# Evaluation of China aster (*Callistephus chinensis* L. Nees) varieties on the growth, flower yield and quality parameters under Southern Telangana zone.


## Abstract

The present investigation was carried out during ~~*rabi*season of2018-~~2018-2019 and 2019-20 seasons at farm of Regional Agricultural Research Station, Palem, Telangana ~~during *rabi* season with the objective~~ to evaluate the china aster varieties under Southern Telangana zone with respect to growth, flower yield and quality characters. Data in ~~In~~ this study revealed that, all characteristics varied significantly among the varieties. Maximum plant height, plant spread, number of primary and secondary branches and number of leaves were observed in the varietyPhule Ganesh White and the least was recorded in the variety Arka Archana.

The variety Phule Ganesh White took less number of days for flower bud initiation (52.05), minimum number of days to ~~fifty per cent~~ 50% flower opening (61.63) while more number of days were recorded in the variety Kamini (56.32 and 68.53, respectively). Maximum stalk length was recorded in Phule Ganesh White (20.60 cm) and minimum was recorded in Arka Archana (9.80 cm). In addition, ~~F~~flower diameter was more (7.00 cm) in both the varieties Phule Ganesh White and Local White,while ~~and~~ minimum was detected in Phule Ganesh Pink (5.40cm). The variety Phule Ganesh White recorded more number of flowers per plant (48.7), more flower yield per plant (111.00 g plant$^{-1}$) and maximum flower yield per hectare (4.64 tha$^{-1}$). Whereas lowest number of flowers per plant (37.40), flower yield per plant (57.50 g plant$^{-1}$), flower yield per hectare (2.08 t ha$^{-1}$) was observed in Arka Archana. Maximum vase life for cut flower (6.00 days) were recorded in Arka Poornima and least was observed in Arka Aadya (3.70 days). Maximum shelf life for loose flowers was recorded in Phule Ganesh White (3.20 days) and minimum was recorded in Arka Archana (1.70 days).



**Key words:** China Aster, varieties, genotypes, evaluation, performance, yield, quality


## 1. Introduction

China aster (*Callistephus chinensis* L. Nees) is a half hardy annual flowering plant and is one of the most popular annual grown throughout the world(reference). Among annuals it ranks next to chrysanthemum and marigold. China aster belongs to the family Asteraceae. The genus *Callistephus* derived its name from two Greek words 'Kalistos' meaning most beautiful and 'stephos' means a crown, referring to the flower (reference). The genus *Callistephus* has only a single species *i.e.*,*Callistephus~~C.~~ chinensis*.

China aster is an easy growing crop grown for cut as well as for loose flowers. The cut flowers have good vase life and are used in flower arrangements, vases, bouquets, for interior decorations, *etc*. The loose flowers are widely used for makinggarlands, for decorations, for worship and are also used in social functions (reference). Due to their different plant heights they are highly suitable in garden landscape and are grown in flower beds, borders and potted plants. The present day varieties are available indiverse forms, types and a wide spectrum of colour ranges like pink, primrose, pale blue,mauve, purple, scarlet, creamy white, pure white, violet etc. (Zosiamliana, 2009).

Though the flower yield and quality are primarily varietal characters, they are also greatly influenced by climatic factors (reference). The climatic factors like photoperiod, temperature, relative humidity and also soil moisture influence both vegetative and

**Comment [PDAFAEK1]:** % losses in world and in the Country

reproductive phases of the plant, ultimately leading to variation in the performance of genotypes (reference). Hence, plants have to be exposed to proper climatic factors in order to get optimum and economic flower yields. (Munikrishnappa *et al*., 2013).

Hence, it is necessary to evaluate the performance of varieties and identify the suitable variety in a particular place before recommending for commercial cultivation. Hence, the present investigation was carried out to study the performance of china aster varieties under southern Telangana zone

## 2. Materials and methods

A field experiment on Eevaluation of China aster [*Callistephus chinensis* (L.) Nees] varieties on the growth, flower yield and quality parameters under Southern Telangana zone was conducted at farm of Regional Agricultural Research Station, Palem, Telangana during *rabi*season in the year2018-2018-2019 and 2019-2019-2020seasons. The experiment was laid out in Randomized Block Design (RCBD) having 3 replications with eight varieties i.e., Arka Archana, Arka Aadya, Arka Poornima, Kamini, Phule Ganesh Pink, Phule Ganesh White, Local Pink and Local White each having 3 replications. Cultivation practices were followed as per recommendations.

