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Pranjali S Khandre

PG Scholar, Floriculture and
Landscaping, Horticulture
Section, College of Agriculture,
Nagpur, Maharashtra, India

Shalini A Badge

Associate Professor,
Horticulture Section, College
of Agriculture, Nagpur,
Maharashtra, India

Hemlata M Khobragade

Assistant Professor,
Horticulture Section, College
of Agriculture, Nagpur,
Maharashtra, India

Corresponding Author:

Pranjali S Khandre

PG Scholar, Floriculture and
Landscaping, Horticulture
Section, College of Agriculture,
Nagpur, Maharashtra, India

Effect of staggered planting and pinching time on flowering and quality of annual chrysanthemum

Pranjali S Khandre, Shalini A Badge and Hemlata M Khobragade

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Abstract

The present investigation entitled “Effect of staggered planting and pinching time on flowering and quality of annual chrysanthemum” during the year 2024-25 was undertaken at Horticulture Section, College of Agriculture, Nagpur. The experiment comprises of two factors; the main factor consists of four different planting time and four levels of pinching time as sub factor with sixteen different treatment combinations. The experiment was laid out in a Factorial Randomized Block Design with three replications. The result of the present study on flowering parameters indicated that, minimum days to first flower bud initiation, days to 50 per cent flowering, days to first fully opened flower from bud initiation and days to first harvesting of flowers from planting was recorded in treatment planting on first week of October and No pinching treatment. Whereas, maximum flowering duration was recorded in the treatment planting on first week of October and treatment pinching at 30 and 45 DAT. In respect of quality parameters, diameter of flower, weight of single flower, length of flower pedicel, longevity of intact flower on plant, shelf life and vase life of flower were recorded maximum in treatment planting on first week of October and No pinching treatment.

Keywords: Annual chrysanthemum, staggered planting, pinching time, flowering

1. Introduction

Annual chrysanthemum (*Chrysanthemum coronarium* L.), commonly known as Crown Daisy, is a fast-growing, ornamental flower crop belonging to the family Asteraceae. It is widely cultivated for its vibrant, uniform size, bright coloration and attractive yellow and white daisy-like blooms, which make it an excellent choice for loose flower markets and landscape decoration. These characteristics are crucial not only for aesthetic appeal but also for market value and post-harvest longevity. Unlike perennial chrysanthemums, annual chrysanthemum completes its life cycle within a single growing season, offering a quick floral return to growers.

In India, loose flowers are commercially grown in specific areas of Maharashtra, Karnataka, Bihar, Punjab, Haryana, Uttar Pradesh, Madhya Pradesh, and West Bengal. Several states, including Tamil Nadu (21%), Karnataka (16%), Madhya Pradesh (14%), and West Bengal (12%), are commercial floriculture producers. When it comes to flower output, Maharashtra is among the top states. Commercial loose flowers are grown in a few areas of Maharashtra, including Nashik, Ahmednagar, Thane, Pune, Satara, Sangli, and Nagpur.

Staggered planting is one of the crop management practices used to increase quality and flower production also regular supply of flower in the market. Whereas, pinching involves removing the soft, growing tip of the main stem to encourage the plant to develop more lateral branches to get quality flower blooms.

2. Material and Methods

The present study entitled “Effect of staggered planting and pinching time on flowering and quality of annual chrysanthemum” was carried out at PG Research unit, Horticulture Section, College of Agriculture, Nagpur during Rabi season in the year 2024-25. The experiment was laid out in Factorial Randomized Block Design with three replications. The experiment consists of two factors; Factor A consist of four different planting time viz., (Third week of September, first week of October, third week of October and first week of November) and Factor B consist of four pinching time viz., (No pinching, pinching at 30 DAT, pinching at 45 DAT and pinching at 30 and 45 DAT).

The experiment was carried out on a flat bed with a gross plot size of 2.25 m × 1.80 m. The seedlings were prepared on a nursery bed and transferred onto the main field. The spacing kept was 45 cm x 30 cm. The recommended dose of inorganic fertilizer NPK hectare⁻¹ was administered to all experimental plots to provide NPK, respectively.

The observations in respect of flowering parameters i.e., days to first flower bud initiation, days to 50 per cent flowering, days to first fully opened flower from bud initiation, days to first harvesting of flowers from planting, flowering duration and in quality parameters i.e., diameter of flower, weight of single flower, length of flower pedicel, longevity of intact flower on plant, shelf life and vase life of flower were recorded. The data was analyzed statistically as per the methods described by Panse and Sukhatme (1967) [11].

3. Results and discussion

3.1 Flowering parameters

3.1.1 Effect of staggered planting on flowering parameters

The data from Table 1 exhibited the significant difference among the planting time on flowering parameters. Significantly minimum days to first flower bud initiation (46.66), days to 50 per cent flowering (63.42), days to first fully opened flower from bud initiation (14.95) and days to first harvesting of flowers from planting (66.83) were recorded in the treatment planting on first week of October followed by treatment planting on third week of September. Significantly maximum flowering duration (59.19 days) was recorded in the treatment planting on first week of October and minimum was recorded in the treatment planting on first week of November.

