



ISSN (E): 2277-7695

ISSN (P): 2349-8242

NAAS Rating: 5.23

TPI 2023; 12(12): 110-112

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www.thepharmajournal.com

Received: 09-09-2023

Accepted: 15-10-2023

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Effect of pinching and mulching on growth and yield parameters in China aster (*Callistephus chinensis* L.) cv. Phule Ganesh white

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Abstract

The experiment entitled “Effect of pinching and mulching on growth and yield parameters in china aster (*Callistephus chinensis* L.) cv. Phule Ganesh White” was conducted during *Rabi-Summer* season of the year 2022-23 at College of Horticulture, DBSKKV, Dapoli, Dist. Ratnagiri, Maharashtra. The experiment was laid out in Split Plot Design with three replications and two factors *i.e.* Pinching and mulching. Pinching constituted four treatments *viz.* P₁ –Pinching after 3 weeks of transplanting, P₂ – Pinching after 5 weeks of transplanting, P₃ – Pinching after 3 and 5 weeks of transplanting, P₄ – No pinching. Mulching as sub factor constituted four treatments *viz.* M₁- Black polythene mulch, M₂- Silver polythene mulch, M₃- Paddy straw, M₄-No mulching. Thus, two factors with three replication and total sixteen treatment combinations were tested during this investigation. In case of mulching black polythene mulch found best with respect to minimum weed intensity. In respect of pinching methods, maximum yield was recorded with double pinching.

Keywords: Mulching, pinching

1. Introduction

Flowers honour friendship, love, encouragement in loss, and success. Bright and happy flowers have an immediate impact on our mood because they can make us feel happy. This is the reason flowers are given to loved ones who are ill. It is thought that the presence of flowers and plants around hospitals can naturally heal a patient by lowering their stress and anxiety levels. The main benefit is that flowers have medicinal qualities that are entirely natural. Various kinds of flowers are used in ayurveda as therapeutic agents. The flower stands for strength, kindness, and selflessness. They encourage everyone to follow the path of goodness. Flowers are a vital component of our lives which improve our surroundings with their beauty, colour and fragrance. Around the world, there are many different kinds of flowers that each have their own distinct qualities, properties, and symbolism.

One of the most well-known showy and freely blooming annuals in the family Asteraceae is the china aster (*Callistephus chinensis* L.), also known as aster. The name of the genus *Callistephus* comes from two Greek words. Referring to the huge and vibrant flower heads, *Kallistos* means “most beautiful” and *Stephos* means “a crown”.

2. Materials and Methods

The present investigation entitled “Effect of pinching and mulching on growth and yield parameters in china aster (*Callistephus chinensis* L.) cv. Phule Ganesh White” was conducted during *Rabi-Summer* season of the year 2022-2023 at College of Horticulture, Dapoli, Dist. Ratnagiri, Maharashtra. The experiment was laid out in split plot design with 16 treatment combinations comprising of P₁: Pinching after 3 weeks of transplanting, P₂: pinching after 5 weeks of transplanting, P₃: pinching after 3 and 5 weeks of transplanting and P₄: No pinching and methods as sub factor *viz.*, M₁ (black polythene mulch), M₂ (silver polythene mulch), M₃ (paddy straw), M₄ (control) no mulch replicated thrice. The experimental plot was marked and each plot of 4.50 m x 1.00 m size was laid out. After field preparation, 45 days old seedlings were transplanted in main field at spacing of 45 x 45 cm² distance. The observations on the vegetative characters *viz.*, plant height, spread, number of branches, number of leaves, leaf area and yield were recorded. The data were statistically analyzed by the method suggested by Panse and Sukhatme (1995) [13].