The observations were recorded and presented as pooled data of two years (2018-19 and 2019-20). The observations includeincluding vegetative parameters such as plant height (cm), plant spread (cm), NoNumber. of primary and secondary branches per plant and number of leaves per plant and the floral characters like days taken for flower initiation, days taken to fifty per cent flowering, flower diameter, stalk length, number of flowers per plant, flower yield per plant (g plant$^{-1}$) and Flower yield per hectare (t ha$^{-1}$), Vase life of cut flower and shelf life of loose flower.

Statistical analysis with Combined analysis

## 3. Results and Discussion

### 3.1 Performance of China aster Varieties for vegetative parameters at harvesting stage

The pooled data of two years *i.e.*, 2018-192018-1920 and 2019-202019-2020 with respect to vegetative parameters like plant height, plant spread, no. of primary branches, no. of secondary branches, flower parameterslike days taken for flower initiation, days taken to fifty percent flowering, number of flowers per plant, flower diameter (cm), stalk length (cm), flower yield per plant (gplant$^{-1}$), flower yield per hectare (t ha$^{-1}$),vase life of cut flower and shelf life of loose flowerof China aster varieties is presented in Tables 1- 3.

Pooled mean of growth characters of eight China aster cultivars is presented in Table 1 and significant variation was observed in growth characters of China aster cultivars. The maximum plant height was observed in the variety Phule Ganesh White (50.60 cm) and the minimum plant height was recorded in variety Arka Archana (29.20 cm) it was statistically at par with the variety Kamini (30.90 cm).Variations in plant height among the cultivars are attributed to the genetic makeup of the plant. Variation in plant height due to varieties has also been reported by Heera *et al.* ,(2019) and ,Nataraj *et al*.,(2020).

The variety Phule Ganesh White recorded maximum plant spread (17.90 cm) and least plant spread (11.80 cm) was observed in the variety Arka Archana and Kamini and it was statistically at par with Arka Aadya (13.00 cm). The difference in plant spread per plant is a varietal trait as it is governed by the genetical makeup. Similar variations in plant spread among varieties were also observed in China aster by Munikrishnappa *et al.* ,(2013) and Shital *et al*.,(2020).

At different stages of plant growth, China aster varieties differ significantly for number of branches per plant and no. of leaves per plant. The maximum no. of primary branches were recorded in the variety Phule Ganesh White (8.10) and it was statistically at

par with Arka Poornima (7.43) and least no. was observed in the variety Arka Archana (4.92) it was statistically at par with the variety Kamini (5.15). With respect to secondary branches, maximum branches recorded in the variety Phule Ganesh white (22.17) and least no. of branches were recorded in the variety Arka Archana (10.30) and it was statistically at par with the variety Kamini (13.15). Maximum no. of leaves per plant were recorded in the variety Phule Ganesh white (108.80) and least no. of leaves per plant were recorded in the variety Arka Archana (52.00) and it was statistically on par with Kamini (60.30). Since these three characters are inter-related, the plants with the maximum number of branches are expected to have the highest number of leaves and flowers. Moreover, the difference in branches among the genotypes could be due to the influence of genetic makeup of the genotypes(Pratiksha *et al*., 2017)