This early flowering might be due to optimal climatic conditions prevailing during the vegetative and floral initiation phases, particularly moderate temperature and favorable photoperiods. These results are in close conformity with Lakshmi *et al.* (2014) [8] in African marigold and Gaidhani *et al.* (2020) [4] in China aster, Jyothi *et al.* (2018) [7] in marigold and Mohanty *et al.* (2023) [9] in annual chrysanthemum.

3.2 Effect of pinching time on flowering parameters

The data from Table 1 exhibited the significant difference among the pinching time on flowering parameters. Significantly minimum days to first flower bud initiation (39.65), days to 50 per cent flowering (55.42), days to first fully opened flower from bud initiation (13.58) and days to first harvesting of flowers from planting (61.17) were recorded in the treatment No pinching followed by treatment pinching at 30 DAT. Significantly maximum flowering duration (58.51) was recorded in the treatment pinching at 30 and 45 DAT followed by treatment pinching at 30 DAT.

This progressive in flowering with pinching is likely to encouraging the vegetative growth by removal of apical dominance, which delays the transition to the reproductive phase. These results are in close conformity with Gaidhani *et al.* (2020) [4] in China aster, Sedhai *et al.* (2024) [12] and Halagi *et al.* (2023) [5] in African marigold, Badge *et al.* (2017) [2] and Amalseda *et al.* (2024) [1] in annual chrysanthemum.

3.3 Interaction effect

The data from Table 2 exhibited the significant difference

among the staggered planting and pinching time on days to first harvesting of flowers from planting. Significantly minimum days to first harvesting of flowers (56.33 days) was found in treatment combination first week of October with No pinching which was followed by treatment combination third week of September with No pinching (58.67 days). Whereas, maximum days to first harvesting of flowers was recorded in treatment combination first week of November with pinching at 30 and 45 DAT (85.67 days).

The interaction between planting and pinching treatments was significant, indicating that the combination of these two factors substantially influenced.

3.2 Quality parameters

3.2.1 Effect of staggered planting on quality parameters

The data from Table 1 exhibited the significant difference among the planting time on quality parameters. Significantly maximum flower diameter (6.51 cm), weight of single flower (5.64 g), length of flower pedicel (11.65 cm), shelf life of flower (3.27 days), vase life of flower (7.35 days) and longevity of flower intact on plant (10.68 days) were recorded in the treatment planting on first week of October followed by treatment planting on third week of October. Significantly minimum flower diameter (5.34 cm), weight of single flower (4.46 g), length of flower pedicel (10.63 cm), shelf life of flower (3.02 days), vase life of flower (4.67 days) and longevity of flower intact on plant (10.08 days) were recorded in the treatment planting on first week of November.

The early planting possibly ensured better vegetative growth, optimum utilization of environmental resources and favorable climatic conditions, which enhanced the flower development and size. These results are in close conformity with Thumar *et al.* (2020) [13] in chrysanthemum, Jyothi *et al.* (2018) [7] in marigold and Hawa *et al.* (2021) [6] in annual chrysanthemum.

3.2.2 Effect of pinching time on quality parameters

The data from Table 1 exhibited the significant difference among the pinching time on quality parameters. Significantly maximum flower diameter (6.74 cm), weight of single flower (5.93 g), length of flower pedicel (13.46 cm), shelf life of flower (3.48 days), vase life of flower (6.35 days) and longevity of flower intact on plant (11.35 days) were recorded in the treatment No pinching followed by treatment pinching at 30 DAT. Significantly minimum flower diameter (5.36 cm), weight of single flower (4.14 g), length of flower pedicel (8.93 cm), shelf life of flower (2.65 days), vase life of flower (5.50 days) and longevity of flower intact on plant (9.38 days) were recorded in the treatment pinching at 30 and 45 DAT.

These results are in close conformity with Dobariya *et al.* (2023) [3] in annual chrysanthemum, Moon *et al.* (2017) in gaillardia and Badge *et al.* (2017) [2] in annual chrysanthemum.

3.3 Interaction effect

The data from Table 2 exhibited the significant difference among the staggered planting and pinching time on vase life of flower. Significantly maximum vase life of flower (8.13 days) was observed in treatment combination first week of October with No pinching which was found to be at par with treatment combination first week of October with pinching at 30 DAT (8.07 days). Whereas, minimum vase life of

flower was recorded in treatment combination first week of November with pinching at 30 and 45 DAT (4.27 days). The interaction between staggered planting and pinching time was significant, indicating that the combination of these two factors substantially influenced vase life.

