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Effect of Pre Harvest Treatments on Growth, Flowering, Yield and Vase Life of *Gerbera jamesonii* cv. Red Gem

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A B S T R A C T

An experiment was conducted on gerbera plants where ten treatments consisting of Control, GA_3 (50, 100, 150 ppm), MH (200, 250, 300 ppm) NAA (200, 250, 300 ppm) were replicated three times and given a single spray at 2 months after planting in pots. Results revealed that the best treatment with respect to growth and flowering was with GA_3 100 ppm. While GA_3 100 and 150 ppm were proved to be the best in yield attributes and MH 250 ppm proved to be significantly better in influencing the vase life of cut gerbera flowers as compared to the various treatments under study.

Introduction

Gerbera (*Gerbera jamesonii*) is an important cut flower having good demand both in the domestic and international markets. The flower occupies the 5th position among the most important cut flowers of the global floriculture market. The rate of demand in ornamental products such as cut flowers and potted plants has gained a great momentum which has far surpassed the rate of supply. The growth and yield of plants is mainly influenced by two principle factors viz., genetic and cultivation or management factors. In recent years scientist have given due attention to the idea of regulating plant growth as third most important factor in improving the growth, yield and flower quality with the application of plant growth regulators in various ways. Growth regulators are known to have significant effect even in very small quantities and have been used in several ornamental crops. These substances modify the plant physiological processes within the plant, which ultimately affects plant growth and development. They are also expensive chemicals as such their optimum dose to get the targeted result needs to be standardized for the cultivation practice to be cost effective. Application of certain nutrients and growth regulators as foliar feeding has been found to improve growth and flowering of gerbera because high percentage of the nutrients is immediately absorbed by the leaves which

influence the growth and development of plant and improve the quality of flower as well as increase the yield of cut flowers and suckers. Foliar application of growth chemicals also reduces the cost of production (Jamal Udin *et al.,* 2011). However, the research work on this aspect of agro-technique in gerbera plants is lacking and so with a view to this, an investigation was carried out to study the effect of foliar application of plant growth regulators on growth, flowering, yield and vase life of *Gerbera jamesonii* cv. Red Gem.

Materials and Methods

The experiment was conducted in the month of June-December in the year 2012 in the Experimental Farm of Horticulture Department in Nagaland University, School of Agricultural Sciences and Rural Development, Medziphema Nagaland. Plants of gerbera cv. Red Gem were pot cultured for the study. Ten treatments consisting of: T_0 - Control, T_1 - 50 ppm GA_3, T_2 - 100 ppm GA_3, T_3 - 150 ppm GA_3, T_4 - 200 ppm MH, T_5 - 250 ppm MH, T_6 - 300 ppm MH, T_7 - 200 ppm NAA, T_8 - 250 ppm NAA and T_9 – 300 ppm NAA were tested.

The plants were given a single spray of the treatments at two months after planting. The experiment was carried out in a completely randomized design with three replications where each pot containing one number of suckers was taken as a unit. The pots were filled with a mixture of soil: sand: FYM in a 1:1:1 ratio and NPK @ 250:250:100 kg/ha was incorporated in the soil. Half dose of N and full dose of P and K were applied at the time of planting while the remaining half dose of N was applied at the time of flowering. The data pertaining to vegetative parameters, flowering attributes, yield attributes and vase life were recorded and analyzed statistically as per the method suggested by Panse and Sukhatme (1989).

Results and Discussion

Effect on vegetative growth

It was evident from Table 1 that the various pre harvest treatments under study effected the vegetative growth of the plant significantly. GA_3 (150 ppm) resulted in greater number of leaves per plant while the highest value in terms of plant spread was recorded with GA_3 @ 100 ppm (34.33 cm). Application of GA_3 might have resulted in profuse cell division and cell elongation resulting in enhanced vegetative growth.

This finding is in concurrence with the reports of Nair *et al.,* (2002) and Dalal *et al.,* (2009).

