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INFLUENCE OF PINCHING AND GROWTH RETARDANTS ON FLOWER QUALITY PARAMETERS OF CHINA ASTER (*CALLISTEPHUS CHINENSIS* L.) CV. ARKA SHUBHI FOR POT PURPOSE

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ABSTRACT

The present investigation entitled "Influence of pinching and growth retardants on flower quality parameters of China Aster (*Callistephus chinensis* L.) cv. Arka Shubhi for pot purpose" was carried out during the *rabi* season of the year 2024 to 2025, at Post Graduate Institute for Horticultural Sciences, Sri Konda Laxman Telangana Horticultural University, Mulugu, Siddipet. The data on flower quality parameters revealed that among various pinching levels, P_1(No pinching) registered maximum flower diameter (5.69 cm) and longevity of flower (10.71 days), Whereas in growth retardants, soil drenching of G_4(Paclobutrazol at 50 ppm) recorded maximum flower longevity (9.83 days) and pot presentability (81.71). Regarding treatment combinations P_1G_4 (No pinching + paclobutrazol at 50 ppm) recorded maximum flower longevity (11.27 days), while P_3G_4 (Double-pinching + paclobutrazol at 50 ppm) registered highest pot presentability (87.82). Among pinching treatments, double pinching (P_3) had the best pot presentability (84.03).

***Key words*:** China aster, pinching, growth retardants, pot presentability, flower characters

Introduction

China aster (*Callistephus chinensis* L. Nees) is considered as one of the important commercial cut flowers belonging to the family Asteraceae with a chromosome number of 2n = 18 and is native to China (Navalinskien *et al*., 2005). It is a shallow-rooted plant that thrives in containers with minimal maintenance and is commonly chosen to enhance the beauty of living spaces and balconies. The total area under loose flower production in India is approximately 305 hectares, with a yield of around 3,063 metric tonnes, respectively (NHB- 2020). Pinching is a common practice used to control the flowering time and enhance flower quality. By removing the terminal growing bud, it promotes the development of lateral branches, leading to a more compact and bushier plant in African Marigold (Singh *et al*., 2015). This method aids in regulating plant growth, enabling staggered flower production, better bloom quality and a prolonged flower duration. It serves as an effective tool for optimizing crop performance (Jindal *et al.*, 2018). Along with pinching, growth retardants also have a significant impact on growth, development and flowering of the plants, resulting in attractive potted plants. Growth retardant plays a key role in reducing the inter nodal length by blocking the synthesis of gibberellins. Cycocel is an organic compound, is commonly used to regulate plant height, control flowering time and influence flower size. Paclobutrazol is used to restrict excessive vegetative growth, thereby promoting maximum flower production and improving overall yield (Amalseda *et al*., 2024). The efficacy of paclobutrazol is highly dependent on its application method and location. When administered as a soil drench or

Table 1: Effect of pinching levels and growth retardants on flower diameter (cm) of China aster cv. Arka Shubhi.

Flower diameter (cm)						
Pinching levels (P)	**Growth retardants (G)**					
	G_1	**G_2**	**G_3**	**G_4**	**G_5**	**Mean**
P_1	5.79	5.83	5.55	5.51	5.77	**5.69** [a]
P_2	5.21	5.44	4.81	4.94	4.97	**5.07** [a]
P_3	4.57	4.35	4.32	4.18	4.37	**4.36** [b]
Mean	**5.19**	**5.2**	**4.89**	**4.88**	**5.03**	
Factors	**SE (m) ±**		**CD@ 5%**		**CV %**	
P	0.24		0.69		18.35	
G	0.30		NS			
P×G	0.53		NS			

integrated into the growing substrate, it exhibits greater potency and prolonged growth-regulating effects (Taha and Srour 2016).

Material and Methods

The experimental site is located at the Post Graduate Institute for Horticultural Sciences, Sri Konda Laxman Telangana Horticultural University, Mulugu, Siddipet. The experimental site falls under a semi-arid tropical climate with an average rainfall of 615.6 mm, located at an altitude of 543.3 m above mean sea level on 78.62° East longitude and 17.72° North latitude. The study was conducted using pure and disease-free seeds of the China aster cultivar Arka Shubhi, which were procured from the Floricultural Research Station, Rajendranagar, Hyderabad. The experiment was laid out in Factorial Completely Randomized Design with two factors in which the first factor consists of three levels of pinching *viz.*, P_1: No pinching, P_2: Single pinching and P_3: Double pinching and the second factor consisting of five levels of growth retardants *viz.*, G_1: Cycocel @ 1000 ppm, G_2: Cycocel @ 1500 ppm, G_3: Paclobutrazol @ 25 ppm, G_4: Paclobutrazol @ 50 ppm and G_5: Control (No spray) with three replications. The number of treatment combinations-