**Table 1. Performance of China aster Varieties for vegetative parameters at harvesting stage**

| Treatment | Plant height (cm) | | | Plant spread (cm) | | | Number of branches per plant | | | | | | Number of leaves per plant | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Primary branches | | | Secondary branches | | | | | |
| | ~~2018-~~2018-~~2019~~19 | ~~2019-~~2019-~~2020~~20 | Pooled | 2018-19 | ~~2019-~~2019-~~2020~~20 | Pooled | 2018-19 | 2019-20 | Pooled | 2018-19 | 2019-20 | Pooled | 2018-19 | 2019-20 | P |
| $T_1$-Arka Archana | 28.50 | 29.90 | 29.20 | 12.10 | 11.50 | 11.80 | 4.87 | 4.97 | 4.92 | 10.20 | 10.40 | 10.30 | 55.70 | 48.20 | 52.00 |
| $T_2$-ArkaAadya | 36.80 | 33.00 | 34.90 | 13.30 | 12.80 | 13.00 | 5.73 | 5.80 | 5.77 | 13.40 | 13.60 | 13.52 | 73.90 | 62.70 | 68.30 |
| $T_3$-Arka Poornima | 46.50 | 44.40 | 45.40 | 16.40 | 14.60 | 15.50 | 7.40 | 7.47 | 7.43 | 18.60 | 18.50 | 18.55 | 100.80 | 83.10 | 92.00 |
| $T_4$- Kamini | 32.30 | 29.50 | 30.90 | 12.80 | 10.70 | 11.80 | 5.07 | 5.23 | 5.15 | 13.13 | 13.20 | 13.15 | 66.00 | 54.50 | 60.30 |
| $T_5$- Phule Ganesh Pink | 39.10 | 36.50 | 37.80 | 13.70 | 12.40 | 13.10 | 6.13 | 5.90 | 6.02 | 15.07 | 15.10 | 15.08 | 83.80 | 74.90 | 79.40 |
| $T_6$- Phule Ganesh White | 52.10 | 49.20 | 50.60 | 19.80 | 16.00 | 17.90 | 8.07 | 8.13 | 8.10 | 22.00 | 22.30 | 22.17 | 125.80 | 91.70 | 108.80 |
| $T_7$- Local White | 43.90 | 37.60 | 40.70 | 14.90 | 13.20 | 14.10 | 6.47 | 6.63 | 6.55 | 18.47 | 18.50 | 18.50 | 92.40 | 82.00 | 87.20 |
| $T_8$- Local Pink | 42.80 | 38.60 | 40.70 | 14.30 | 11.80 | 13.10 | 6.27 | 6.43 | 6.35 | 16.67 | 16.90 | 16.77 | 91.50 | 83.30 | 87.40 |
| SE m (±) | 0.70 | 2.00 | 1.50 | 0.40 | 0.80 | 0.50 | 0.94 | 0.27 | 0.28 | 3.16 | 1.00 | 1.00 | 3.29 | 3.60 | 3.10 |
| CD (P=0.05%) | 2.30 | 5.90 | 3.90 | 1.20 | 2.30 | 1.90 | 0.31 | 0.83 | 0.85 | 1.03 | 3.027 | 3.06 | 10.08 | 10.91 | 9.80 |

**Comment [PDAFAEK2]:** Is combined analysis?



### 3.2 Performance of China aster Varieties for flowering parameters

The pooledmean data presented in table 2 indicate that the variety Phule Ganesh Whitesignificantly took less number of days for flower bud initiation (52.05) and it was statistically at par with the variety Local Pink (53.48) while the variety Kamini recorded the longest number of days(56.32) and it was statistically at par with the variety Arka Archana (56.20). The variations in flower bud initiation may be due to varietal trait. Whereas minimum number of days to 50% flower opening was recorded in the variety Phule Ganesh White (61.63) and the variety Kamini (68.53) took maximum number of days to 50% flower opening, statistically at par with Arka Archana (67.57). This character is positively correlated to days taken to first flower opening. The genetic constituents of the plant play an important role in this character. (Teerath and Chaudhary, 2016, Heera *et al*., 2019)

Maximum stalk length was exhibited byPhule Ganesh White(20.60 cm) and minimum stalk length was recorded in 'Arka Archana (9.80cm), which was statistically at par with Arka Aadya (9.90 cm). Variations among the cultivars areattributed to the genetic makeup of the plant. Significant variation for stalk length was reported by Teerath and Chaudhary (2016), Zosiamliana (2013).

