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Yield and Quality Performance of China Aster (*Callistephus chinensis* (L) Nees) Varieties under Nagpur Conditions

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Abstract

This study was conducted during the Rabi season of 2024-2025 at the P.G Research Farm, Horticulture Section, College of Agriculture, Nagpur, Maharashtra to identify the most suitable China aster varieties for optimal quality and yield under local climatic conditions. The experiment was laid out in a Randomized Block Design comprising twelve treatments, including varieties from the Arka series (Arka Poornima, Arka Kamini, Arka Aadya, Arka Shashank, Arka Shubhi, Arka Archana, Arka Advika and Arka Nirali and Phule Ganesh series Phule Ganesh White, Phule Ganesh Violet, Phule Ganesh Purple and Phule Ganesh Pink each replicated three times. Results demonstrated that Phule Ganesh White exhibited superior yield performance, producing the highest flower yield per plant (111.26 g), plot yield (1.34 kg) and hectare yield (123.63 q), followed by Arka Archana (92.16 g), (1.11 kg) and (102.40 q) respectively and Arka Aadya (84.66 g), (1.02 kg) and (94.07 q) respectively. Regarding quality parameters, Phule Ganesh White recorded the maximum flower diameter (7.49 cm) flower weight (3.16 g) and shelf life (4.93 days) while Arka Poornima exhibited the minimum disc diameter (1.65 cm). Arka Aadya produced the highest number of flowers per plant (42.33). The findings conclusively indicate that Phule Ganesh White is the most suitable variety for cultivation under Nagpur conditions, offering superior yield and quality parameters, with Arka Archana and Arka Aadya serving as viable alternative cultivars.

Keywords: China aster; Variety evaluation; Yield; Flower quality; Shelf life; Nagpur condition; Maharashtra

1. Introduction

The adoration and admiration for the beauty of flowers and its use has been noted ever since the beginning of human civilization. Floriculture a specialized branch of horticulture, focuses on cultivating, processing and marketing of flowering and ornamental plants. This includes a diverse range such as cut flowers, loose flowers, potted plants, foliage plants and even plants grown for essential oils or dried arrangements. It's a dynamic industry with significant aesthetic, social, and economic value, contributing to landscaping, events, employment generation and foreign exchange through trade.

The total area flower production in India was 3.17 lakh hectares with the production of 26.58 lakh tonnes of loose flowers and 8,76,520 cut flowers during 2023-2024[1]. In India major flower growing states are Kerala, Tamil Nadu, Karnataka, Andhra Pradesh, Madhya Pradesh, Maharashtra, Gujarat, West Bengal etc. The production of flowers were recorded highest in Tamil Nadu with an average production of 628.79 thousand tonnes followed by Madhya Pradesh with the production of 505.61 thousand tonnes.

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Total area in Maharashtra under floriculture was 11,060 ha with the production of 61560 tonnes of loose flowers and 99,180 cut flowers during the year 2023-2024[1]. In production of flower Maharashtra is one of the important state of the country. Flowers have more demand at the time of various festivals and functions for floral decoration. China aster is more popular among the farmers of Maharashtra due to its easy cultivation for loose flowers as well as for cut flowers.[2]

China aster widely appreciated for its vibrant blooms and dual utility as loose and cut flowers, stands as the third most important annual flower (after Chrysanthemum and Marigold). It thrives under India's diverse agro-climatic tapestry and is cultivated across Karnataka, Tamil Nadu, West Bengal and Maharashtra. In Maharashtra, especially in the western region encompassing Pune, Nashik, Satara and Ahilyanagar. China aster cultivation by small and marginal farmers has gained prominence. Among tested varieties, Phule Ganesh White emerged superior in plant growth, flowering duration, stalk length, flower yield and vase life under Pune conditions.[3]