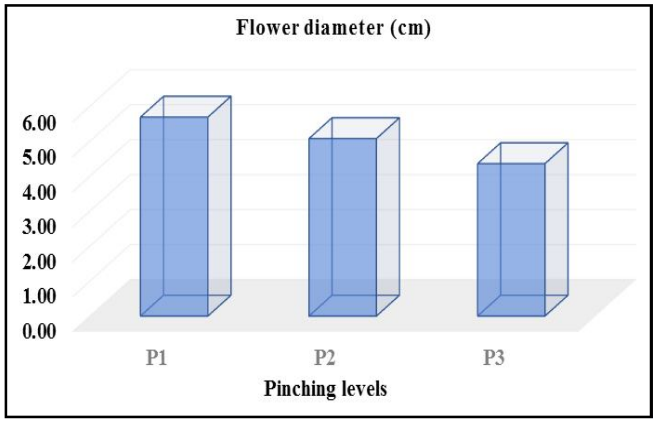

Fig. 1: Effect of pinching levels and growth retardants on flower diameter (cm) of China aster cv. Arka Shubhi.

Table 2: Effect of pinching levels and growth retardants on duration of flowering (days) in China aster cv. Arka Shubhi.

Duration of flowering (days)						
Pinching levels (P)	**Growth retardants (G)**					
	G_1	**G_2**	**G_3**	**G_4**	**G_5**	**Mean**
P_1	42.07	42.13	41.4	43.73	43.67	**42.6** [c]
P_2	43.27	42.8	43.13	43	44.27	**43.29** [b]
P_3	49.67	52.6	53.87	54.4	51.6	**52.43** [a]
Mean	**45**	**45.84**	**46.13**	**47.04**	**46.51**	
Factors	**SE (m) ±**		**CD@ 5%**		**CV %**	
P	0.53		1.55		4.50	
G	0.69		NS			
P×G	1.19		NS			

15, Number of pots per treatment- 5, Number of plants per pot- 1 and pot type- PVC pot. The plants were sprayed and drenched with growth retardants like Cycocel and Paclobutrazol respectively at one week after single and double pinching. Single pinching and double pinching were performed at 30 and 45 DAT.

Result and Discussion

Flower diameter (cm)

Upon observation, it was noted that there was existed discernible variation in the size of flowers based on the level of pinching is presented in the Table 1 and Fig. 1. It was found that plants that did not undergo any pinching (P_1) significantly exhibited the largest flower diameter (5.69 cm) and it was comparable with P_2 (Single pinching) (5.07 cm). Conversely, plants that underwent double pinching P_3 significantly displayed the smallest flower diameter (4.36 cm). The results related to growth retardants and their interaction effects were found to be non-significant on this parameter.

Among pinching levels, P_1 (No pinching) recorded

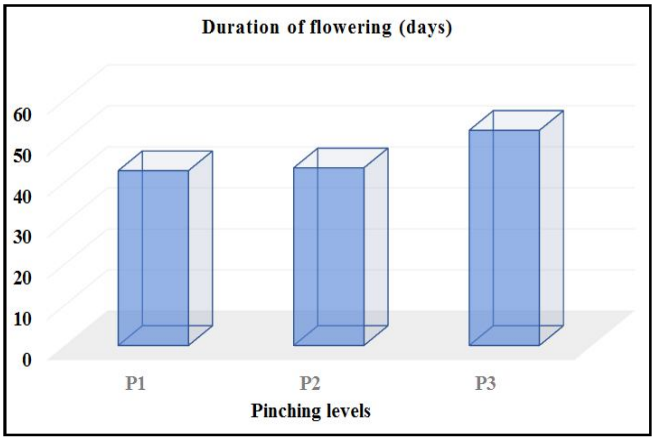

Fig. 2: Effect of pinching levels and growth retardants on duration of flowering (days) in China aster cv. Arka Shubhi.

Table 3: Effect of pinching levels and growth retardants on flower longevity (days) of China aster cv. Arka Shubhi.

