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Screening of different varieties for early and late flowering with better growth, flower yield and quality of China aster (*Callistephus chinensis* (L.) Nees)

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Abstract

The present experiment was carried out during November 2020 to March 2021 at Horticultural Research Field, Department of Horticulture, SHUATS, Prayagraj. The experiment was conducted in Randomized Block Design (RBD), with seven varieties of China aster and each Replicated thrice. The varieties were V₁ (Bonita), V₂ (Arka Archana), V₃ (Arka Kamini), V₄ (Matsumoto), V₅ (Arka Poornima), V₆ (Phule Ganesh Pink), V₇ (Arka Shashank). Observations were recorded on growth parameter, flower parameter, yield parameter, self-life and economics of treatments and Subjected to statistical analysis. On the basis of results it was found that the Variety V₆ (Phule Ganesh Pink) was found to be best in Prayagraj in terms of maximum plant spread (cm²), flower diameter (cm), individual flower weight (g), self-life, flower yield/plant(g) and flower yield t/ha after 120 days. Variety V₄ (Matsumoto) recorded minimum plant height (cm), plant spread (cm²), number of primary branch/plant, number of leaves/plant, days of first flowering, days of 50% flowering, flower diameter(cm), stalk length(cm), number of flower/plant, flower yield/plant, flower yield t/ha whereas, maximum plant height, stalk length and number of flowers/plant was recorded in variety V₇ (Arka Shasank), maximum number of primary branches/plant were recorded in Variety V₂ (Arka Archana), maximum number of secondary braches, number of leaves/plant and flowering duration were recorded in variety V₅ (Arka Poornima) maximum number of days taken for first flowering were recorded in variety V₃ (Arka Kamini). In terms of economics of different treatments, maximum total income, net profit, and cost benefit ratio was found in V₆ (Phule Ganesh Pink) followed by treatment V₂ (Arka Archana) whereas, minimum was recorded in treatment V₄ (Matsumoto).

Keywords: China aster, varieties, evaluation, flower parameters, vegetative parameters, yield parameters

Introduction

China aster, scientifically known as *Callistephus chinensis* (L.) Nees. belongs to the family Asteraceae, It is one of the most demanding winter annual flower ranks third just next to Chrysanthemum and Marigold. The genus named '*Callistephus*' was derived from the greek words '*Kalistos*' meaning 'most beautiful' and '*Stephos*' means 'a crown'. The aster bloom consist two kinds of florets ray florets and disc florets. The disc florets are short while the ray florets are usually long. China aster is a free blooming half hardy, easy growing winter annual crop grown for cut flower as well as loose flower. China aster is a heavy feeder and hence has larger requirements for nitrogen, phosphorus and potassium. The emphasis at an early stage for vegetative growth should be especially on nitrogen. China aster is one of the most preferable commercial flower crops, grown as cut flower, loose flower, bedding plant, floral decoration, bouquets and garland preparation. China aster have a wide spectrum of attractive colors including violet, purple, magenta, many shades of pink, pure white, pale blue, dark blue, scarlet and comparatively longer vase life. China aster being well adapted to diversified soil and climatic condition, it is now-a-days successfully grown in various agro-climatic zones of India. China aster estimated to be commercially grown over an area of 3500 ha in India by marginal and small farmers in Karnataka, Tamil Nadu, Telangana, Andhra Pradesh, Maharashtra and West Bengal.

Materials and Method

A field experiment entitled "Screening of different varieties for early and late flowering with better growth, flower yield and quality of China aster (*Callistephus chinensis* (L.) Nees)" will be carried out in the Department of Horticulture, SHUATS, Prayagraj during 2020-21."

was conducted at Horticultural Research Field, Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, during Rabi season of 2020-2021.

Experimental site

The experiment was conducted during winter season of the year 2020-2021 in Departmental Research field of Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agricultural Technology and Sciences, Prayagraj. The area is situated on the South of Prayagraj on the right bank of Yamuna at Rewa road at a distance of about 6 km from Prayagraj city. It is situated at 25.8°N latitude and 81.50° E longitudes on elevation of 98 Meters from the sea level.

Climate and weather

The area of Prayagraj district comes under subtropical belt in the South East of Uttar Pradesh, which experience extremely hot summer and fairly cold winter. The maximum Temperature of the location reaches up to 46°C – 48° C and seldom falls as low as 4°C 5°C. The Relative humidity ranges between 20 to 94 per cent. The average rainfalls in this area are around 1013.4 mm annually.

