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Effect of GA_3, Alar and BA on Flowering and Vase Life in China Aster (*Callistephus chinensis*)

Ragini Maurya*, S.P. Singh and Anil K. Singh

Department of Horticulture, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi 221005, UP, India
**Corresponding author*

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A B S T R A C T

A field experiment entitled "Effect of GA_3, alar and BA on flowering and vase life of China aster (C*allistephus chinensis*) was conducted at Horticulture Research Farm, Department of Horticulture, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi during the year 2016-2017. China aster is a very popular winter annual flower crop and is mainly cultivated for production of cut flowers, loose flowers, as pot plant and for bedding plant purposes in landscape. Growth regulators play an important role in morphology and physiology of the plants and their effect varies with plant, species, variety, concentration used, method of application, frequency of applications etc. Treatment consisted of GA_3 75 ppm and 150 ppm, alar 300 ppm and 600 ppm, BA (6-Benzyl Adenine) 20 ppm and 40 ppm along with control in a Randomized Block Design. The treatments were imposed as foliar sprays at 30 days after transplanting. Spraying of GA_3 150 ppm resulted in early flowering and increased number of flowers per plant, fresh weight and dry weight of flowers. Among growth regulators foliar application of Alar also recorded for better flower quality parameters. Foliar spray of BA at 40 ppm enhanced vase life of China aster flower.

Introduction

China aster (*Callistephus chinensis*) belongs to one of the largest families of flowering plants Asteraceae. China aster is a very popular winter annual flower crop and is mainly cultivated for production of cut flowers, loose flowers, as pot plant and for bedding plant purposes in landscape (Kumar *et al.*, 2002). Plant growth substances have been used as an effective tool to improve vegetative as well as reproductive function of plant (Meena *et al.*, 2017). Plant growth regulators or phytohormones are organic substances produced naturally or synthetically in higher plants, controlling growth or other physiological functions at a site remote from its place of production and active in minute amounts (Sujatha *et al.*, 2002). Keeping these points in view the present work has been proposed to study the response of GA_3, alar and BA on flowering and vase life of China aster (*Callistephus chinensis*).

Materials and Methods

A field experiment was conducted at Horticulture Research Farm, Department of Horticulture, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi

during the year2016-2017. The experiment was laid out in Randomized Block Design with 7 treatments (GA_3 at 75 ppm, 150 ppm, alar at 300 ppm, 600 ppm and BA at 20 ppm, 40 ppm and control) and replicated four times. The treatment was allocated randomly in each plot using Fisher and Yates allocation random table (Panse and Sukhatme, 1985). Well decomposed FYM at 20 t ha^{-1} was incorporated during the last ploughing. Phosphorous and potassium at 80 and 120 kg ha^{-1} were applied in the form of single superphosphate and muriate of potash, respectively as basal dose. Nitrogen at 120 kg^{-1} was applied in the form of urea in two equal splits, first at the time of transplanting and second after one month of transplanting.

Nursery of China aster was raised and seedlings having the height of 5-6 cm and uniform growth were uprooted and transplanted at distance of 30x20 cm in 150x100 cm plots in the evening of 20th November, 2016. Standard cultural practices were followed during the entire crop period. Solutions of various concentrations of GA_3, alar and BA were prepared and sprayed uniformly over the plants of China aster immediately after preparation at 30 days of transplanting. Control plants were sprayed with distilled water in same manner. Observations were recorded and subjected to statistical analysis to draw the valid conclusion.

Results and Discussion

Data recorded on days to first flowering was minimum (62.8days) with 150 ppm GA_3 (Table 1) and it was maximum findings (71.06 days) with 600 ppm alar. These findings corroborate the findings of Tomberg (1963), Reddy and Sulladamath (1983). Maximum number of flowers per plant(75.73) was recorded with application of 150 ppm GA_3 followed by 75 ppm GA_3, 600 ppm alar and 300 ppm alar. This might be due to greater dry matter accumulation which is suggestive to better photosynthetic activity, enhancement in other metabolic activities and accelerated uptake of nutrients from soil. The present findings are in conformity with the results of Devadanam *et al.*, (2007) and Kumar *et al.*, (2010) in tuberose whereas Reddy and Sulladamath (1983), Lal and Mishra (1986) in aster and Singh (2004) in marigold.

