water spray). The higher concentration of GA_3 at 200 ppm attributed superior results regarding height of plant, CCC at 1000 ppm recorded maximum number leaves per plant and number of clumps per plant. The number of spike per plant, per plot and per hectare, number of florets per spike, yield of florets per plant, per plot and per hectare were found to be significantly maximum with CCC at 1500 ppm.

Keywords: *Tuberose, Plant growth regulators, Growth, Yield.*

INTRODUCTION

Tuberose (*Polianthes tuberosa* L.) is one the dearest flower to the mankind among the ornamental bulbous plants. Tuberose is much adore for its colour, elegance and fragrance, it occupies a prime position because of its popularity as cut flowers, loose flowers as well as for its potential in perfume industry. Loose flowers are used for making artistic garlands, floral ornaments, bouquets and button holes etc. Tuberose is commercially propagated vegetatively by means of bulbs. It is a day neutral plant; it requires high humidity and 20-30^{0}C temperature for its luxuriant growth. Tuberose (*Polianthes tuberosa* L.) belongs to family Amaryllidaceae, is native of Mexico. In India, it is popularly known as Rajanigandha, Nishigandha, Sugandharaja, Gulcheri, and Gul-eshahu. Tuberose is muchadorned for its colour, elegance and fragrance. Among the commercially grown flowers, Tuberose occupies prime position in India since it is used as cut flower, loose flower as well as for its potential in perfume industry. Tuberose is cultivated in many tropical and subtropical parts of world including India.

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Plant growth regulators have significant role in modifying the growth and flowering of plant. Today, the practical use of growth regulating substances in horticulture has assumed invariable dimensions due to revealed capacity of many significant mechanisms in plant which have led to a situation nearly approaching to horticultural revolution (Devadanam et al. 2007[b]). Keeping in view the above points, the experiment was undertaken to study the effect of foliar application of plant growth regulators on growth, flowering and yield of tuberose.

MATERIALS AND METHODS

The investigation was undertaken at the farm of Horticulture Section, College of Agriculture, Nagpur during *kharif* season of the year 2008-2009 in Randomized Block Design (RBD) with ten treatments replicated three time. Three growth regulators with three concentrations of each, i.e. GA_3 (100, 150 and 200 ppm), NAA (50, 100 and 150 ppm) and CCC (1000, 1500 and 2000 ppm) along with a control (Water spray) were used to study the effect on growth, flowering and yield of tuberose. The foliar sprays of growth regulators in the concentration as per treatments were undertaken once on dated 15th June 2008. The experiment was super imposed on already established tuberose plot of cv. Single raised on flat beds at spacing of 20 cm x 20 cm during the year 2007. Before conducting the experiment, water stress was given from 30th April 2008 till the monsoon start. The recommended dose of chemical fertilizers at the rate of 200:300:200 kg NPK ha^{-1} along with FYM @ 15 t ha^{-1} was applied before start of experiment. The full dose of P_2O_5 and K_2O along with 1/4th dose of N as a basal was applied on dated 1st June 2008 and remaining doses of N were given in three equal splits after 30, 60 and 90 days. . The various observations on growth *viz.*, plant height (cm), number of leaves plant^{-1}, number of clump plant^{-1}, were recorded at after planting, number spike plant^{-1}, spike plot^{-1}, spike ha^{-1}, number of floret spike^{-1}, yield of florets plant^{-1}, yield of florets ha^{-1} were recorded at harvesting stage. Collected data were analyzed as per the method suggested by Gomez and Gomez (1984).

RESULTS AND DISCUSSION

1. Effect of plant growth regulators on growth parameters of tuberose:

It is revealed from the data presented in Table-1 that foliar spray of different plant growth regulatorsat 120 days had significant effect on growth parameters of tuberose plants. Significantly, maximum plant height (72.32 cm) was recorded in the treatment GA_3 200 ppm. At par with treatment of GA_3 at 150 ppm (70.42cm). the lowest plant height (61.92 cm) was recorded under CCC at 2000 ppm. The effect of GA_3 in relation to the elongation of cells and thereby increase in height of plant and it was also noted by Singh (1999) and Tak and Nagda (2001) in tuberose.

The periodical data in respect of number of leaves per plant. Significantly, maximum number of leaves per plant (87.83) were recorded under the treatment CCC at 1000 ppm which was at par with the treatment CCC at 1500 ppm (85.23). Minimum number of leaves per plant recorded under control (73.53). The increase in number of leaves per plant may be due to the dwarfing effect of cycocel (CCC) on plant. Similar results were reported by Devadanam et al. (2007[a]) in tuberose and Sharma et al. (2006) in gladiolus.

In respect of number of clumps per plant maximum number (37.33) was observe in CCC at 1000 ppm which is at par with CCC 1500 (35.20)and minimum no was observe in control (27.70).

