



ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; 12(5): 3266-3268
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www.thepharmajournal.com

Received: 15-02-2023

Accepted: 18-03-2023

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Evaluation of China aster varieties under Pune conditions

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Abstract

An investigation on 'Evaluation of China aster varieties under Pune conditions' was carried out at All India Co Ordinated Research Project, Zonal Agricultural Research station Ganeshkhind Pune -67 (Maharashtra, India) during 2020-21 and 2021-22 in randomized block design with 09 treatments and three replications. The results revealed that variety Phule Ganesh White recorded maximum plant height, stalk length, number of flowers plant⁻¹ and shelf life. Phule Ganesh White variety recorded significantly maximum flowering duration (days) and 100 flowers weight. However, the maximum plant spared (cm), Days to flowering and flower diameter (cm) was noticed in Phule Ganesh Violet variety. The variety Phule Ganesh Pink has recorded maximum vase life of flower. Finally, it concluded that among the different varieties of China aster studied, variety Phule Ganesh White was found superior in respect of growth, flower yield as well as quality parameters under Western Maharashtra particularly Pune condition.

Keywords: China aster, evaluation, growth, flower yield and quality

Introduction

China aster (*Callistephus chinensis* Nees) belongs to one of the largest families of flowering plants 'Asteraceae'. It is a free blooming half hardy, easy growing winter annual crop grown for cut flower as well as loose flower. The bloom type depends mainly upon the relative number of the two kinds of florets and their shapes. The most suitable character for the classification of China aster is the shape of ray florets. Among the traditional flowers China aster ranks next to chrysanthemum and marigold in importance. Though the flower yield and quality are primarily varietal characters, they are also greatly influenced by climatic factors, ultimately leading to variation in their performance. 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 are region specific and varies from place to place, information on best China aster cultivar for loose flower production and cut flower production is lacking under the western region of Maharashtra. Hence, the present investigation was undertaken with emphasis on selection of suitable varieties of China aster based on performance for western region of Maharashtra particularly in Pune, Nashik, Satara, Ahmednagar districts of Maharashtra during winter season.

Materials and Methods

An investigation was carried out to evaluate different China aster varieties in respect of growth, flowering, yield and quality of flowers at All India Co-ordinated Research Project on Floriculture, Zonal Agricultural Research Station Ganeshkhind Pune -67 (Maharashtra, India) during the year 2020-21 and 2021-22 from October to March, in randomized block design with nine treatments and three replications comprising of nine varieties of China aster viz., V₁- Arka Kamini, V₂ - Arka Archana, V₃- Arka Aadhya, V₄ - Phule Ganesh Pink, V₅ - Phule Ganesh White, V₆- Phule Ganesh Violet, V₇- Phule Ganesh Purple, V₈- Local White (Bengaluru), V₉- Local Pink (DFR). The plant material of different varieties of China aster was collected from IIHR, Bangalore (Karnataka) and released varieties of from AICRP on Floriculture, ZARS, Ganeshkhind, Pune (Maharashtra).

The experimental plot was brought to fine tilth by ploughing, clod crushing and harrowing. At the time of land preparation, well-rotted FYM @ 30 t ha⁻¹ was mixed uniformly in the soil

before last harrowing. The field was then laid out with ridge beds of the dimension 1.50 m x 2.40 m. As per the treatment, uniform and healthy seedlings of nine varieties of aster were transplanted in the prepared plots at the spacing of 20 cm x 20 cm. Treatment wise half the dose of 100 kg nitrogen was applied in the form of urea before transplanting of seedlings and the remaining half dose of nitrogen was top dressed after 30 days of transplanting. However, the full dose of 50 kg phosphorus and 50 kg potassium ha⁻¹ were applied in the form of single super phosphate and muriate of potash, respectively at the time of transplanting. All the cultural operations viz., weeding, irrigation, pest control etc. were carried out as and when required. Various observations on growth, flowering, yield and quality parameters viz., plant spread, flowering duration, number of flowers plant⁻¹, weight of 100 flowers (g), diameter of flower, and shelf life of flower were recorded at proper stages and the data was statistically analyzed by the method suggested by Panse and Sukhatme (1995) [4].

Results and Discussion

The results presented in Table 1 revealed that, different varieties of China aster had significant effect on all growth, flowering, yield and quality parameters. The response of different cultivars on behalf of vegetative growth regarding plant height, plant spread, the significantly plant height was observed in cultivar Phule Ganesh White (76.59 cm) over other variety, whereas minimum in local pink (35.51 cm). The range for plant spread among the cultivars was from (19.96 to 45.98cm) and the maximum plant spread was found in the cultivar Phule Ganesh violet (45.98 cm). However, range for stalk length of aster plant was from (25.03 to 44.64 cm). The maximum flower stalk length the cultivar Phule Ganesh white (44.64 cm). In respect of Days to flowering the minimum days for 50 per cent flowering was recorded with the variety Phule Ganesh Violet (108.56 days) which was at par with Arka Adhya (110.33), however, the significantly number of days to flowering was found with the variety Phule Ganesh White (126.46 days). The different period required for the 50 per cent flowering in China aster varieties might be due to the varying growth rate and their different genetic make-up. Similar variation due to different varieties have also been observed by Naikwad *et al.* (2019) [3] in China aster.

