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## Standardization of sowing dates of different varieties of china aster under Raipur region of Chhattisgarh plains

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### Abstract

The research aimed to standardize the sowing dates for different varieties of China Aster in the Raipur region of Chhattisgarh Plains during the Rabi season of 2022-23. The experimental design utilized a Completely Randomized Design (CRD, Factorial) with 16 treatment combinations, consisting of four varieties (Phule Ganesh Violet, Phule Ganesh Purple, Phule Ganesh Pink, and Phule Ganesh White), along with four sowing dates (20<sup>th</sup> November, 30<sup>th</sup> November, 10<sup>th</sup> December, and 20<sup>th</sup> December). The results indicated that among the interaction between sowing dates and different varieties of China Aster, it was observed that V<sub>2</sub>D<sub>2</sub> had the maximum plant height (70.0), V<sub>3</sub>D<sub>2</sub> exhibited the maximum number of leaves (68.0), and V<sub>4</sub>D<sub>2</sub> showed the maximum plant spread (32.6 cm). Regarding flowering parameters, V<sub>3</sub>D<sub>2</sub> demonstrated early flowering (37.4 days), the highest number of flowers per plant (52.1), flower size (5.8 cm), flower yield per plant (180.8 g), and vase life (12.9 days). Additionally, V<sub>4</sub>D<sub>2</sub> had the longest flowering duration (56.0 days).

**Keywords:** China aster, sowing dates, variety, flower yield

### Introduction

China Aster (*Callistephus chinensis*) is an important ornamental flowering plant that is widely cultivated for its attractive flowers in various parts of the world. It belongs to the family Asteraceae and is commonly known as the "annual chrysanthemum". The genus *Callistephus* derives its name from two Greek words: '*kalistos*', meaning 'most beautiful', and '*stephos*', meaning 'a crown', referring to the flowers. The development of central florets was the first change in the flower type, which ultimately led to the formation of quelled flowers. The Chhattisgarh Plains, which lies in the central part of India, has a favorable climate and soil conditions for the cultivation of China Aster. However, the cultivation of different varieties of China Aster is often associated with variations in their sowing dates, which ultimately affect the yield and quality of the flowers. The quality of China Aster flowers is mainly determined by the variety and the prevailing climatic conditions during the growing period. According to Nagaraju *et al.* (2004) <sup>[10]</sup>, optimal temperature and photoperiod are crucial factors in achieving blooms of good size and high quality. In South Indian conditions, the winter season is considered the most favorable for planting China Aster. In areas with less than 75 cm of rainfall and cool weather.

The standardization of sowing dates for different varieties of China Aster is crucial for enhancing the production efficiency of the crop. It can also help in reducing the production costs and improving the overall profitability of the farmers. However, the optimum sowing dates of China Aster may vary depending on various factors such as climatic conditions, soil types, and the specific variety of China Aster being grown. The current research study aims to investigate the effects of different sowing dates on the vegetative growth, floral parameters, and vase life of China Aster.

### Material and Methods

An experiment was conducted at the Department of Floriculture and Landscape Architecture, Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.) during Rabi season of 2022-2023 to study the effect of sowing dates for different varieties of China Aster in the Raipur region of Chhattisgarh Plains. The experiment was designed as a complete randomized design (Factorial) with a total of 16 treatment combination. The treatments consisted of four varieties (Phule Ganesh Violet, Phule Ganesh Purple, Phule Ganesh Pink, and Phule Ganesh White), along with four sowing dates (20<sup>th</sup> November, 30<sup>th</sup> November, 10<sup>th</sup> December, and 20<sup>th</sup> December).