Results and Discussion

The present investigation entitled “Screening of different varieties for early and late flowering with better growth, flower yield and quality of China aster (*Callistephus chinensis* (L.) Nees)” was carried out at Departmental Research Field, Department of Horticulture, Naini agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj (U.P.) in the year 2020-2021. The results of the investigation, regarding the China aster on growth, yield and flower quality have been presented in tables and bar-diagrams wherever required. The result of the experiment has been presented under the following heading.

Growth Parameter

In terms of plant height the Variety V₇ (Arka Shashank) recorded maximum (9.417, 19.742, 44.400 and 74.750 cm) Plant height, at 30, 60, 90 and 120 Days respectively in seven varieties of China aster, followed by V₆ (Phule Ganesh Pink) with (8.998, 18.042, 44.325 and 71.167 cm) at 30, 60, 90 and 120 days respectively, whereas minimum plant height (5.332, 13.492, 35.217 and 45.708 cm) was recorded in Variety V₄ (Matsumoto).

In terms of plant spread the variety V₆ (Phule Ganesh Pink) recorded maximum (363.0, 2046.0, 2801.0 and 5428.33 cm²) Plant spread, at 30, 60, 90 and 120 Days respectively in seven varieties of China aster, followed by V₅ (Arka Poornima) with (318.0, 1504.50, 2362.0 and 5428.33 cm²) at 30, 60, 90 and 120 days respectively, whereas minimum plant spread (147.50, 750.617, 1838.0 and 2049.66 cm²) was recorded in Variety V₄ (Matsumoto).

Number of primary branches/plant was recorded maximum in the Variety V₂ (Arka Archana) with (3.750, 34.50 and 43.50) number of primary branches/plant at 60, 90 and 120 Days respectively in seven varieties of China aster, followed by V₅ (Arka Poornima) with (6.50, 25.58 and 42.25) at 60, 90 and 120 days respectively, whereas minimum number of primary branches/plant (4.75, 18.41 and 23.41) was recorded in Variety V₄ (Matsumoto).

Number of secondary branches/plant was recorded maximum in the variety V₂ (Arka Poornima) with (8.0 and 25.0)

number of secondary branches/plant at 90 and 120 Days respectively in seven varieties of China aster, followed by V₅ (Arka Shashank) with (11.50 and 18.333) at 90 and 120 days respectively, whereas minimum Number of primary branches/plant (5.417 and 11.583) was recorded in Variety V₁ (Bonita).

In terms of number of leaves/plant the variety V₅ (Arka Poornima) recorded maximum (9.083, 33.333, 199.417 and 267.333) number of leaves/plant at 30, 60, 90 and 120 Days respectively in seven varieties of China aster, followed by V₇ (Arka Shashank) with (10.583, 41.417, 204.333 and 224.417 cm) at 30, 60, 90 and 120 days respectively, whereas minimum Number of leaves/plant (10.917, 30.167, 101.750 and 132.0) was recorded in Variety V₄ (Matsumoto).

Flower Parameter

In terms of days for first flowering that the Variety V₄ (Matsumoto) recorded Minimum (95.0 Days) of first flowering in seven varieties of China aster, followed by V₅ (Arka Poornima) with (98.86 Days), whereas Maximum Days taken for first flowering (116.200 Days) was recorded in Variety V₃ (Arka Kamini).

Days of 50% flowering was recorded maximum in the Variety V₆ (Phule Ganesh Pink) with (125.333 Days) in seven varieties of China aster, followed by V₃ and V₇ (Arka Kamini and Arka Shashank) with same (124.0 Days) for 50% of flowering, whereas Minimum Days taken for 50% flowering (94.333 Days) was recorded in Variety V₄ (Matsumoto)

Maximum flowering duration was recorded in the Variety V₅ (Arka Poornima) with Maximum (26.400 Days) flowering duration in seven varieties of China aster, followed by V₇ (Arka Shashank) with (24.333 Days) flowering duration, whereas Minimum Days taken for flowering duration (13.900 Days) was recorded in Variety V₃ (Arka Kamini).

In terms of flower diameter the Variety V₆ (Phule Ganesh Pink) recorded Maximum (6.20 cm) flower Diameter in seven varieties of China aster, followed by V₅ (Arka Poornima) with (5.420 cm) flower Diameter, whereas Minimum flower diameter (3.653) was recorded in Variety V₄ (Matsumoto).