The significant differences in the plant growth parameters of China aster varieties might be attributed due to the differential genetic makeup and varied growth rate among the varieties of China aster. The better performance of variety Phule Ganesh White in respect of plant spread and stalk diameter might be due to their genetic make-up and better adaptability to the prevailing environmental conditions. These results are in conformity with the results reported earlier in China aster by Zosiamliana *et al.* (2013) [8] and Sankari *et al.* (2019) [7].

The range for flower diameter among the cultivars was from (4.69 to 7.71 cm) and the maximum flower diameter was recorded in the cultivar Phule Ganesh White (7.71 cm). The range for flowering duration of aster among the cultivars was from (22.34 to 38.05 days). The blooming period was registered significantly highest with the variety Phule Ganesh White (38.05 days) and the lowest blooming period was noticed with the variety Phule Ganesh Violet (22.34 days). However, in respect of flower yield and quality parameters like number of flowers plant⁻¹ was maximum in Phule Ganesh White (36.06), and which was followed by the cultivar Arka Archana (34.50). Also flower yield that is weight of 100 flowers (g) were recorded significantly maximum with the cultivar Phule Ganesh White (569.98 g) followed by the cultivar Phule Ganesh violet (442.44 g). The shelf life of loose flower of aster was registered maximum with the variety Phule Ganesh White (6.44 days) which was closely followed by Arka Kamini (6.33 days) and the minimum shelf life was noted with the variety Phule Ganesh Purple (4.68 days). Whereas maximum Vase life was by in variety Phule Ganesh Pink (4.07 days) and minimum vase life recorded by the cultivar Local white (Bengaluru) (2.49 days).

The yield of aster flowers produced per plant might be directly related to production of maximum vegetative growth in respect of plant spread and stem diameter with good number of developed flower buds on the plant, thereby synthesis of more photosynthates resulted in production of highest yield of better-quality flowers on the branches. Also, the increased flower yield might be due to increased diameter of flower and number of flowers produced per plant. The similar results were obtained previously in China aster by Chavan *et al.* (2010) [1], Chowdhuri *et al.* (2016) [2] and Zosiamliana *et al.* (2012) [8].

Table 1: Comparative evaluation of China aster varieties under Pune conditions during 2020-21 and 2021-22

| Treatments | Plant height (cm) | | | Plant spread (cm) | | | Stalk length (cm) | | | Days to flowering (Days) | | | Flower diameter (cm) | | |
|-------------------------|-------------------|---------|-------|-------------------|---------|-------|-------------------|---------|-------|--------------------------|---------|--------|----------------------|---------|------|
| | 2020-21 | 2021-22 | Mean | 2020-21 | 2021-22 | Mean | 2020-21 | 2021-22 | Mean | 2020-21 | 2021-22 | Mean | 2020-21 | 2021-22 | Mean |
| Arka Kamini | 44.43 | 45.21 | 44.82 | 20.37 | 19.54 | 19.96 | 32.57 | 32.48 | 32.53 | 121.33 | 121.40 | 121.37 | 5.60 | 5.53 | 5.57 |
| Arka Archana | 37.93 | 38.25 | 38.09 | 28.53 | 28.84 | 28.69 | 25.10 | 24.96 | 25.03 | 114.33 | 113.70 | 114.02 | 5.50 | 5.43 | 5.47 |
| Arka Adhya | 37.37 | 36.75 | 37.06 | 24.97 | 24.68 | 24.83 | 26.73 | 26.56 | 26.65 | 110.00 | 110.66 | 110.33 | 6.23 | 6.01 | 6.12 |
| Phule Ganesh Pink | 66.40 | 66.51 | 66.46 | 32.10 | 31.73 | 31.92 | 37.77 | 37.48 | 37.63 | 120.67 | 120.59 | 120.63 | 6.80 | 6.67 | 6.74 |
| Phule Ganesh White | 76.83 | 76.34 | 76.59 | 42.27 | 42.54 | 42.41 | 44.63 | 44.65 | 44.64 | 126.33 | 126.59 | 126.46 | 7.73 | 7.68 | 7.71 |
| Phule Ganesh Violet | 64.90 | 64.59 | 64.75 | 46.23 | 45.73 | 45.98 | 34.70 | 34.92 | 34.81 | 108.67 | 108.44 | 108.56 | 7.00 | 6.93 | 6.97 |
| Phule Ganesh Purple | 68.90 | 68.26 | 68.58 | 35.60 | 35.72 | 35.66 | 44.57 | 44.11 | 44.34 | 110.33 | 111.22 | 110.78 | 6.57 | 6.07 | 6.32 |
| Local White (Bengaluru) | 35.43 | 36.62 | 36.03 | 25.90 | 24.85 | 25.38 | 32.57 | 32.67 | 32.62 | 114.00 | 113.77 | 113.89 | 4.83 | 4.54 | 4.69 |
| Local Pink (DFR Pune) | 35.40 | 35.62 | 35.51 | 25.27 | 25.58 | 25.43 | 30.87 | 30.66 | 30.77 | 115.00 | 115.37 | 115.19 | 4.70 | 4.67 | 4.69 |
| SE(m)± | 0.95 | 1.64 | 1.30 | 0.92 | 1.32 | 1.12 | 0.91 | 1.31 | 1.11 | 1.26 | 1.43 | 1.35 | 0.12 | 0.25 | 0.19 |
| C.D.at 5% | 2.86 | 4.97 | 3.92 | 2.78 | 4.00 | 3.39 | 2.74 | 3.95 | 3.35 | 3.81 | 4.32 | 4.07 | 0.37 | 0.74 | 0.56 |