Among flowering plants, China aster (*Callistephus chinensis* (L) Nees) is a prominent member of the Asteraceae family. This free-blooming, half-hardy, easy-to-grow winter annual is popular for both cut and loose flowers. Its bloom type is determined by the number and shape of its florets, with the shape of ray florets being a key classification character. After chrysanthemum and marigold, China aster holds significant importance among traditional flowers. The name of the genus '*Callistephus*' is derived from two Greek words 'Kalistos' meaning 'most beautiful' and 'Stephus', 'a crown' referring to the flower head. The genus *Callistephus* has only a single species i.e. *C. chinensis* and behave as a diploid plant (2n = 18). China aster is one of the most important traditional flowers in India and has maximum use for traditional purposes. The commercial importance of China aster is increasing in India especially in Karnataka, Tamil Nadu, West Bengal and Maharashtra [4,5].

China aster is commercially grown by marginal and small farmers in western region of Maharashtra. China aster flower has a great demand in local market as cut flower and potted plants, previously it was grown with local varieties, but quality is not up to the mark as desired by the customers due to lacking of selection of varieties as well as improper use of agro-techniques. Although, there are sufficient number of cultivars under cultivation but their performance is region specific and varies from place to place, information on China aster cultivars for loose flower production and cut flower production is lacking under Nagpur and the Vidarbha region of Maharashtra. Hence, the present investigation on 'evaluation of different varieties of China aster under Nagpur Conditions' during rabi season was undertaken.

1.1. Importance of study

China aster (*Callistephus chinensis* (L) Nees) is one of the most economically important annual flower crops in India, valued for its diverse colors, long-lasting blooms, and adaptability as both loose and cut flowers. Maharashtra, being one of the leading states in floriculture with over 11,000 hectares under flower cultivation offers immense potential for commercial cultivation of China aster. However, varietal performance can vary widely depending on local agro-climatic factors such as temperature, soil type and rainfall patterns.

Despite the region's growing interest in floriculture, limited research has been conducted on 'evaluation of different varieties of China aster under Nagpur Conditions'. Therefore, this study is essential for identifying high-performing varieties suited to the local environment.

Objective: To study the performance of China aster varieties for better yield and quality parameters under Nagpur conditions.

2. Material and methods

During the academic year 2024-25, research entitled "Evaluation of different varieties of China aster under Nagpur conditions" have been successfully conducted at PG Research Farm, Horticulture Section, College of Agriculture, Nagpur during Rabi season (November -April) and the details of used experimental materials, methods followed and adopted techniques have been discussed in this chapter.

2.1. Geographical Location

Nagpur city lies along the Nag River and is situated almost at the geographic center of the country, which comes under Vidarbha region of Maharashtra State. It is situated in sub-tropical zone at the latitude of 21.10^{o}N and longitude of 79.19^{0}E. The altitude of the place is 310.26 meters above the mean sea level.

2.2. Climatic and weather Conditions

Nagpur city has diversified climatic conditions which comes under Vidarbha region of Maharashtra state. It is located in the sub- tropical zone at the latitude of 21.10^{o}N and longitude of 79.19^{0}E. Nagpur is characterized by hot and dry summer and fairly cold winter. The mean annual minimum and maximum temperatures are 10.2 to 43.7^{0}C respectively. The humidity ranges from 28 to 69% during morning hours and 16 to 34% during evening hours in summer and 35 to 90% during morning hours and 18 to 83% during evening hours on rainy days. The mean annual precipitation based on the last fifteen years is 1250 mm which is received almost from the south-west monsoon.

The weekly meteorological data with respect to rainfall, humidity and temperature recorded at Meteorological Observatory, Department of Agronomy, College of Agriculture, Nagpur, Maharashtra.

2.3. Experimental Details

The experiment was laid out in Randomized Block Design (RBD) with twelve treatments which were replicated thrice. The layout of an experiment is depicted in Fig. 1 and experimental details are given below.

Figure 1 View of experimental plot at full bloom stage

2.4. Growth parameters

Plant Height (cm), Branches plant^{-1}, Plant Spread at 50 % flowering (cm) EW/SN, Leaf area (cm^{2}).