Stalk length was recorded maximum in the variety V₇ (Arka Shashank) recorded Maximum (55.053 cm) Stalk length in seven varieties of China aster, followed by V₅ (Arka Poornima) with (50.670 cm) Stalk length, whereas Minimum Stalk length (22.243 cm) was recorded in Variety V₄ (Matsumoto).

Yield Parameter

Number of flowers/plant was recorded maximum in the variety V₇ (Arka Shashank) recorded Maximum (96.540) number of flowers/plant in seven varieties of China aster, followed by V₂ (Arka Archana) with (94.0) number of flowers/plant, whereas Minimum number of flowers/plant (31.667) was recorded in Variety V₄ (Matsumoto).

In terms of individual flower weight the Variety V₆ (Phule Ganesh Pink) recorded Maximum (4.337 g) individual flower weight in seven varieties of China aster, followed by V₅ (Arka Poornima) with (3.550 g) individual flower weight, whereas Minimum individual flower weight (2.057 g) was recorded in Variety V₇ (Arka Shashank).

Flower yield/plant was recorded maximum in the V₆ (Phule Ganesh Pink) with (321.117 g) flower yield/plant in seven varieties of China aster, followed by V₂ (Arka Archana) with (230.350 g) flower yield/plant, whereas Minimum flower yield/plant (76.63 g) was recorded in Variety V₄

(Matsumoto).

Flower yield t/ha was recorded maximum in the variety V₆ (Phule Ganesh Pink) with (20.480 t/ha) in seven varieties of China aster, followed by V₂ (Arka Archana) with flower yield (14.537 t/ha), whereas Minimum flower yield (4.877 t/ha) was recorded in Variety V₄ (Matsumoto).

In terms of self-life the Variety V₆ (Phule Ganesh Pink) recorded Maximum (3.400 days) self-life in seven varieties of China aster, followed by V₂ (Arka Poornima) and V₄ (Matsumoto) with same (3.067 days) of self-life, whereas Minimum self-life (2.233 days) was recorded in Variety V₂

(Arka Archana).

Economics of Treatments

In terms of the economics of the treatment cultivar V₆ (Phule Ganesh Pink) recorded maximum total income (Rs. 7,16,800), net profit (Rs. 6,13,140), and cost benefit ratio(1:6.91) was found in followed by treatment V₂ (Arka Archana) with total income (Rs. 5,08,795), net profit (Rs. 4,05,135) and cost benefit ratio (1:6.91) whereas minimum was recorded in treatment V₄ (Matsumoto) with total income (Rs. 1.21,925), net profit (Rs. 7,265), and cost benefit ratio (1:1.06).

Table 1: Screening of different varieties of China aster for Plant Height (cm), Plant Spread (cm²) and Number of Primary Branches/Plant.

| Variety Symbol | Variety Name | Plant Height (Cm) | | | | Plant Spread (cm ²) | | | | Number Of Primary Branches/Plant | | |
|----------------|-------------------|-------------------|--------|--------|---------|---------------------------------|----------|----------|----------|----------------------------------|--------|---------|
| | | 30 DAT | 60 DAT | 90 DAT | 120 DAT | 30 DAT | 60 DAT | 90 DAT | 120 DAT | 60 DAT | 90 DAT | 120 DAT |
| V ₁ | Bonita | 5.417 | 9.125 | 32.275 | 50.517 | 185.000 | 752.467 | 1441.667 | 2305.000 | 3.917 | 25.167 | 31.917 |
| V ₂ | Arka Archana | 5.748 | 10.108 | 22.833 | 50.250 | 207.250 | 1231.483 | 2565.667 | 4940.333 | 3.750 | 34.500 | 43.500 |
| V ₃ | Arka Kamini | 6.458 | 10.100 | 24.292 | 51.208 | 223.667 | 1086.400 | 2282.667 | 3716.333 | 4.500 | 15.917 | 29.167 |
| V ₄ | Matsumoto | 5.332 | 13.492 | 35.217 | 45.708 | 147.500 | 750.617 | 1838.000 | 2049.667 | 4.750 | 18.417 | 23.417 |
| V ₅ | Arka Poornima | 9.042 | 23.225 | 49.158 | 69.083 | 318.000 | 1504.500 | 2362.333 | 5428.333 | 6.500 | 25.583 | 42.250 |
| V ₆ | Phule Ganesh Pink | 8.998 | 18.042 | 44.325 | 71.167 | 363.000 | 2046.000 | 2801.000 | 5672.667 | 4.000 | 24.500 | 30.583 |
| V ₇ | Arka Shashank | 9.417 | 19.742 | 44.400 | 74.750 | 413.000 | 1925.440 | 2637.333 | 3646.333 | 6.583 | 22.083 | 26.750 |
| F-test | | S | S | S | S | S | S | S | S | S | S | S |
| SE(d) | | 0.590 | 1.979 | 3.977 | 4.118 | 51.776 | 254.118 | 762.754 | 370.067 | 0.782 | 3.781 | 5.659 |
| C.D. at 5% | | 1.286 | 4.313 | 8.667 | 8.974 | 112.821 | 553.724 | 479.790 | 806.376 | 1.706 | 8.240 | 12.332 |