Significant variation was observed in flower diameter of china aster varieties and maximum flower diameter (7.00 cm) was recorded in Phule Ganesh White and local White and it was statistically at par with Arka poornima (6.60 cm) and minimum was observed in the variety Phule Ganesh Pink (5.40 cm) and it was statistically at par with the variety Kamini (5.70 cm). The changes in size of flowers might be directly linked with vegetative growth with some exceptions, thereby increasing photosynthates which plays a vital role in improving flower size. (Aparna *et al*, 2020)

**Table 2. Performance of China aster Varieties for flowering parameters**

| | **Days taken for flower initiation** | | | **Days taken to fifty percent flowering** | | | **Stalk length (cm)** | | | **Flower diameter (cm)** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Treatment** | ~~2018-~~2018-~~20~~19 | ~~2019-20~~2019-2020 | **Pooled** | **2018-19** | **2019-20** | **Pooled** | **2018-19** | **2019-20** | **Pooled** | **2018-19** | **2019-20** | **Pooled** |
| $T_1$-Arka Archana | 56.07 | 56.33 | 56.20 | 68.13 | 67.00 | 67.57 | 10.9 | 8.70 | 9.80 | 6.50 | 5.20 | 5.90 |
| $T_2$-ArkaAadya | 55.53 | 56.00 | 55.77 | 67.13 | 67.33 | 67.23 | 8.8 | 11.10 | 9.90 | 6.50 | 6.10 | 6.30 |
| $T_3$-Arka Poornima | 53.67 | 54.67 | 54.17 | 63.13 | 63.00 | 63.07 | 16.6 | 17.20 | 16.90 | 6.80 | 6.40 | 6.60 |
| $T_4$- Kamini | 55.80 | 56.83 | 56.32 | 68.40 | 68.67 | 68.53 | 9.7 | 12.60 | 11.20 | 5.70 | 5.60 | 5.70 |
| $T_5$- Phule Ganesh Pink | 54.60 | 54.00 | 54.30 | 66.73 | 68.00 | 67.37 | 11.4 | 12.90 | 12.10 | 5.20 | 5.60 | 5.40 |
| $T_6$- Phule Ganesh White | 52.60 | 51.50 | 52.05 | 62.60 | 60.67 | 61.63 | 21.2 | 19.90 | 20.60 | 7.20 | 6.80 | 7.00 |
| $T_7$- Local White | 54.33 | 54.33 | 54.33 | 64.27 | 66.00 | 65.13 | 14.6 | 14.20 | 14.40 | 7.00 | 7.00 | 7.00 |
| $T_8$- Local Pink | 53.80 | 53.17 | 53.48 | 64.87 | 65.00 | 64.93 | 13.8 | 13.40 | 13.60 | 6.80 | 5.80 | 6.30 |
| SE m (±) | 0.26 | 0.77 | 0.48 | 0.43 | 0.81 | 0.44 | 0.40 | 0.80 | 0.50 | 0.08 | 0.31 | 0.28 |
| CD (P=0.05%) | 0.80 | 2.33 | 1.44 | 1.32 | 2.45 | 1.32 | 1.20 | 2.40 | 1.80 | 0.25 | 0.95 | 0.64 |



### 3.3 Performance of China aster Varieties for flower yield and quality parameters

The pooled mean data presented in table 3 indicate that highest number of flowers per plant was observed in the variety Phule Ganesh White (48.7) and it was statistically on par with the variety Arka Poornima (46.8) and Local White (46.7) and least number was observed in the variety Arka archana (37.40) and Arka Aadya (37.90). The number of flowers produced per plant might be directly related to production of more plant height, number of leaves, plant spread, more number of branches per plant with good number developed flower buds on the branch, thereby synthesis of more photosynthates resulted in production of good number of developed flower buds on the branches (Naikwad *et al*., 2019)