2.5. Quality parameters

Diameter of fully opened flower (cm), Disc diameter (cm), Weight of flower (g), Shelf life (days).

3. Results and discussion

The results of the investigation, regarding the China aster on yield and flower quality have been presented in tables and bar-diagrams. The result of the experiment has been presented under the following heading.

3.1. Yield parameters of different varieties of China aster

In terms of yield parameters of significantly maximum number of flowers plant^{-1} were produced by variety Arka Aadya (42.33) and minimum number of flowers plant^{-1} were produced by variety Arka Shashank (25.64).

In terms of maximum yield of flowers plant^{-1} was recorded in variety Phule Ganesh White (111.26 g). Whereas, the minimum yield of flowers plant^{-1} was recorded in variety Arka Nirali (53.17 g). In any crop, yield parameters are more important for commercial production. It is mostly dependent on yield attributes *viz.,* number of flowers plant^{-1}, diameter and weight of flower etc. so, variation in all these characters of different varieties might have reflected in yield of flowers.

The maximum yield of flowers plot^{-1} was observed in variety Phule Ganesh White (1.34 kg). Whereas, minimum yield of flowers plot^{-1} was produced by Arka Nirali (0.64 kg). So, variation in all these characters in different varieties might have reflected in yield of flowers per plot.

Number of maximum yield of flowers hectare^{-1} was recorded in Phule Ganesh White (123.63 q) and minimum yield quintal of China aster observed in variety was recorded in variety Arka Nirali (59.96 q). The differentiating ability of number of flowers plant^{-1}, yield of flowers plant^{-1}, flowers plot^{-1} and flowers ha^{-1} in various varieties of China aster could be attributed to their individual genetic potential. These results are in close agreement with the findings of [6,7,8,9,10] in China aster respectively.

Arka Aadya

Arka Advika

Phule Ganesh White

Figure 2 Best China Aster Varieties for Number of Flowers

Table 1 Yield Parameters of different varieties of China aster

Varieties	Number of flowers plant^{-1}	Yield of flowers plant^{-1} (g)	Yield of flowers plot^{-1} (kg)	Yield of flowers hectare^{-1} (q)
Arka Poornima	26.50	67.05	0.80	74.49
Arka Kamini	27.33	66.41	0.80	73.79
Arka Aadya	42.33	84.66	1.02	94.07
Arka Shashank	25.64	57.43	0.69	63.82
Arka Shubhi	35.08	77.18	0.93	85.75
Arka Archana	40.60	92.16	1.11	102.40
Arka Advika	26.73	56.67	0.68	62.96
Arka Nirali	25.81	53.17	0.64	59.96
Phule Ganesh White	35.21	111.26	1.34	123.63
Phule Ganesh Voilet	29.01	82.10	0.99	91.22
Phule Ganesh Purple	31.42	68.18	0.82	75.76
Phule Ganesh Pink	29.81	68.56	0.82	76.18
F test	Sig.	Sig.	Sig.	Sig.
S.E (m) ±	0.96	2.35	0.06	6.49
C.D. at 5%	2.85	6.99	0.19	19.28