Table 2: Screening of different varieties of China aster for Number of Secondary Branches/Plant, Number of Leaves/Plant, Days of First Flowering and Days of 50% flowering

| Variety Symbol | Variety Name | Number of secondary branches/Plant (cm) | | Number of leaves/plant | | | | Days of first flowering | Days for 50% flowering |
|----------------|-------------------|---|---------|------------------------|--------|---------|---------|-------------------------|------------------------|
| | | 90 DAT | 120 DAT | 30 DAT | 60 DAT | 90 DAT | 120 DAT | | |
| V ₁ | Bonita | 5.417 | 11.583 | 9.583 | 33.750 | 136.417 | 164.250 | 100.067 | 111.000 |
| V ₂ | Arka Archana | 6.333 | 18.33 | 7.083 | 21.250 | 125.333 | 209.417 | 107.433 | 121.000 |
| V ₃ | Arka Kamini | 6.583 | 16.750 | 8.750 | 26.750 | 89.083 | 165.250 | 116.200 | 124.000 |
| V ₄ | Matsumoto | 8.917 | 12.500 | 10.917 | 30.167 | 101.750 | 132.000 | 95.000 | 94.333 |
| V ₅ | Arka Poornima | 8.000 | 25.000 | 9.083 | 33.333 | 199.417 | 267.333 | 98.867 | 114.333 |
| V ₆ | Phule Ganesh Pink | 6.750 | 16.500 | 8.333 | 23.000 | 129.417 | 144.250 | 109.533 | 125.333 |
| V ₇ | Arka Shashank | 11.500 | 18.333 | 10.583 | 41.417 | 204.333 | 224.417 | 105.333 | 124.000 |
| F-test | | S | S | S | S | S | S | S | S |
| SE(d) | | 1.274 | 2.961 | 1.005 | 5.219 | 22.286 | 28.028 | 1.705 | 2.603 |
| C.D. at 5% | | 2.778 | 6.454 | 2.190 | 11.374 | 48.562 | 61.074 | 3.717 | 5.673 |

Table 3: Screening of different varieties of China aster for Flowering Duration (Days), Flower Diameter (cm), Stalk Length (cm), Number Of Flower/Plant, Individual flower weight (g), Flower Yield/Plant (g), Flower Yield t/ha, Self-life (Days), C:B Ratio

| variety symbol | Variety Name | Flowering Duration (Days) | Flower Diameter (cm) | Stalk Length (cm) | Number Of Flower/Plant | Individual flower weight (g) | Flower Yield/Plant (g) | Flower Yield t/ha | Self-life (Days) | C:B Ratio |
|----------------|-------------------|---------------------------|----------------------|-------------------|------------------------|------------------------------|------------------------|-------------------|------------------|-----------|
| V ₁ | Bonita | 23.733 | 3.870 | 28.900 | 38.613 | 2.433 | 85.503 | 5.353 | 2.467 | 1:1.16 |
| V ₂ | Arka Archana | 21.400 | 4.710 | 41.840 | 94.000 | 2.693 | 230.350 | 14.537 | 2.233 | 1:4.90 |
| V ₃ | Arka Kamini | 13.900 | 4.590 | 44.150 | 74.333 | 2.430 | 158.767 | 9.710 | 2.633 | 1:3.27 |
| V ₄ | Matsumoto | 24.067 | 3.653 | 22.243 | 31.667 | 2.403 | 76.630 | 4.877 | 3.067 | 1:1.06 |
| V ₅ | Arka Poornima | 26.400 | 5.420 | 50.670 | 59.043 | 3.550 | 179.630 | 11.257 | 3.067 | 1:3.80 |
| V ₆ | Phule Ganesh Pink | 23.900 | 6.200 | 41.557 | 85.033 | 4.337 | 321.117 | 20.480 | 3.400 | 1:6.91 |
| V ₇ | Arka Shashank | 24.233 | 4.990 | 55.053 | 96.540 | 2.057 | 194.420 | 12.130 | 2.433 | 1:4.09 |
| F-test | | S | S | S | S | S | S | S | S | |
| SE(d) | | 0.992 | 0.321 | 1.660 | 2.459 | 0.126 | 9.180 | 0.380 | 0.204 | |
| C.D. at 5% | | 2.009 | 0.700 | 3.619 | 5.360 | 0.278 | 20.005 | 0.829 | 0.448 | |