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The experiment has been undertaken in Grow bags (UV stabilized) under open conditions. Mixture of soil, FYM and Cocopeat media has been filled in the grow bags having pre-punched bottom holes for thorough drainage in the ratio 2:1:1. The nursery trays were prepared with a well-aerated mixture of sand, soil, and well-rotted farmyard manure (FYM) in equal proportions (1:1:1, v/v). Four varieties of healthy and disease-free seeds were sown in protray on four different dates: 20<sup>th</sup> November, 30<sup>th</sup> November, 10<sup>th</sup> December, and 20<sup>th</sup> December in 2022-23. After sowing, a layer of vermicompost was applied over the seeds, and the trays were covered with gunny bags. Careful watering was provided through sprinkling to prevent seed wash-off. Throughout the nursery raising period, adequate irrigation and weeding were carried out. Thinning of seedlings was done to promote better growth and the development of robust and disease-resistant seedlings. The seedlings, which were healthy, disease-free, and of consistent size and vigor at the 3-4 leaf stage, were carefully chosen and transplanted into grow bags on four different dates for planting: D<sub>1</sub>, D<sub>2</sub>, D<sub>3</sub>, and D<sub>4</sub> in the 2022-23 season.

Vegetative parameters *i.e.*, Plant height (cm), Number of leaves per plant, Plant spread (cm) and Number of branches per plant while Floral parameter *i.e.*, Days to first flowering, Number of flowers per plant, Flower yield per plant (g), Flower diameter (cm) and vase life of flower were recorded. The data collected was analyzed by using analysis of variance (Steel and Torrie, 1980) [16].

## Result and Discussion

### Growth Parameter

#### Plant Height (cm)

The data presented in the table 1 shows the mean plant height (cm) of four different varieties. The significant tallest variety was V<sub>2</sub> (Phule Ganesh Purple) with a mean height of 64.1 cm, while V<sub>1</sub> (Phule Ganesh Violet) was shorter with mean heights of 45.6 cm. Among the different date of sowing the plants from the D<sub>2</sub> sowing dates had heights of 59.0 cm, which were significantly higher than the heights of plants from the other planting dates. The plants with late planting which was D<sub>4</sub> sowing dates had a minimum plant height (48.0 cm) Interaction between varieties and sowing dates was unable to show significant differences on plant height. The tallest plants were observed in V<sub>2</sub>D<sub>2</sub> (70.0 cm). The shortest plants were recorded in V<sub>1</sub>D<sub>4</sub> (38.3 cm)

The variation in plant height among cultivars is primarily attributed to the genetic makeup of the plants. The interplay between different genes and their interactions with the environment determines the observed phenotypic variation. Similar variation in plant height due to genotypes was also observed in china aster by Chavan *et al.* (2010) [11] in China Aster, Poornima *et al.* (2006) [13] and Munikrishnappa (2011) [9], Zosiamlina *et al.* (2012) [18].

The plants that were planted on November 30 exhibited the tallest growth, likely due to the extended duration available for vegetative growth. Consequently, these plants had a longer growth period compared to the crops planted at a later date, resulting in greater overall height. These results are in close agreement with the earlier findings of Mishra (1997) [8] in marigold under Samastipur, Bihar conditions. Similar results have also been reported by Dilta *et al.* (2007) [4] who observed more plant height of China Aster.

The combination of planting dates and varieties had an interactive effect on plant height, and the study showed that

the maximum plant height was observed in V<sub>2</sub>D<sub>2</sub>, which refers to the planting of 'Phule Ganesh Purple' on November 30<sup>th</sup>. This outcome can be attributed to the fact that the crop planted early had more time to undergo substantial vegetative growth, which was further enhanced by the superior genotype of 'Phule Ganesh Purple'. These findings align closely with the earlier research conducted by Dilta *et al.* (2007) [4].

#### Number of leaves

The significant effect found in number of leaves among different sowing dates and different variety. The maximum number of leaves found in Phule Ganesh Violet (V<sub>1</sub>) had 60.4 leaves while minimum with V<sub>2</sub> (42.1). Different date of sowing exhibited significant effect on number of leaves. The maximum number of leaves recorded with D<sub>1</sub> having 53.8 leaves while minimum number of leaves with sowing dates of D<sub>4</sub> having 43.1 leaves. The number of leaves in China Aster plants is significantly influenced by different varieties and planting dates. The combination V<sub>3</sub>D<sub>2</sub> (Phule Ganesh Purple sowed on 30<sup>th</sup> November) exhibited the highest leaf number (68.0), In contrast, (Phule Ganesh Purple sowed on 20<sup>th</sup> December) had the lowest recorded leaf count of 32.3. These results are in conformity with the results reported earlier in China Aster by Naikwad *et al.* (2019) [11] and Sankari *et al.* (2019) [14]. Also Similar result found by Dilta *et al.* (2007) [4] in China Aster.