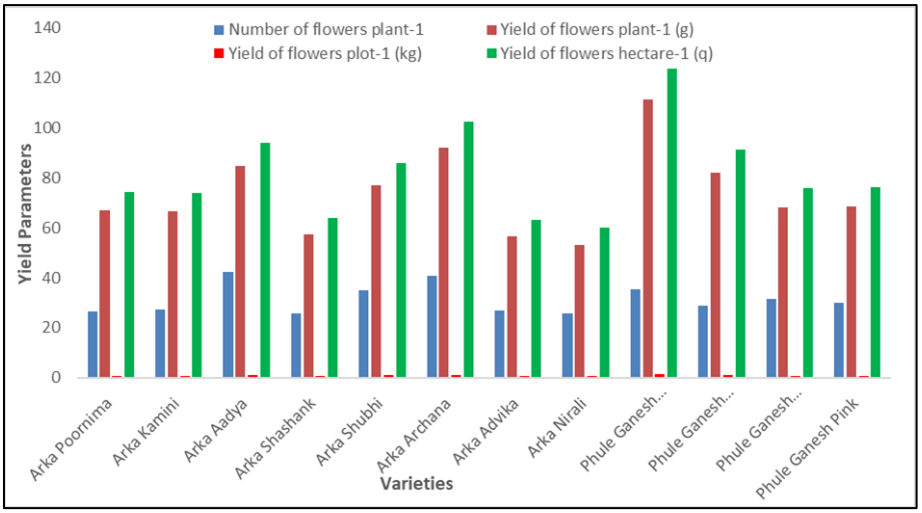

Figure 3 Yield parameters of different varieties of China aster

3.2. Quality parameters of different varieties of China aster

As shown in Table 2 and Fig.2, there was a significant difference observed in the quality parameters. Amongst the varieties, significantly the maximum diameter of fully opened flower was recorded in variety Phule Ganesh White (7.49 cm) and the minimum diameter of fully opened flower was recorded in variety Arka Nirali (3.48 cm). The variation in the diameter of fully opened flower in varieties of China aster might be attributed due to vigorous growth, profuse branching and the differences in genetic makeup of different varieties.

The significantly minimum disc diameter of flower was recorded in variety Arka Poornima (1.65 cm) and whereas, the maximum disc diameter of flower was recorded in variety Arka Shubhi (2.61 cm). The variation in disc diameter of flower of different varieties of China aster might be due to genetic makeup of individual variety.

The weight of flower was significantly maximum in variety Phule Ganesh White (3.16 g) and the significantly minimum weight of flower was recorded in variety Arka Aadya (2.00 g). The variation in average weight of flower might be due to the variation in size, length of flower and number of petals flower^{-1}.

The maximum shelf life was observed in variety Phule Ganesh White (4.93 days) and minimum shelf life was recorded in variety Arka Nirali (1.53 days). The variety Phule Ganesh White recorded maximum shelf life of flower. This might be due to lower ethylene sensitivity, reduced transpiration rates, more vegetative growth, early initiation of flowering and more diameter of flower which might have helped the flower to last longer at ambient temperature.

These all-quality parameters-based results are in close agreement with findings of [11] in China aster, [12] in China aster and [13,14,15] respectively.

Table 2 Quality Parameters of different varieties of China aster

Treatments	**Diameter of fully opened flower (cm)**	**Disc diameter of flower (cm)**	**Weight of flower (g)**	**Shelf life of flower (days)**
Arka Poornima	4.93	1.65	2.53	3.07
Arka Kamini	5.90	1.87	2.43	2.37
Arka Aadya	6.08	2.18	2.00	3.22
Arka Shashank	4.18	2.43	2.24	3.83
Arka Shubhi	5.18	2.61	2.20	2.80
Arka Archana	6.81	2.54	2.27	3.43
Arka Advika	4.40	2.00	2.12	2.70
Arka Nirali	3.48	1.88	2.06	1.53
Phule Ganesh White	7.49	2.23	3.16	4.93
Phule Ganesh Voilet	6.85	2.11	2.83	4.10
Phule Ganesh Purple	6.86	1.73	2.17	4.11
Phule Ganesh Pink	5.71	2.25	2.30	3.80
F test	Sig.	Sig.	Sig.	Sig.
S.E (m) ±	0.16	0.11	0.13	0.19
C.D. at 5%	0.50	0.32	0.40	0.58