The varieties showed significant variation for flower yield per plant and flower yield per hectare. The maximum flower yield per plant (111.00 g plant$^{-1}$) and flower yield per hectare (4.64 t ha$^{-1}$) was recorded in the variety Phule Ganesh White. The increased flower

yield in the varieties was due to increased flower size and flower weight and due to more number of flowers per plant. Further, these varieties had fairly high dry matter accumulation, which might have contributed for the increased flower yield. The lowest flower yield per plant was recorded in the variety Arka Archana(57.50 g plant$^{-1}$), while the lowest flower yield per hectare was recorded in the variety Arka Archana (2.08 t ha$^{-1}$) and it was statistically on par with Kamini (2.34 t ha$^{-1}$). This was because of the fact that it had lesser number of leaves, which resulted in less dry matter accumulation. Variation in flower yield was observed previously in china aster by Munikrishnappa *et al*, .(2013), Shantappa *et al*.,(2015).

A significant variation among varieties on vase life of cut flower and shelf life of loose flower was observed. The maximum vase life for cut flower (6.00 days) was recorded in the variety Arka Poornima and it was statistically at par with Phule Ganesh White (5.90 days) and least was recorded in Arka Aadya (3.70 days) and it was statistically at par with Arka Archana (3.90 days). With respect to shelf life of loose flowers, maximum was recorded in the variety Phule Ganesh White (3.20 days) and minimum was observed in the variety Arka Archana (1.70 days) and it was statistically at par with Arka Aadya, Kamini (1.90 days). This superiority in vaselife may be due to the inherited trait of particular variety for better storage of photosynthates as indicated by the production of more number of leaves during its growth periods. It was observed previously in China aster (Zosiamliana *et al.*, 2013), in gerbera (Acharya *et al*., 2010)

**Table 3. Performance of China aster Varieties for flower yield and quality parameters**

| | Number of flowers per plant | | | Flower yield per plant (g plant$^{-1}$) | | | Flower yield per hectare (t ha$^{-1}$) | | | Vase life (Cut flowers) (Days) | | | shelf life (Loose flowers) (Days) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Treatment** | **2018-2018-2019** | **2019-202019-2020** | **Pooled** | **2018-19** | **2019-20** | **pooled** | **2018-19** | **2019-20** | **Pooled** | **2018-19** | **2019-20** | **Pooled** | **2018-19** | **2019-20** | **Pooled** |
| $T_1$-Arka Archana | 44.70 | 30.20 | 37.40 | 66.40 | 48.60 | 57.50 | 2.22 | 1.95 | 2.08 | 4.90 | 2.80 | 3.90 | 2.10 | 1.20 | 1.70 |
| $T_2$-ArkaAadya | 37.70 | 38.10 | 37.90 | 69.40 | 66.50 | 68.00 | 2.44 | 2.40 | 2.42 | 2.60 | 4.70 | 3.70 | 2.10 | 1.80 | 1.90 |
| $T_3$-Arka Poornima | 51.10 | 42.50 | 46.80 | 105.70 | 89.80 | 97.80 | 3.97 | 3.74 | 3.85 | 6.90 | 5.10 | 6.00 | 3.20 | 1.90 | 2.50 |
| $T_4$- Kamini | 42.00 | 40.90 | 41.50 | 69.30 | 62.90 | 66.10 | 2.39 | 2.30 | 2.34 | 3.80 | 4.40 | 4.10 | 2.10 | 1.70 | 1.90 |
| $T_5$- Phule Ganesh Pink | 46.50 | 39.00 | 42.70 | 73.80 | 71.20 | 72.50 | 2.67 | 2.64 | 2.66 | 5.20 | 4.60 | 4.90 | 2.50 | 1.50 | 2.00 |
| $T_6$- Phule Ganesh White | 51.20 | 46.30 | 48.70 | 114.50 | 107.6 | 111.00 | 4.69 | 4.59 | 4.64 | 7.10 | 4.70 | 5.90 | 3.70 | 2.70 | 3.20 |
| $T_7$- Local White | 51.10 | 42.30 | 46.70 | 99.00 | 84.10 | 91.60 | 3.66 | 3.44 | 3.55 | 6.10 | 5.00 | 5.60 | 2.90 | 1.90 | 2.40 |
| $T_8$- Local Pink | 47.40 | 40.10 | 43.70 | 91.60 | 84.30 | 88.00 | 3.42 | 3.31 | 3.36 | 6.20 | 4.90 | 5.50 | 2.60 | 1.70 | 2.10 |
| SE m (±) | 0.98 | 1.67 | 1.40 | 1.30 | 3.50 | 2.80 | 0.41 | 0.14 | 0.13 | 0.200 | 0.21 | 0.15 | 0.11 | 0.10 | 0.15 |
| CD (P=0.05%) | 3.00 | 5.05 | 3.80 | 3.80 | 10.50 | 6.40 | 0.13 | 0.41 | 0.41 | 0.1 | 0.63 | 0.54 | 0.33 | 0.30 | 0.28 |