#### Plant Spread (cm)

The Table 1 and 2 revealed that both sowing dates and varieties play a significant role in determining the plant spread of China Aster.

The variety 'Phule Ganesh White' exhibited a significantly maximum plant spread of 28.7 cm. Conversely, the variety 'Phule Ganesh Violet' exhibited the minimum plant spread of 23.7 cm. Among Sowing dates, significantly maximum plant spread (28.1 cm) was recorded with D<sub>1</sub> (20 November), However, minimum plant spread of (24.7 cm) was observed in D<sub>4</sub> (20 December).

The data presented in Table shows significant variations in plant spread were observed among different sowing dates and varieties, The treatment combination V<sub>4</sub>D<sub>2</sub> (Phule Ganesh White sown on 30 November) displayed the maximum plant spread of 32.6 cm. while, V<sub>1</sub>D<sub>4</sub> (Phule Ganesh Violet sown on December 20) had the lowest spread recorded at 22.0 cm.

Plant spread in China Aster is influenced by planting dates and varieties. Early planting dates resulted in greater spread compared to later plantings, and spread decreased with delayed planting time across all varieties. These findings align with Mishra's (1997) [8] research on marigold in Samastipur, Bihar, as well as Kumar and Kaur's (2000) [7] study on Phlox in PAU, Ludhiana. Similar results were also reported by Dilta *et al.* (2007) [4] in China Aster.

The plants of 'Phule Ganesh Pink' attained more spread which may be due to the superiority of these variety over other varieties. These results are also in close agreement with the earlier findings of Singh *et al.* (2018) Dilta *et al.* (2007) [4] Kumar (2005) [7] in China Aster.

The interactive effects of planting dates and varieties revealed maximum plant spread in V<sub>4</sub>D<sub>2</sub> *i.e.* planting of 'Phule Ganesh White' on 30 November which may be due to the reason that early sown crop got maximum time to put up sufficient vegetative growth particularly the more number of branches resulting increasing plant spread which was further catalyzed by the superior genotype of 'Phule Ganesh White'. These

results are in close agreement with the earlier work of Singh *et al.* (2018) Dilta *et al.* (2007)<sup>[4]</sup>, Pandey and Rao (2014)<sup>[12]</sup> in China Aster; Sharma (2014) in French marigold.

Similarly, at 90 days transplanting, V<sub>4</sub>D<sub>2</sub> (Phule Ganesh White sown on November 30) exhibited the highest plant spread of 32.6 cm, which was significantly different from the other treatments. whereas, V<sub>1</sub>D<sub>4</sub> (Phule Ganesh Violet sown on December 20) had the minimum spread recorded at 22.0 cm.

### Number of branches plant<sup>-1</sup>

The impact of different sowing dates had significant impact on number of branches in various varieties. The result revealed Variety Phule Ganesh Pink exhibited the highest branch count (4.7) compared to the other varieties across all growth stages. The minimum number branches (3.7) found in variety Phule Ganesh Violet. Among different sowing dates, plants sowed on D<sub>2</sub> (30<sup>th</sup> November) recorded the highest branch (4.4), while those sowed on D<sub>4</sub> (20<sup>th</sup> December) exhibited the lowest branch (3.9). Although treatment combination V<sub>3</sub>D<sub>2</sub> (Phule Ganesh Pink sowed on 30<sup>th</sup> November) displayed the highest number of branches with 5.4 branches, which were statistically similar with V<sub>3</sub>D<sub>1</sub> and V<sub>4</sub>D<sub>1</sub> (Phule Ganesh Pink and White sowed on 20<sup>th</sup> November) with 4.5 branches. V<sub>1</sub>D<sub>3</sub> (Phule Ganesh Violet sowed on 20<sup>th</sup> December) had the lowest branch count recorded at 3.3.