Flower longevity on the plant (days)						
Pinching levels (P)	**Growth retardants (G)**					
	G_1	**G_2**	**G_3**	**G_4**	**G_5**	**Mean**
P_1	10.33	10.73	10.77	11.27	10.47	**10.71^{a}**
P_2	9.20	9.60	9.27	9.47	8.67	**9.24^{b}**
P_3	9	8.47	8.90	8.77	8.73	**8.77^{c}**
Mean	**9.51^{AB}**	**9.6^{AB}**	**9.64^{AB}**	**9.83^{A}**	**9.29^{B}**	
Factors	**SE (m) ±**		**CD@ 5%**		**CV %**	
P	0.08		0.24		3.41	
G	0.11		0.31			
P×G	0.19		0.54			

maximum flower diameter which might be due to energy sharing was limited to the flower developing only on the main branch. Least flower diameter was recorded in double pinching (P_3) was due to the energy shared by the developing side branches. Dorajeerao and Mokashi (2012) in Carnation reported that pinching practice encourages the production of synthetic compound (Benzyl adenine) which positively affect cell division and formation, resulted in improve number of petals and their expansion or both of them. The present findings are comparable with that of Sailaja and Panchbhai (2014) in China aster and Ullah *et al.*, (2019) in Zinnia.

Duration of flowering (days)

Various levels of pinching also had significant influence on duration of flowering is presented in the Table 2 and Fig. 2. Significantly P_1 (No pinching) took minimum duration of flowering (42.6 days), whereas significantly maximum value (52.43 days) was registered in P_3 (Double pinching). The results pertaining to growth retardants and their interaction effects were found to be non-significant.

Maximum duration of flowering was recorded in P_3

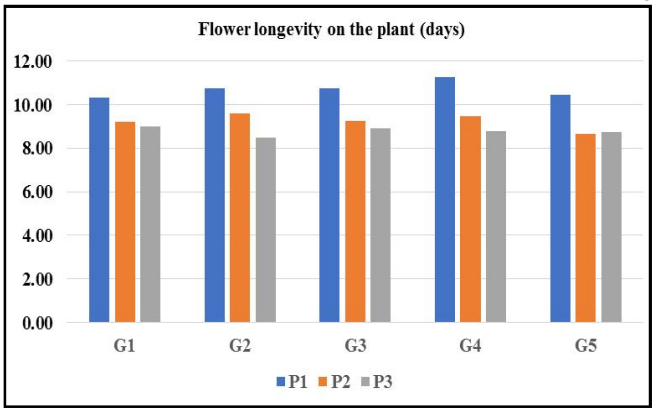

Fig. 3: Effect of pinching levels and growth retardants on flower longevity (days) of China aster cv. Arka Shubhi.

Table 4: Effect of pinching levels and growth retardants on pot presentability (score) of China aster cv. Arka Shubhi.

Post presentability (Score)						
Pinching levels (P)	**Growth retardants (G)**					
	G_1	**G_2**	**G_3**	**G_4**	**G_5**	**Mean**
P_1	75.03	73.55	77.06	77.82	72.21	**75.13^{c}**
P_2	75.59	78.05	79.2	79.47	79.78	**78.42^{b}**
P_3	82.74	83.02	85.59	87.82	80.99	**84.03^{a}**
Mean	**77.78^{B}**	**78.21^{B}**	**80.62^{A}**	**81.71^{A}**	**77.66^{B}**	
Factors	**SE (m) ±**		**CD@ 5%**		**CV %**	
P	0.43		1.24		2.10	
G	0.55		1.60			
P×G	0.96		2.78			

(Double pinching) which might be due to the fact that by removing apical growing part, the plant enters vegetative phase and new shoots took longer time to be physiologically mature and thus, resulted in extended flowering span. This result was in line with findings of Jindal *et al.*, (2018) in Chrysanthemum.

Flower longevity on the plant (days)

The data on longevity of flower as impacted by the pinching level treatments, growth retardant concentrations and their interactions are presented in the Table 3 and Fig. 3. It was observed that significantly the flowers with the longest lifespan, lasting (10.71 days), were found in the group of plants that did not undergo any pinching (P_1). On the other hand, significantly shortest lifespan, lasting (8.77 days), were found in plants that were pinched twice (P_3). Likewise, longevity of flower on plant also showed significant difference among various growth retardant concentrations. Soil drenching of G_4 (Paclobutrazol at 50 ppm) registered maximum value (9.83 days) and it was comparable with G_3 (Paclobutrazol at 25 ppm) (9.64 days), while it was significantly minimum