The increase in production of leaves with the application of gibberellic acid was a result of enhanced induction of leaf initial break *i.e.* differentiation of leaf primordial in the apical growing region (Dhaduk *et al.,* 2007). The variation in plant height due to different treatments was found to be insignificant.

However, the maximum plant height was recorded with NAA @ 200 ppm (26.33 cm). The increase in plant height as an influence of NAA application was also reported by Sooch *et al.,* (2002). Leaf area was not significantly influenced by the different pre harvest treatments. However, the maximum leaf area was observed in MH @ 300 ppm (105.00 cm^2).

Effect on flowering

A perusal of the data in Table 1 revealed that minimum number of days taken for bud emergence, bud burst and full bloom were recorded in GA_3 treatments. Among the GA_3 doses, 150 ppm significantly reduced the number of days taken to full bloom (141 days). These results corroborated with the findings of Dalal *et al.,* (2009).

Table.1 Vegetative growth characters and days taken to bud emergence, bud burst and full bloom as influenced by pre harvest treatments

Treatments	Vegetative characters				Bud emergence (days)	Bud burst (days)	Full bloom (days)
	Number of leaves	Plant spread (cm)	Leaf area (cm^2)	Plant height (cm)			
T_0	70.67	32.00	98.67	23.33	125.67	137.33	147.00
T_1	68.33	30.67	103.67	23.50	125.00	136.33	145.00
T_2	67.33	34.33	97.33	24.33	125.33	136.00	144.33
T_3	77.33	32.67	90.33	24.00	124.33	134.00	141.00
T_4	61.00	30.33	89.00	22.17	126.33	137.00	148.67
T_5	67.00	30.33	92.00	23.67	126.67	137.00	148.33
T_6	60.67	32.17	105.00	22.00	126.67	138.00	151.67
T_7	40.00	33.83	85.67	26.33	128.67	139.67	152.67
T_8	57.00	31.67	90.67	24.33	127.00	138.67	147.67
T_9	36.67	33.00	96.33	26.00	130.67	143.00	158.67
CD at 5%	23.21	NS	NS	NS	NS	NS	7.78

Table.2 Floral attributes as affected by pre harvest treatments

Treatments	Fresh weight (g)	Flower size (cm)	Diameter of disc florets (cm)	Stalk length (cm)	Stalk diameter (cm)	Neck diameter (cm)	Number of ray florets	Number of disc florets	Self-life (days)
T_0	11.00	8.80	6.23	24.67	0.53	0.40	39.00	216.00	17.00
T_1	13.00	9.87	6.83	29.10	0.63	0.47	43.00	236.00	18.67
T_2	14.00	10.10	7.07	32.93	0.60	0.50	47.67	328.67	16.33
T_3	12.67	9.17	6.70	28.30	0.53	0.43	43.33	244.33	15.67
T_4	11.67	8.93	6.57	28.30	0.53	0.43	34.33	207.33	18.00
T_5	13.00	9.33	6.67	35.00	0.57	0.43	41.67	220.33	19.33
T_6	13.33	9.53	6.57	36.17	0.60	0.50	45.00	260.00	15.67
T_7	13.67	9.50	6.83	41.67	0.63	0.50	39.67	215.67	12.00
T_8	12.67	8.63	6.10	42.23	0.57	0.40	41.67	200.33	18.67
T_9	13.67	9.17	6.27	42.77	0.57	0.47	46.00	214.33	15.00
CD at 5%	1.98	1	NS	8.09	NS	0.08	NS	NS	4.51

Table.3 Effect of pre harvest treatments on yield and vase life of Gerbera

Treatments	Yield parameters		Vase life (days)
	No. of flowers/plant	No. of suckers/plant	
T_0	13.00	11.00	9.00
T_1	17.67	10.67	11.00
T_2	20.00	11.00	11.33
T_3	19.67	12.67	10.00
T_4	15.67	10.33	12.67
T_5	15.33	11.67	14.33
T_6	13.33	10.67	13.00
T_7	12.00	7.00	9.33
T_8	12.33	9.00	10.00
T_9	11.67	6.67	9.33
CD at 5%	6.17	3.70	3.19