It is varietal trait and variations among the genotypes are attributed to the genetic makeup of the plant. Variation in number of primary and secondary branches due to varieties has been reported by Chowdhuri *et al.*, 2016, Pandey and Rao (2014)<sup>[12]</sup> in China Aster; Sharma (2014) in French marigold and Munikrishnappa *et al.* (2013)<sup>[9]</sup> in china Aster.

Sowing dates play a crucial role in number of primary and secondary branches. Early sowing, such as on 20<sup>th</sup> November and 30<sup>th</sup> November, resulted in superior vegetative parameters compared to later sowing dates. This may be due to, early sowing allows the crop to take advantage of favorable environmental conditions, such as higher soil moisture and temperature, which are conducive to seed germination and early growth.

### Effect on Flowering and Yield parameters

#### Days to first flowering

The study examined the impact of different sowing dates and varieties on the time taken for flower formation in China Aster. Significant variations were observed among varieties, with 'Phule Ganesh Pink' taking the shortest duration (47.2 days) and 'Phule Ganesh Violet' taking the longest (67.4 days) for first flower formation. Among the sowing dates, the longest duration (61.8 days) was observed with December 20<sup>th</sup>, while the shortest duration (52.5 days) was recorded on November 30<sup>th</sup>. The interaction between sowing dates and varieties was significant, with early flowering (37.4 days) observed in the combination involving 'Phule Ganesh Pink' sown on November 30<sup>th</sup>. The longest duration (73.7 days) for first flowering was recorded when 'Phule Ganesh Violet' was sown on November 20<sup>th</sup>.

The time taken for first flower formation in China Aster is influenced by both sowing dates and varieties, either individually or in combination. The variation in flowering duration among different genotypes is attributed to their genetic makeup. Similar findings have been reported by Palai *et al.* (2008), Zosiamlina *et al.* (2012)<sup>[18]</sup>, and Chowdhari *et al.* (2016)<sup>[2]</sup> in their studies on China Aster. Delayed planting

dates, such as D<sub>4</sub>, resulted in longer durations for first flower formation, possibly due to lower temperatures and reduced sunlight. Factors like soil moisture, nutrient availability, and photoperiod also affect flowering time. These results are consistent with the studies conducted by Singh *et al.* (2018) and Gaidhani *et al.* (2020)<sup>[6]</sup> in China Aster.

### Number of flowers per plant

The Significant variations were observed among the different varieties in terms of the number of flowers plant<sup>-1</sup>. 'Phule Ganesh Pink' displayed the highest number of flowers per plant (43.8), followed by 'Phule Ganesh Purple' with (37.3). Conversely, 'Phule Ganesh Violet' exhibited the lowest number of flowers per plant (28.0). The impact of different sowing dates, it is observed that the number of flowers per plant varied across the sowing dates. The highest number of flowers per plant (41.7) was recorded for sowing on D<sub>2</sub> (30<sup>th</sup> November), followed by D<sub>1</sub> (37.1). On the other hand, the lowest number of flowers per plant (28.6) was observed for plants sown on D<sub>4</sub> (20<sup>th</sup> December).

The treatment combination V<sub>3</sub>D<sub>2</sub> (Phule Ganesh Pink sown on 30<sup>th</sup> November) resulted in the highest number of flowers per plant (52.1), while V<sub>1</sub>D<sub>4</sub> (Phule Ganesh Violet sown on 20<sup>th</sup> December) exhibited the lowest number of flowers per plant (22.5).

Among the varieties tested, the 'Phule Ganesh Pink' variety displayed superior performance by producing a higher number of flowering stems plant<sup>-1</sup>. This highlights its advantage in flower shoot production compared to the other varieties. These findings align with previous studies conducted by Shete *et al.* (2023)<sup>[15]</sup>, Singh *et al.*, (2021), Tirakannanavar *et al.* (2015)<sup>[17]</sup> in China Aster, Earlier sowing dates in China Aster resulted in a higher number of flowering stems per plant compared to later sowing dates. This is attributed to the plants having more time for vegetative growth, allowing for the production of additional shoots that later develop into reproductive stems. The presence of more branches also contributes to an increased number of potential flower-bearing stems. Consequently, early sowing promotes greater vegetative growth and enhances flower production in China Aster. Singh *et al.* (2018), Dhatt and Kumar (2010)<sup>[13]</sup>.