3. Results and Discussion

The data present in table no.1 showed that, the interaction study between pinching levels and mulching significantly revealed that highest plant height (71.91 cm) was recorded in treatment combination no pinching with black polythene mulching and lowest plant height (43.01 cm) was recorded in treatment combination pinching at 3 and 5 weeks after transplanting with no mulching. The highest plant height as a result of black polythene mulching may be attributed to favourable soil temperature, increased soil moisture conservation, improved weed control, and soil microorganism activity, which increases nutrient availability and ultimately, increases photosynthesis and also pinching removes the topmost portion of the shoot, or apical growth, it causes the plant's vertical growth to stop. It is obvious that the control, which involved no pinching, showed the maximum plant height. Similar results were also obtained with the findings of Murugan and Gopinath (2001)^[12] in crossandra, Malshe *et al.* (2017)^[7], Kharat *et al.* (2022)^[6], Moon *et al.* (2018)^[10], Chopde *et al.* (2019)^[2], Mhatre (2022)^[8] in china aster.

Maximum average plant spread (36.10 cm) was recorded in P₃M₁ (pinching after 3 and 5 weeks of transplanting with black polythene mulching) and minimum average plant spread (15.93 cm) was found in treatment combination P₄M₄ (control) at 90 days interval. Increase in the plant spread might be due to mulching and pinching that produced greater number of lateral branches, resulting in increase plant spread. This is lined by Kawack *et al.* (1990)^[4] in *Canna hybrida*, Sikarwar *et al.* (2021)^[15] in marigold, who noted maximum vegetative growth in black polythene mulching and, Gaidhani *et al.* (2020)^[3] and Mhatre (2022)^[8] in china aster.

The interaction study reveals that P₃M₁ (double pinching with black polythene mulch) had the maximum branches at the end of harvesting (8.65), while P₄M₄ treatment combination had the fewest branches (3.45). The outcomes must reflect the benefits of black polythene mulching in regulating soil temperature, stopping nutrient leaching and suppressing weed growth. Pinching may result in the maximum number of branches because it suppresses apical dominance, which results in a higher number of lateral branches. The findings of Kharat *et al.* (2022)^[6] recorded the highest number of branches in the case of black polythene mulching and Sarkar *et al.* (2018)^[14] in marigold, Gaidhani *et al.* (2020)^[3] in china aster.

The interaction study between pinching levels and mulching effects significantly remarked that maximum leaf area (7184.88 cm²) was registered in treatment combination P₃M₁ (pinching at 3 and 5 weeks after transplanting with black polythene mulch) and minimum leaf area (2285.35cm²) was recorded in treatment combination P₄M₄ (control) at final stage of harvest. The leaf area determines how much light is absorbed, which in turn affects transpiration, photosynthesis, and plant productivity. Leaf area was significantly influenced

by mulching and pinching at different plant growth stages. Similar outcomes were also noted by Gaidhani *et al.* (2020)^[3] and Mhatre *et al.* (2023)^[9] in china aster.

The interaction study between pinching levels and mulching effects shows significant influence on number of days required for flower initiation. The minimum number of days required for flower initiation (62.42 days) was perceived in treatment combination P₄M₁ (no pinching with black polythene mulch) whereas the delayed flower initiation (76.51 days) was observed in P₃M₄ (pinching at 3 and 5 weeks after transplanting with no mulch). The notable earliness of the flower initiation under black polythene mulching may be attributed to improved plant growth due to the high soil temperature and moisture content, which promoted abundant and early flower initiation. Pinching prevented vegetative growth by cutting off the growing tip, which delayed flowering. These results are in line with the findings of Kharat *et al.* (2022)^[6] in *gaillardia* and Chopde *et al.* (2019)^[2] and Mhatre (2022)^[8] in china aster.

It has been noted that the treatment combination P₃M₄ (pinching at 3 and 5 weeks after transplanting without mulching) records the maximum number of days required for 50 per cent of flowering, which is 91.30 days. In treatment combination P₄M₁ (no pinching with black mulching), the minimum number of days needed for 50 per cent of flowering (81.75 days) was recorded. Sufficient moisture content and a suitable soil temperature promote better vegetative growth, which in turn promotes the emergence of flowers and it is possible that the new shoots that emerged after pinching went into the vegetative phase and took some time to mature physiologically so they could bear flowers, which is the reason pinched plants did not flower immediately. The results aligned with the studies conducted by Kharat *et al.* (2022)^[6] in *gaillardia* and Mhatre (2022)^[8] in china aster.