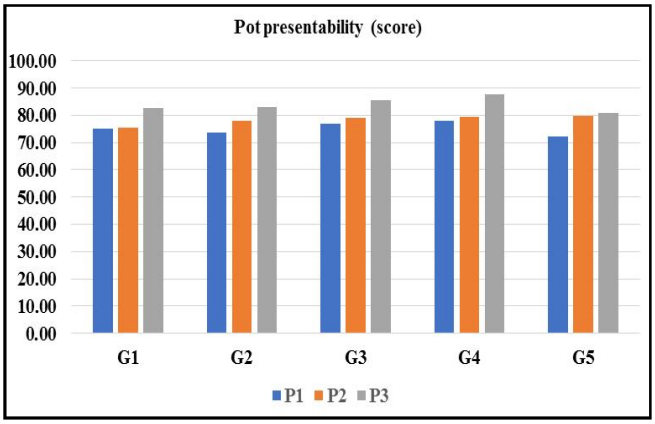

Fig. 4: Effect of pinching levels and growth retardants on pot presentability (score) of China aster cv. Arka Shubhi.

(9.29 days) in G_5 (Control). The interaction between pinching level treatments and different growth retardant concentrations were found to be significant. Among them, P_1G_4 (No pinching + paclobutrazol at 50 ppm) recorded maximum longevity of flower (11.27 days), whereas minimum value (8.47 days) was registered in P_3G_2 (Double pinching+ Cycocel at 1500 ppm).

Maximum longevity of flower was recorded in P_1 (No pinching) due to accumulation of more assimilates which leads to fewer blooms stays longer duration on the plant. Similar findings were reported by Sailaja and Panchbhai (2014) in China aster and Moon *et al*., (2017) in Gaillardia, respectively. Maximum flower longevity was registered in G_4 treatment (Paclobutrazol at 50 ppm) it might be due to low levels of endogenous GA_3 (Rood *et al*., 1989). The current findings are also supported by experimental evidence of Hemlata and Singh (2017) in Marigold, Carvalho - Zanão *et al*., (2018) in potted Rose.

Pot presentability (Score)

The data pertaining to pot presentability as effected by the pinching level treatments, growth retardant concentrations and their interactions are presented in the Table 4 and Fig. 4. It was noted that those plants that underwent double pinching (P_3) significantly exhibited the highest level of pot presentability, achieving score (84.03). However, those plants that received no pinching (P_1) significantly demonstrated the lowest level of pot presentability (75.13). There were significant differences observed among different growth retardant concentrations with respect to pot presentability. Soil drenching of G_4 (Paclobutrazol at 50 ppm) recorded higher pot presentability (81.71) and it was *on par* with G_3 (Paclobutrazol at 25 ppm) (80.62), whereas it was significantly lowest (77.66) in G_5 (Control). The research findings indicated that the interaction between various pinching levels and growth retardant concentrations were found to be significant on pot presentability. Among them, P_3G_4 (Double-pinching + paclobutrazol at 50 ppm) recorded maximum pot presentability score (87.82), while it was minimum (72.21) in P_1G_5 (No pinching + control).

Among the pinching levels, P_3 (Double-pinching) registered maximum pot presentability score which was due to the fact that pinching had improved vegetative and flowering attributes like dwarf and more compact plants with balanced growth, wider plant spread, maximum number of lateral branches per plant, higher number of flowers per plant as well as longer field life besides other quality attributes. These results are in comparable with Bhargavi *et al*., (2021) in Zinnia. Higher pot presentability score was recorded in G_4 treatment (Paclobutrazol at 50 ppm) which was due to it had improved various growth and flowering characteristics resulted in the improvement of pot presentability. These results are in close agreement with the findings of Bhardwaj (2019) in Barleria and Dogra (2013) in Primula.

Conclusion

Based on experimental data, it can be concluded that among pinching levels, no pinching (P_1) recorded the maximum flower diameter (5.69 cm) and longevity (10.71 days). In growth retardants, soil drenching of paclobutrazol at 50 ppm (G_4) registered the highest flower longevity (9.83 days) and pot presentability (81.71). Regarding treatment combinations P_1G_4 (No pinching + paclobutrazol at 50 ppm) recorded maximum flower longevity (11.27 days), while P_3G_4 (Double-pinching + paclobutrazol at 50 ppm) registered highest pot presentability (87.82). Among pinching treatments, double pinching (P_3) had the best pot presentability (84.03).

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