### Flower diameter (cm)

The analysis of flower diameter revealed significant variations among different varieties. Among the varieties, 'Phule Ganesh Pink' exhibited the largest flower diameter, measuring 5.0 cm. It was followed by 'Phule Ganesh White' with a flower diameter of 4.60 cm. whereas, 'Phule Ganesh Violet' and 'Phule Ganesh Purple' displayed smaller flower diameters, measuring 3.9 cm and 3.8 cm, respectively. Regarding the effect of sowing dates, there were also significant differences observed. The largest flower diameter (4.7 cm) was recorded in plants sowed on D<sub>2</sub> (30<sup>th</sup> November), while the smallest flower diameter (3.4 cm) was observed in plants sowed on D<sub>4</sub> (20<sup>th</sup> December).

Among the different treatment, the largest flower size (5.8 cm) was observed in V<sub>3</sub>D<sub>2</sub>, which represents 'Phule Ganesh Pink' variety sown on D<sub>2</sub> (30<sup>th</sup> November). This was followed by V<sub>3</sub>D<sub>1</sub>, where the same variety was sown on D<sub>1</sub> (20<sup>th</sup> November) with a flower diameter of 5.2 cm. On the other hand, the smallest flower diameter (3.4 cm) was recorded in V<sub>2</sub>D<sub>4</sub>, representing 'Phule Ganesh Purple' variety sown on D<sub>4</sub> (20<sup>th</sup> December).

Maximum flower size found in Phule Ganesh Pink that might be due to environmental factors and genetic factors specific to the 'Phule Ganesh Pink' variety may also play a role in determining flower diameter. Genetic makeup can influence the overall size and development of flowers, leading to variations in diameter among plants sowed on different dates. Plants sowed on November 30<sup>th</sup> (D<sub>2</sub>) had a longer growth period, providing more favorable environmental conditions for flower formation, including increased sunlight exposure and optimal temperatures, resulting in larger flower diameter. The maximum flower size observed in V<sub>3</sub>D<sub>2</sub>, representing the 'Phule Ganesh Pink' variety sown on November 30<sup>th</sup>, variations in flower diameter can be attributed to a combination of genetic factors, environmental conditions, growth duration, and their intricate interactions. These findings align closely with the previous research conducted by Dilta *et al.* (2007) [4].

### Yield of Flower per plant

#### Effect of varieties

Among different varieties (Table 4.5). 'Phule Ganesh Pink' exhibited the highest average weight of flowers per plant (118.8 g), followed by 'Phule Ganesh White' (89.7 g) whereas minimum flower weight per plant found 'Phule Ganesh Violet' (54.8 g). The plants sown on '30 November' (D<sub>2</sub>) with 114.9 g followed by, '20 November' (D<sub>1</sub>) had the highest average weight (87.0 g), while minimum flower weight per plant observed in '20 December' (D<sub>4</sub>) with 57.1 g.

The highest flower yield of 180.8 grams per plant was observed in the treatment combination V<sub>3</sub>D<sub>2</sub>, which involved sowing the 'Phule Ganesh Pink' variety on the 30<sup>th</sup> of November (D<sub>2</sub>). This was followed by the treatment combination V<sub>4</sub>D<sub>2</sub>, where the Phule Ganesh White variety

was sown on the 30<sup>th</sup> of November (D<sub>1</sub>), resulting in a flower yield per plant of 132.7 grams. Conversely, the lowest flower yield per plant of 40.6 grams was recorded in the treatment combination V<sub>1</sub>D<sub>4</sub>, which involved sowing the 'Phule Ganesh Violet' variety on the 20<sup>th</sup> of December (D<sub>4</sub>).