It is observed that maximum flower yield per hectore (136.15 q) was recorded in treatment combination P₃M₁ (pinching at 3 and 5 weeks after transplanting with black polythene mulch). The minimum flower yield per hectore (43.11 q) was recorded in treatment combination P₄M₄ (control). The highest flower yield was evidently found in polythene mulch, which could be attributed to the improved growth characteristics of the treatment, including plant height, plant spread, number of branches and the most significant practice for improving a plant's health, vigour, and aesthetic value is pinching. According to Mundhe *et al.* (2018)^[11], pinching strengthens plants and helps them develop a sturdy framework. It is crucial for preserving the china aster plant's vigour, floriferousness, and flower quality. The current findings are consistent with those of Malshe *et al.* (2017)^[7], Sikarwar *et al.* (2021)^[15] on marigold and Khandelwal *et al.* (2003)^[5], Chauhan *et al.* (2005)^[1], Mhatre (2022)^[8] in china aster.

Table 1: Effect of pinching and mulching on growth and yield parameters in china aster cv. Phule Ganesh White

Treatment combination	Plant height (cm)	Plant spread (cm)	Number of branches	Leaf area (cm ²)	Initiation of flowering	Days to 50 per cent flowering	Yield/ha
P ₁ M ₁	66.31	28.10	6.25	2490.12	66.14	81.95	91.56
P ₁ M ₂	56.94	26.47	5.07	3559.98	68.91	82.78	90.15
P ₁ M ₃	54.83	22.43	3.78	3679.87	71.05	83.64	88.00
P ₁ M ₄	47.95	18.74	3.53	2550.19	72.47	86.39	60.07
P ₂ M ₁	63.93	31.60	6.90	6620.71	66.68	84.12	111.93
P ₂ M ₂	56.67	28.04	6.43	4734.06	70.15	86.82	107.93
P ₂ M ₃	54.16	23.30	4.61	4190.30	71.59	87.71	95.56
P ₂ M ₄	44.75	23.23	3.77	3674.03	73.14	88.19	68.15
P ₃ M ₁	62.63	36.10	8.65	7184.88	67.98	88.18	136.15
P ₃ M ₂	56.19	32.20	7.23	7094.54	70.64	89.12	132.77
P ₃ M ₃	52.52	26.07	6.33	5114.15	73.09	90.41	130.59
P ₃ M ₄	43.01	23.50	4.67	4540.53	76.51	91.30	75.56
P ₄ M ₁	71.91	27.57	5.60	2390.40	62.42	81.75	54.89
P ₄ M ₂	61.65	21.40	4.73	2840.04	68.48	82.32	52.59
P ₄ M ₃	60.27	19.07	3.52	2762.96	68.95	83.31	44.74
P ₄ M ₄	51.71	15.93	3.45	2285.35	71.27	83.59	43.11
SEm ±	0.14	0.02	0.02	39.24	0.28	0.21	0.27
CD at 5%	0.40	0.06	0.05	114.54	0.83	0.61	0.80

4. Conclusion

From the present investigation, it can be concluded that the pinching practice with mulching treatments were have profound effect on vegetative and yield characters of china aster. Treatment P₃M₁, which involves pinching at 3 and 5 weeks after transplanting with black polythene mulching, was found to have the best interaction effect in terms of maximum plant spread, maximum leaf area, maximum number of branches and highest yield per hectare. Treatment P₄M₁ (No pinching with black polythene mulching) was found best in terms of plant height.

5. Acknowledgement

Authors are thankful to Department of Floriculture and Landscape Architecture, College of Horticulture, Dr. B. S. Konkan Krishi Vidyapeeth, Dapoli-415712, dist- Ratnagiri, Maharashtra (India), to provide necessary facility and valuable suggestion during investigation.

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