Conclusion

From the present investigation it is concluded that the variety V₆ (Phule Ganesh Pink) was found best in Prayagraj in terms of maximum plant spread (cm²), flower diameter (cm), individual flower weight (g), self-life, flower yield/plant(g) and flower yield t/ha. Variety V₄ (Matsumoto) recorded minimum plant height (cm), plant spread (cm²), number of primary branch/plant, number of leaves/plant, days of first flowering, days of 50% flowering, flower diameter(cm), stalk

length(cm), number of flower/plant, flower yield/plant, flower yield t/ha. In terms of early and late flowering variety V₄ (Matsumoto) has taken minimum time for first flowering whereas variety V₇ (Arka Kamini) has taken maximum time for first flowering. In terms of economics of different treatments, maximum total income, net profit, and cost benefit ratio was found in V₆ (Phule Ganesh Pink) followed by treatment V₂ (Arka Archana) whereas minimum was recorded in treatment V₄ (Matsumoto).

References

1. Al-Jibouri HA, Miller PA, Robinson HF. Genotypic and environmental Variances and co-variances in an upland cotton cross of inter-specific origin. *Agron. J.* 1958;50:633-636.
2. Agandi SM. Studies on the performance of China aster (*Callistephus chinensis* Ness.) cultivars. *M.Sc. Thesis*, University of Agricultural Sciences, Dharwad, 2000.
3. Ashwath C, Parthasarathy VA. Heritability and correlation studies in China aster (*Callistephus chinensis* Ness.). *Indian Journal of Horticulture* 1993;50(1):89-92.
4. Arora JS, Singh J. Performance of Marigold cultivars under North Indian Conditions. *National Seminar on Production Technology for commercial flower Crops*. Coimbatore, India, Tamil Nadu Agriculture University, 1980, 81-82.
5. Behera TK, Sirohi PS, Anandpal. Assessment of chrysanthemum germplasm For commercial cultivation under Delhi conditions. *Journal of Ornamental Horticulture (New series)*, 2002;5(2):11-14.
6. Boe AA, Drugan B. Dakota sunburst, a new chrysanthemum for northern Gardens. *North Dakota Far Research* 1991;49(3):14-15.
7. Bhanupratap GN, Tewari, Mishra LN. Correlation studies in Marigold. *Journal of Ornamental Horticulture (New series)*, 1999;2(2):84-88.
8. Chowdhuri TK, Rout B, Sadhukhan R, Mondal T. Performance Evaluation of Different Varieties of China aster (*Callistephus Chinensis L Nees*) In Sub-Tropical Belt of West Bengal. *Int. J Pharm. Sci. Invent* 2016;5(8):15-18.
9. Gopichand YMNVS, Padmalatha T, Pratap M, siva sankar A. Effect of bioregulators and stage of harvesting on seed maturity and quality in African marigold (*Tagetes erecta* L.). *Indian J Agric. Res* 2014;48(5):342-351.
10. Kumar R and Yadav DS. Evaluation of gerbera for NEH region. *Journal of Ornamental Horticulture, (New Series)* 2003;6(1):69-70.
11. kishanswaroop Kanwar SP, Saxena NP, Krishan Singh P. Evahhati China aster varieties under Delhi condition. *Journal of Ornamental Horts* 2004.7(1): 127-128.
12. Munikrishnappa PM, Patil AA, Patil VS, Patil BN, Channappagoudar BB, Alloli TB. Studies on the growth and yield parameters of different Genotypes of China aster (*Callistephus chinensis* Nees.), *Karnataka J Agric. sci* 2013;26(1):107-110.