The yield of flowers produced per plant might be directly related to production of maximum number of leaves and branches per plant with good number of developed flower buds on the plant, thereby synthesis of more photosynthates resulted in production of good yield of quality flowers on the branches. Also, the increased flower yield might be due to increased weight of flower and number of flowers per plant. The similar results were obtained in China Aster which are reported by Chavan *et al.* (2010) [1] and Zosiamliana *et al.* (2012) [18]. Santhosh *et al.* (2020)

#### Vase life of flower (Days)

The duration of vase life varied among the different China Aster varieties. The 'Phule Ganesh Violet' variety (V<sub>1</sub>) demonstrated a vase life of 8.8 days, while the 'Phule Ganesh Purple' variety (V<sub>2</sub>) exhibited a slightly lowest vase life of 8.4 days. On the other hand, the 'Phule Ganesh Pink' variety (V<sub>3</sub>) displayed the highest vase life of 11.9 days, followed closely by the 'Phule Ganesh White' variety (V<sub>4</sub>) with a vase life of 10.9 days.

Among the sowing dates, the flowers sown on November 20 (D<sub>1</sub>) had a vase life of 10.8 days, while those sowed on November 30 (D<sub>2</sub>) showed a slightly longer vase life of 11.0 days. On the other hand, flowers sown on December 10 (D<sub>3</sub>) had a vase life of 9.4 days, whereas those sowed on December 20 (D<sub>4</sub>) exhibited the shortest vase life of 8.8 days.

The data analysis shows non-significant interaction between sowing dates and varieties on the vase life of flowers.

**Table 1:** Effect of Different Variety and Sowing dates on growth of China Aster

Variety		Plant height (cm)	Number of leaves/plant	Number of branches/plant	Plant spread (cm)
V <sub>1</sub>	(Phule Ganesh Violet)	45.6	44.3	2.7	23.7
V <sub>2</sub>	(Phule Ganesh Purple)	64.1	42.1	2.6	24.4
V <sub>3</sub>	(Phule Ganesh Pink)	60.5	60.4	3.4	28.0
V <sub>4</sub>	(Phule Ganesh White)	46.9	56.7	3.0	28.7
Sem±		0.89	0.92	0.15	0.41
CD at 5%		2.58	2.64	0.44	1.18
Sowing Dates					
D <sub>1</sub>	(20 November)	56.5	53.8	3.0	26.7
D <sub>2</sub>	(30 November)	59.0	57.4	3.3	28.1
D <sub>3</sub>	(10 December)	53.6	49.2	2.9	25.3
D <sub>4</sub>	(20 December)	48.0	43.1	2.5	24.7
Sem±		0.89	0.92	0.15	0.41
CD at 5%		2.57	2.64	0.44	1.18

**Table 2:** Interaction Effect of Different Variety and Sowing dates on growth characters of China Aster

Treat.	Plant height (cm)	Number of leaves / plant	Number of branches / Plant	Plant spread (cm)
V <sub>1</sub> D <sub>1</sub>	53.1	54.1	4.1	24.1
V <sub>1</sub> D <sub>2</sub>	49.1	50.1	3.8	24.7
V <sub>1</sub> D <sub>3</sub>	41.8	37.3	3.3	24.0
V <sub>1</sub> D <sub>4</sub>	38.3	35.8	3.6	22.0
V <sub>2</sub> D <sub>1</sub>	64.3	41.1	4.0	24.5
V <sub>2</sub> D <sub>2</sub>	70.0	46.9	4.0	26.4
V <sub>2</sub> D <sub>3</sub>	62.6	48.1	4.1	23.7
V <sub>2</sub> D <sub>4</sub>	59.6	32.3	3.7	22.9
V <sub>3</sub> D <sub>1</sub>	63.0	62.6	4.5	29.8
V <sub>3</sub> D <sub>2</sub>	65.2	68.0	5.4	28.7
V <sub>3</sub> D <sub>3</sub>	60.0	57.9	4.4	25.7
V <sub>3</sub> D <sub>4</sub>	53.8	52.9	4.4	27.7
V <sub>4</sub> D <sub>1</sub>	45.6	57.3	4.5	28.2