## 4. Conclusion

FromBased on data in this study, it can be concluded that,among the different varieties of China aster, the varietyvariety of Phule Ganesh White was found superior with

respect to growth, flower yield and quality parameters under Southern Telangana Zone region.

**References:**


1. Acharya AK, Baral DR, Gautam DM, Pun UK. Influence of locations and varieties on vase life of Gerbera (*Gerbera jamesonii*, Hook). J. Inst. Agric. Anim. Sci. 2010; 31: 43 - 50
2. Aparna S, Raghunath S, Chowdhuri TK. Varietal Evaluation of China-Aster (*Callistephus chinensis* Nees.) in Sub-Tropical Region of West Bengal.International Journal of Current Microbiology and Applied Sciences. 2020; 9(6): 3726-3736
3. Heera LA, Bhairwa HL, Mahawer LN, Regar AL. Studies on performance of China aster [*Callistephus Chinensis* (L.) Nees] varieties in southern Rajasthan agro-climatic conditions. Journal of Ornamental Horticulture. 2019; 22 (1&2): 33-37
4. 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
5. Naikwad D, Kavita K, Ashok H, Manthu GP, Vikas K. Performance of different varieties of China aster [*Callistephus chinensis* (L.) Nees] for North eastern dry zone of Karnataka. Journal of Pharmacognosy and Phytochemistry. 2019; 8(4): 1486-1494
6. NatarajSK, Seetharamu GK, Srinivasa V, Balaji SK, Rajiv K, Lakshmana D, Venugopalan R, Munikrishnappa PM.Screening of China Aster F1 Hybrids for Growth and Yield Characters. International Journal of Current Microbiology and Applied Sciences. 2020; 9(5): 656-666
7. Pratiksha K, Rajiv KT, Manjanatha R, Usha BT, Dhananjaya MV, Bhargav V. Evaluation of China aster [*Callistephus chinensis* (L.) Nees] F1 Hybrids and Parents for Growth, Flower quality, Yield and Postharvest life. International Journal of Current Microbiology and Applied Sciences.2017; *6*(8): 1543-1549
8. Shantappa T, Abhishek K, Jagadeesha RC, Halesh GK. Studies on genotypic evaluation and correlation studies in china aster [*Callistephus chinensis* (L.) Nees.]. Indian Res. J. Genet. & Biotech. 2015; 7(2): 179 – 186 (2015)
9. Shital B, Raut VU, Neha C, Satar V. Evaluation of China aster varieties under Vidarbha conditions. International Journal of Chemical Studies. 2020; 8(3): 337-339
10. Teerath SR, Chaudhary SVS. Evalution of china aster (*Callistephus chinensis* Nees.) cultivars under mid hill conditions of Himachal Pradesh. The Bio Scan. 2016; 11(4): 2367-2370.
11. Zosiamliana JH. Studies on the performance of China aster [*Callistephus chinensis* (Linn.) Ness] varieties under Hyderabad conditions. *M. Sc. Thesis*, submitted to APHU, Hyderabad; 2009.
12. Zosiamliana JH, Reddy GSN and Rymbai H. Study on the performance of some varieties of China aster (*Callistephus chinensis* Nees) in Andhra Pradesh. Progressive Horticulture. 2013; 45(2): 312-316.