| Treatments | Flower per plant | | | Weight of 100 flowers (g) | | | Flowering duration (days) | | | Vase life (days) | | | Shelf life (days) | | |
|-------------------------|------------------|---------|--------|---------------------------|---------|---------|---------------------------|---------|-------|------------------|---------|-------|-------------------|---------|-------|
| | 2020-21 | 2021-22 | Mean | 2020-21 | 2021-22 | Mean | 2020-21 | 2021-22 | Mean | 2020-21 | 2021-22 | Mean | 2020-21 | 2021-22 | Mean |
| Arka Kamini | 32.00 | 33.33 | 32.67 | 415.93 | 417.42 | 416.68 | 33.00 | 35.89 | 34.45 | 3.20 | 3.53 | 3.37 | 6.00 | 6.33 | 6.17 |
| Arka Archana | 34.00 | 35.00 | 34.50 | 323.73 | 325.16 | 324.45 | 24.00 | 24.33 | 24.17 | 2.90 | 2.90 | 2.90 | 5.67 | 5.62 | 5.65 |
| Arka Adhya | 24.00 | 24.67 | 24.34 | 278.23 | 279.08 | 278.66 | 28.33 | 28.44 | 28.39 | 3.37 | 3.28 | 3.33 | 5.33 | 5.61 | 5.47 |
| Phule Ganesh Pink | 24.67 | 25.33 | 25.00 | 403.20 | 403.13 | 403.17 | 35.00 | 34.67 | 34.84 | 4.07 | 4.06 | 4.07 | 6.00 | 5.87 | 5.94 |
| Phule Ganesh White | 36.00 | 36.11 | 36.06 | 571.83 | 568.13 | 569.98 | 38.33 | 37.77 | 38.05 | 3.73 | 3.78 | 3.76 | 6.33 | 6.44 | 6.39 |
| Phule Ganesh Violet | 19.00 | 19.67 | 19.34 | 442.30 | 442.58 | 442.44 | 22.00 | 22.67 | 22.34 | 3.07 | 3.16 | 3.12 | 5.00 | 5.07 | 5.04 |
| Phule Ganesh Purple | 30.00 | 32.00 | 31.00 | 343.80 | 346.23 | 345.02 | 28.67 | 28.52 | 28.60 | 2.63 | 2.68 | 2.66 | 4.67 | 4.69 | 4.68 |
| Local White (Bengaluru) | 19.67 | 19.89 | 19.78 | 268.83 | 270.45 | 269.64 | 25.67 | 28.26 | 26.97 | 2.43 | 2.54 | 2.49 | 5.00 | 4.93 | 4.97 |
| Local Pink (DFR Pune) | 23 | 24.11 | 23.555 | 33 | 178.89 | 105.945 | 22 | 24.4 | 23.2 | 2.53 | 2.61 | 2.57 | 5.33 | 5.44 | 5.385 |
| SE(m) | 1.15 | 2.78 | 1.965 | 1.26 | 6.49 | 3.875 | 0.86 | 1.73 | 1.295 | 0.17 | 0.16 | 0.165 | 0.56 | 0.3 | 0.43 |
| C.D.at 5% | 3.48 | 8.42 | 5.95 | 3.81 | 19.64 | 11.725 | 2.59 | 2.45 | 2.52 | 0.52 | 0.48 | 0.5 | N/A | 0.92 | 0.92 |

Conclusion

Among the nine different varieties of China aster studied for growth and quality parameters in western Maharashtra particularly under Pune condition the variety Phule Ganesh White was found superior in respect of growth, flower yield as well as quality parameters.

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