V <sub>4</sub> D <sub>2</sub>	51.7	64.6	4.3	32.6
V <sub>4</sub> D <sub>3</sub>	50.1	53.5	4.2	27.6
V <sub>4</sub> D <sub>4</sub>	40.2	51.5	3.8	26.3
Sem±	1.79	1.83	0.31	0.72
CD at 5%	5.15	5.28	0.88	2.07

**Table 3:** Effect of Different Variety and Sowing dates on flowering characters of China Aster

Variety		Days to first flowering	Number of flower/ plant	Flower diameter (cm)	Yield of Flower/plant (g)	Vase Life (Days)
V <sub>1</sub>	(Phule Ganesh Violet)	67.4	28.0	3.9	54.74	8.8
V <sub>2</sub>	(Phule Ganesh Purple)	61.2	37.3	3.8	63.14	8.4
V <sub>3</sub>	(Phule Ganesh Pink)	47.2	43.8	5.0	118.82	11.9
V <sub>4</sub>	(Phule Ganesh White)	55.1	31.6	4.6	89.67	10.9
Sem±		0.75	0.96	0.09	4.69	1.00
CD at 5%		2.15	2.77	0.25	13.51	2.89
Sowing Dates						
D <sub>1</sub>	(20 November)	56.5	37.2	4.5	87.05	10.8
D <sub>2</sub>	(30 November)	52.6	41.7	4.7	114.91	11.0
D <sub>3</sub>	(10 December)	60.0	33.2	4.0	67.33	9.4
D <sub>4</sub>	(20 December)	61.8	28.7	4.0	57.09	8.8
Sem±		0.75	0.96	0.09	4.69	1.00
CD at 5%		2.15	2.77	0.25	13.51	2.89

**Table 4:** Interaction Effect of Different Variety and Sowing dates on flowering characters of China Aster

Treat.	Days to first flowering	Number of flowers /Plant	Flower diameter (cm)	Yield of Flower/ plant (g)	Vase Life (Days)
V <sub>1</sub> D <sub>1</sub>	73.7	29.6	4.3	69.3	10.6
V <sub>1</sub> D <sub>2</sub>	70.7	33.5	4.0	66.0	9.8
V <sub>1</sub> D <sub>3</sub>	63.3	26.5	3.5	43.0	7.4
V <sub>1</sub> D <sub>4</sub>	62.1	22.5	3.7	40.6	7.4
V <sub>2</sub> D <sub>1</sub>	63.6	39.5	3.8	59.2	8.6
V <sub>2</sub> D <sub>2</sub>	57.4	42.6	3.9	80.1	9.6
V <sub>2</sub> D <sub>3</sub>	62.6	35.6	3.9	65.1	8.7
V <sub>2</sub> D <sub>4</sub>	61.0	31.5	3.4	48.1	6.7
V <sub>3</sub> D <sub>1</sub>	42.0	45.9	5.2	123.4	12.8
V <sub>3</sub> D <sub>2</sub>	37.4	52.1	5.8	180.8	12.9
V <sub>3</sub> D <sub>3</sub>	54.7	41.1	4.4	86.3	10.9
V <sub>3</sub> D <sub>4</sub>	54.7	36.0	4.6	84.8	11.0
V <sub>4</sub> D <sub>1</sub>	46.7	33.6	4.7	96.2	11.4
V <sub>4</sub> D <sub>2</sub>	44.7	38.6	5.1	132.7	11.8
V <sub>4</sub> D <sub>3</sub>	59.6	29.5	4.4	75.0	10.7
V <sub>4</sub> D <sub>4</sub>	69.5	24.6	4.2	54.8	9.9
Sem±	1.50	1.92	0.17	9.38	0.56
CD at 5%	4.31	5.54	0.50	27.01	1.62

## Conclusion

Based on the current research, the following conclusions have been drawn, which can offer economic benefits for the commercial cultivation of China Aster in the Raipur region of Chhattisgarh Plains: Among the four Sowing Dates, the most favorable timing for achieving desirable growth and flowering parameters in China Aster was achieved in the variety Phule Ganesh Pink followed by Phule Ganesh White and Phule Ganesh Purple, was observed to be D<sub>2</sub>, referring to Sowing on November 30, 2022.

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