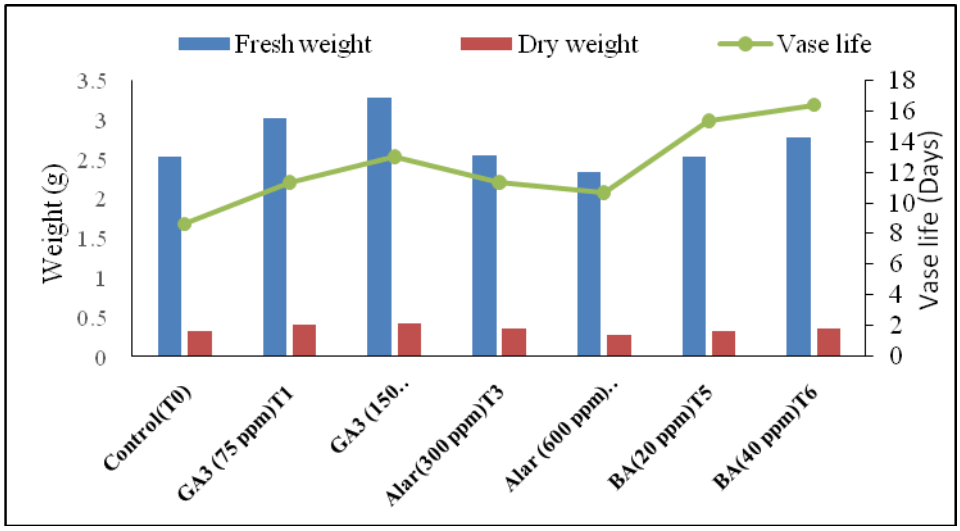
Alar recorded maximum number of flowers per plant after GA_3. The maximum diameter of flower (5.96 cm) was recorded with 150 ppm GA_3.The reason for enhancement of flower size may be due to increase in length of petals and pedicles or may be owing to division of photosynthates towards flower as a consequence of which there is intensification of sink (Zieslin *et al.*,1974) in China aster.

The maximum fresh weight (3.28 g) was exhibited with spraying of GA_3 at 150 ppm which was statistically higher than all other treatments (Figure 1). Similarly dry weight of flower (0.42 g) was recorded with 150ppm GA_3 compared to all other treatments. The increase in weight of flower in treated plants may be attributed to the fact that GA_3 promoted the efficacy of plants in terms of photosynthetic activity, uptake of nutrients and their translocation as well as better partitioning of assimilates into reproductive parts. These results are in agreement with those reported by Rakesh *et al.*, (2003) in chrysanthemum. This might also be due to greater dry matter accumulation which is suggested that better photosynthetic activity, other metabolic activities and uptake of nutrients from soil. Therefore, the growth promoting substances might have positive influence on size weight and of flowers. The present results are in conformity with finding of Vijayakumar *et al.*, (2017) in China aster.

Table.1 Effect of GA_3, alar and BA on days to first flowering, flowers per plant, flower diameter (cm)

Treatment	Days to first flowering	Flowers per plant	Flower diameter (cm)
Control(T_0)	69.46	57.90	5.34
GA_3 (75 ppm)T_1	65.06	70.13	5.64
GA_3 (150 ppm)T_2	62.80	75.73	5.96
Alar(300 ppm)T_3	69.06	70.06	5.33
Alar (600 ppm) T_4	71.06	70.93	4.68
BA(20 ppm)T_5	67.86	57.53	5.38
BA(40 ppm)T_6	68.80	58.73	4.92
SEm ±	0.84	2.25	0.09
C D at 5%	1.83	4.90	0.19

Fig.1 Effect of GA_3, alar and BA on fresh weight (g), dry weight (g) and vase life (days) of flowers



The maximum vase life (16.33 days) was recorded at 40 ppm BA followed by 20 ppm BA and 150 ppm GA_3, whereas control plant regulated in minimum vase life (8.66 days) was recorded under control. The vase life was recorded at 75 ppm GA_3 was statistically at par with vase life of 300 ppm alar. The increased longevity of cytokinin treated flowers might be the result of many different physiological effects of the hormone on the flower tissues. They may operate by maintaining membrane permeabilities (Kende and Baumgartner 1974), water balance (Mayak and Halew 1974) and protein and nucleic acid metabolism (Osborne, 1962).

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Conflict of interest

The authors did not declare any conflict of interest.

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