4. Conclusions

From the above investigation it can be concluded that, in respect of flowering parameter, earliness of flower bud

initiation, 50 per cent flowering, fully opening of flower from bud initiation, and first harvesting of flower were noticed in treatment planting in first week of October with No pinching treatment. Similarly, in respect of quality parameter viz., weight of flower, diameter of flower, length of flower pedicel, shelf life and vase life of flower and longevity of flower intact on plant were recorded maximum in treatment planting at first week of October and No pinching treatment.

Table 1: Effect of staggered planting and pinching time on flowering and quality of annual chrysanthemum

Treatments	Days to first flower bud initiation	Days to 50 per cent flowering	Days to first fully opened flower from bud initiation	Days to first harvesting of flowers from planting	Flowering duration (days)	Flower diameter (cm)	Weight of single flower (g)	Length of flower pedicel (cm)	Shelf life of flower (days)	Vase life of flower (days)	Longevity of flower intact on plant (days)
A) Staggered Planting (D)											
D1: Third week of September	48.46	63.50	15.42	70.92	52.47	6.05	4.93	10.69	3.15	5.37	10.38
D2: First week of October	46.66	63.42	14.95	66.83	59.19	6.51	5.64	11.65	3.27	7.35	10.68
D3: Third week of October	49.18	64.50	15.83	71.67	55.36	6.23	5.40	11.22	3.20	6.30	10.55
D4: First week of November	50.83	65.58	16.40	75.75	50.52	5.34	4.46	10.63	3.02	4.67	10.08
'F' test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE (m) ±	0.66	0.50	0.23	0.71	0.71	0.11	0.10	0.20	0.05	0.17	0.15
CD at 5%	1.91	1.46	0.67	2.05	2.04	0.31	0.29	0.59	0.14	0.49	0.43
B) Pinching Time (P)											
P0: No pinching	39.65	55.42	13.58	61.17	49.12	6.74	5.93	13.46	3.48	6.35	11.35
P1: Pinching at 30 DAT	44.12	63.08	15.40	66.08	55.71	6.09	5.40	10.94	3.28	6.18	10.62
P2: Pinching at 45 DAT	54.70	65.92	16.02	77.17	54.20	5.94	4.96	10.85	3.22	5.65	10.35
P3: Pinching at 30 and 45 DAT	56.67	72.58	17.60	80.75	58.51	5.36	4.14	8.93	2.65	5.50	9.38
'F' test	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.	Sig.
SE (m) ±	0.66	0.50	0.23	0.71	0.71	0.11	0.10	0.20	0.05	0.17	0.15
CD at 5%	1.91	1.46	0.67	2.05	2.04	0.31	0.29	0.59	0.14	0.49	0.43
C) Interaction effect (D X P)											
'F' test	N.S.	N.S.	N.S.	Sig.	N.S.	N.S.	N.S.	N.S.	N.S.	Sig.	N.S.
SE (m) ±	1.32	1.23	0.46	1.42	1.42	0.21	0.20	0.41	0.10	0.41	0.29
CD at 5%	-	-	-	4.12	-	-	-	-	-	1.20	-

Note: A:-Staggered planting, B:-Pinching time, C:-Interaction effect and N.S.:Non-Significant

Table 2: Interaction effect of staggered planting and pinching time on days to first harvesting of flowers from planting and vase life of flower of annual chrysanthemum

Treatments	Days to first harvesting of flowers from planting					Vase life of flower (days)				
	Pinching Time (P)					Pinching Time (P)				
Staggered Planting (D)	P ₀ : No pinching	P ₁ : Pinching at 30 DAT	P ₂ : Pinching at 45 DAT	P ₃ : Pinching at 30 and 45 DAT	Mean	P ₀ : No pinching	P ₁ : Pinching at 30 DAT	P ₂ : Pinching at 45 DAT	P ₃ : Pinching at 30 and 45 DAT	Mean
D ₁ : Third week of September	58.67	67.00	77.33	80.67	70.92	5.47	5.60	4.93	5.47	5.37
D ₂ : First week of October	56.33	61.67	72.33	77.00	66.83	8.13	8.07	6.73	6.47	7.35
D ₃ : Third week of October	63.67	67.33	76.00	79.67	71.67	7.40	5.87	6.13	5.80	6.30
D ₄ : First week of November	66.00	68.33	83.00	85.67	75.75	4.40	5.20	4.80	4.27	4.67
Mean	61.17	66.08	77.17	80.75		6.35	6.18	5.65	5.50	
	Factor A (D)		Factor B (P)		Interaction D X P	Factor A (D)		Factor B (P)		Interaction D X P
'F' test	Sig.		Sig.		Sig.	Sig.		Sig.		Sig.
SE (m) ±	0.71		0.71		1.42	0.17		0.17		0.41
CD at 5%	2.05		2.05		4.12	0.49		0.49		1.20

Note: A:-Staggered planting, B:-Pinching time, C:-Interaction effect and N.S.:Non-Significant

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