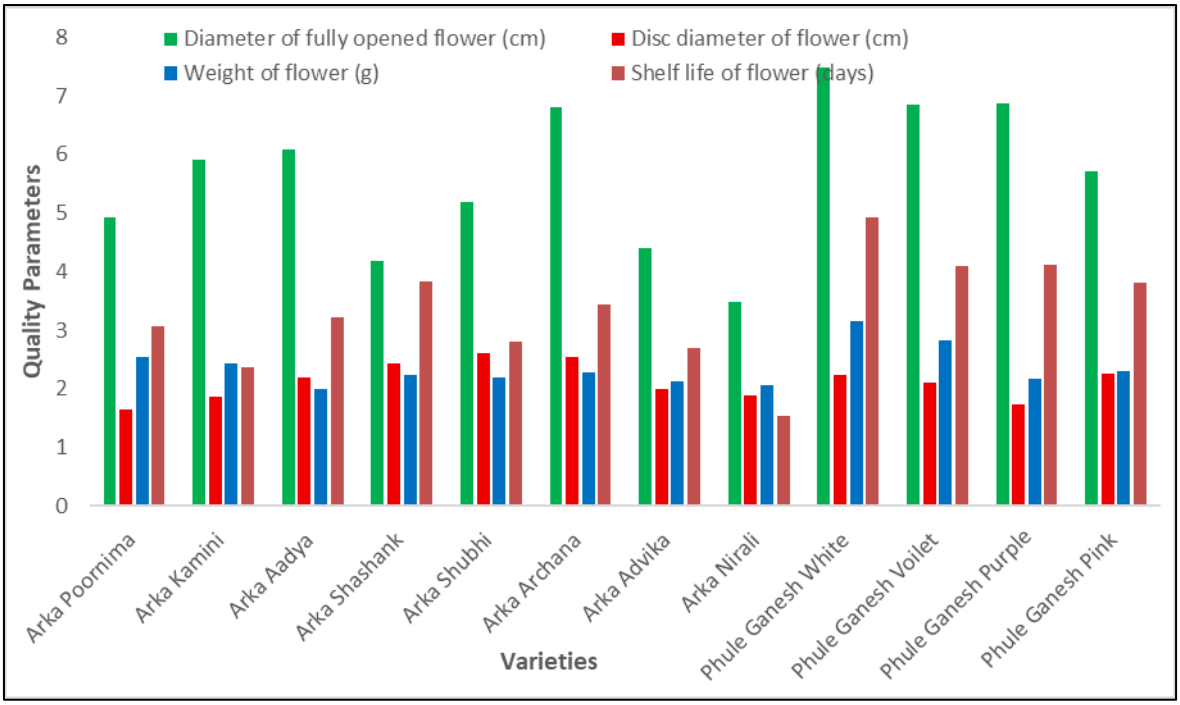

Figure 4 Quality Parameters of different varieties of China aster

4. Conclusion

The experiment was laid out in Randomized Block Design with Twelve treatments. The treatments were Arka Poornima, Arka Kamini, Arka Aadya, Arka Shashank, Arka Shubhi, Arka Archana, Arka Advika, Arka Nirali, Phule Ganesh White, Phule Ganesh Voilet, Phule Ganesh Purple and Phule Ganesh Pink. replicated thrice. The conclusions obtained in respect of yield and quality of Chaina aster varieties are –

Maximum number of flowers plant^{-1} (42.33) were recorded in variety Arka Aadya, yield of flowers plant^{-1} (111.26 g), yield of flowers plot^{-1} (1.34 kg) and yield of flowers ha^{-1} (123.63 q) were recorded in variety Phule Ganesh White followed by Arka Archana and Arka Aadya.

Maximum diameter of fully opened flower (7.49 cm), weight of flower (3.16 g) and shelf life (4.93 days) were recorded in variety Phule Ganesh White. However, minimum disc diameter of flower (1.65 cm) was recorded in variety Arka Poornima.

Thus, it can be inferred from the present investigation that, the variety Phule Ganesh White was found better in respect of yield parameters followed by Arka Archana and Arka Aadya.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors declare that there are no competing interests.

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