The data in Table 2 depicted that the maximum flower size was obtained in GA_3 @ 100 ppm (10.10 cm) which is statistically at par with GA_3 @ 50 ppm (9.87 cm). This is in conformity with the findings of Jadhao *et al.*, (2010). The effect of various pre harvest treatments was non-significant with respect to number of ray florets and disc florets. However, the maximum number was obtained in GA_3 @ 100 ppm (47.67) and (328.67) respectively. While the lowest number of disc floret (200.33) was recorded in NAA @ 250 ppm. GA_3 @ 100 ppm produced maximum diameter (7.07 cm) of disc floret but this result did not reach the level of significance. Increase in flower characters with GA_3 application may be attributed to active cell elongation in the flowers to increase the sink strength of the actively growing parts. Gibberillic acid has been reported to induce an entire developmental programme by activation of master regulatory genes in the later stages of corolla development (Weiss, 2000). Treatment with 300 ppm NAA registered maximum length of flower stalk (42.77 cm) which was statistically at par with 250 ppm NAA (42.23 cm) and 200 ppm NAA (41.67 cm). Stalk diameter did not vary significantly due to pre harvest treatments. However, 50 ppm GA_3 and 200 ppm NAA recorded the highest stalk diameter (0.63 cm). The highest neck diameter of 0.50 cm was obtained with the application of GA_3 @ 100 ppm, MH @ 300 ppm and NAA @ 200 ppm. GA_3 @ 100 ppm recorded the highest fresh weight (14.00 g) which was on par with NAA @ 200 and 300 ppm (13.67 g) whereas minimum fresh weight was recorded in control. The favorable effect of growth regulators might be due to cell elongation and rapid cell stimulation as has been reported by Singh (2004) in French marigold. The highest self-life was recorded in 250 ppm MH (19.33 days). Increased flower life with MH application might be due to retarded metabolism and respiration (Nair *et al.*, 2002).

Effect on yield

Out of the 10 treatments evaluated for their yield parameters (Table 3) the maximum number of flowers per plant was observed in GA_3 treatments followed by MH treatments. GA_3 @ 100 ppm gave a significantly higher number of flowers per plant (20.00) which is on par with GA_3 @ 150 ppm (19.67). The increase in yield and yield parameters with GA_3 spray may be due to better crop growth and more number of suckers thus increased the number of flowers per plant. Further, it can be ascribed due to better translocation of more metabolites from source to sink. Similar findings were reported by Nair *et al.,* (2002) in Gerbera. The maximum number of suckers per pot was recorded with GA_3 @ 150 ppm (12.67). This might be due to the action of GA_3 in producing more number of leaves and after diversion of the photosynthates to the sink, the rest would have been used for the production of suckers. This is in close conformity with the findings of Nair *et al.*, (2002).

Effect on vase life

Data in Table 3 showed that the vase life was profoundly influenced by the different pre harvest treatments where 250 ppm MH recorded the maximum vase life (14.33 days). The minimum vase life was recorded in control (9.00 days). Similar results were also obtained in the findings of Nouri *et al.*, (2012). The reason for longer vase life in MH treated plants might be due to the action of MH in reducing the stomatal size and hence reducing the rate of respiration. Since the rate at which the rapid decline in water conduction of isolated stem segments was much reduced by MH, this might have resulted in better water balance within the plant (Nair *et al.*, 2002). From the above findings, it may be concluded that the best treatment with respect to growth and flowering was with GA_3 100

ppm. While GA_3 100 and 150 ppm were proved to be the best in yield attributes and MH 250 ppm proved to be significantly better in influencing the vase life of cut gerbera flowers as compared to the other treatments under study.

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