2. Effect plant growth regulators on yield of tuberose

Significantly maximum number of spikes per plant was recorded under CCC at 1500 ppm (9.76) that was followed by the treatment GA_3 200 ppm (9.23) while minimum number of spike per plant was observed under control (6.06).

Significantly maximum number of spikes per plot was recorded under CCC at 1500 ppm (500.65) that was followed by with the treatment CCC 1000 ppm (465.10) while lowest number of spike per plot was observed under control (306.27) among all the treatment

The effect of foliar application of CCC at 1500 ppm produced maximum number of spikes per hectare (16,27,771.26 lakh) found at par with GA_3 200 ppm(15,38,882.73 lakh). Lowest number of spikes per hectare (9,38,885.13 lakh) was obtain under control.

The data revealed that the treatment CCC 1500 ppm shown maximum number of florets per spike (36.10) and it was at par with CCC 2000 ppm (34.13). The control treatment recorded lowest number of florets per spike (26.10).

The data in respect of yield of florets per plant, per plot and per hectare. Significantly the highest yield of florets per plant (284.64 g), per plot (13.89 kg) and per hectare (474.40 q) were obtain under CCC 1500 ppm followed by GA_3 200 ppm (265.75 g) per plant, (13.19) kg per plot and (442.9 q) per hectare. Whereas the lowest yield of florets per plant (156.34g), per plot (7.42 kg) and per hectare (261.34 q) were obtained under control.

Table 1: Effect of foliar application of plant growth regulators on growth and flowering of tuberose cv. Single

Treatments (ppm)	Height of plant (cm)	Leaves per plant	Clumps per plant
GA_3 - 100 ppm	69.20	80.43	31.30
GA_3 - 150 ppm	70.62	82.50	33.16
GA_3 - 200 ppm	72.32	84.70	35.06
NAA - 50 ppm	65.25	76.76	29.10
NAA - 100 ppm	67.24	77.26	30.56
NAA - 150 ppm	68.61	78.00	32.00
CCC - 1000 ppm	65.18	87.83	37.33
CCC - 1500 ppm	64.05	85.23	35.20
CCC - 2000 ppm	61.92	84.26	34.13
Control (W.S.)	66.24	73.53	27.70
SE (m) ±	1.14	0.96	0.40
CD at 5%	3.39	2.87	1.20

3. Effect of plant growth regulators on flower yield parameters of tuberose:

The data regarding the yield of spikes of tuberose as influenced by treatments of growth regulators were recorded and presented in Table-2. Significantly, maximum number of spike per plant (9.76), number of spike per plot (500.65) and number of spike per hectare (16,27,771.26) were obtained under treatment GA_3 at 1500 ppm. This implies that CCC stimulates to produce more number of flowering spike may be due to less vegetative growth leading to the more availability of carbohydrates for increasing production of spike. Similar results were reported by Reddy et al. (1997) and Kumar et al. (2006) in tuberose.

Similarly, maximum number of florets per spike (36.10), yield of florets per plant (284.64 g), yield of florets per plot (13.89 kg) and yield of florets per hectare (474.40 q) were obtained under the treatment CCC at 1500 ppm. It is inferred that, the foliar application of CCC at 1500 ppm was found significantly superior over all other treatment in respect of flower production. The above findings are in close agreements with the results obtained by Biswas et al. (1983), Reddy et al. (1997) and Sagar et al. (2005) in tuberose.

Table 2: Effect of foliar application of plant growth regulators on flower yield of tuberose cv. Single

Treatments (ppm)	No. of spike plant^{-1}	No. of spike plot^{-1}	No. of spike ha^{-1}	Number of florets spike^{-1}	Yield of floret plant^{-1} (g)	Yield of floret plot^{-1} (kg)	Yield of floret ha^{-1} (q)
GA_3 - 100 ppm	7.63	390.32	12,72,217.13	30.66	208.39	10.51	347.32
GA_3 - 150 ppm	8.13	419.69	13,55,550.13	32.03	223.31	11.37	372.18
GA_3 - 200 ppm	9.23	454.71	15,38,882.73	33.66	265.75	13.19	442.91
NAA - 50 ppm	6.06	317.30	10,11,107.06	28.30	164.62	8.12	274.38
NAA - 100 ppm	6.36	340.64	10,61,106.86	29.10	176.74	8.83	294.56
NAA - 150 ppm	6.73	364.59	11,22,217.73	29.96	189.97	9.92	316.62
CCC - 1000 ppm	8.83	465.10	14,72,216.33	33.06	221.86	10.96	369.76
CCC - 1500 ppm	9.76	500.65	16,27,771.26	36.10	284.64	13.89	474.40
CCC - 2000 ppm	7.26	424.35	12,11,106.26	34.13	253.68	12.54	422.80
Control (W.S.)	5.63	306.27	9,38,885.13	26.10	156.81	7.42	261.34
SE (m) ±	0.21	4.73	35,311.52	1.05	5.20	0.28	8.67
CD at 5%	0.62	14.07	1,04,919.80	3.13	15.46	0.85	25.78

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