

Short Communication

## Evaluation of China aster (*Callistephus chinensis* (L.) Nees.) genotypes in tropical plains of Kerala

Alfin Santhosh, T. V. Anupama\*, U. Sreelatha, J. S. Minimol and Mini Sankar

College of Agriculture, Kerala Agricultural University, Thrissur 680 656, Kerala, India

Received 19 October 2019; received in revised form 7 December 2020; accepted 9 December 2020

### Abstract

An investigation was conducted at the Department of Floriculture and Landscaping, College of Agriculture, Vellanikkara to evaluate the performance of China aster genotypes in tropical plains of Kerala. Ten genotypes of China aster *viz.*, Arka Kamini, Arka Shashank, Arka Archana, Phule Ganesh White, Phule Ganesh Violet, Phule Ganesh Pink, Phule Ganesh Purple, AAC-1, Local Pink and Mat White were evaluated for vegetative, floral and post harvest characters. The greatest plant height (68.86 cm), number of primary branches (14.25), number of leaves (56.48), stem girth (11.09 cm) and plant spread (50.08 cm) were recorded in the variety Phule Ganesh Pink. Leaf area was highest in variety Phule Ganesh White (34.31 cm<sup>2</sup>). Number of flowers per plant was the highest in variety Arka Shashank (20.20), while Arka Archana (18.47), Local Pink (18.47), Phule Ganesh Pink (17.73), Phule Ganesh White (16.93) and Arka Kamini (16.27) were on par. Flower stalk length was highest in variety Phule Ganesh Pink (21.39 cm), which was on par with Phule Ganesh Purple (20.61 cm), Phule Ganesh Violet (19.73 cm), AAC-1 (18.27 cm) and Phule Ganesh White (17.73 cm). Flower yield was highest in variety Phule Ganesh Pink (55.99 g). Duration of flowering was the longest in variety Local Pink (62.40 DAP) and was on par with variety Phule Ganesh Pink (60.60 DAP). Shelf life (3.67 days) and vase life (13.93 days) were the highest in variety Phule Ganesh Pink. The study revealed that Phule Ganesh Pink was best suited for cultivation in Kerala, both as cut flower and loose flower. The varieties Local Pink and Phule Ganesh White were also found promising for the tropical plains of Kerala.

**Key words:** Asteraceae, China aster, Cut flower, Genotype, Loose flower, Tropical plains.

China aster [*Callistephus chinensis* (L.) Nees.] belongs to the family Asteraceae and is native to China. It is one of the important annual flower crops grown in most parts of the world. It is a hardy annual commercial flower crop grown for loose as well as cut flowers, as pot plant and for bedding purpose in landscapes. It has gained considerable importance in the flower trade because of its short stature, wide range of colours, longer vase life and ability to withstand rough handling in transport (Chaitra and Patil, 2007). In India the cultivation of the crop is mainly confined to the states of Karnataka, Maharashtra, Andhra Pradesh, Tamil Nadu and West Bengal. A study was conducted to evaluate the performance of China aster genotypes in the tropical

plains of Kerala for assessing its suitability for commercial cultivation.

The experiment was conducted during the year 2018-19, at the College of Agriculture, Vellanikkara, with October as planting season. Ten genotypes of China aster were used for the study *viz.*, Arka Kamini, Arka Shashank, Arka Archana, Phule Ganesh White, Phule Ganesh Purple, Phule Ganesh Pink, Phule Ganesh Violet, AAC-1, Local Pink and Mat White. The experiment was laid out in Randomised Block Design with three replications. One month old healthy seedlings were transplanted in the open field at a spacing of 0.3 x 0.3 m. Five plants were randomly selected in each replication

\*Author for correspondences : Phone: +91 9447062824, Email: anupama.tv@kau.in

for recording the observations. Vegetative characters were recorded at monthly intervals and floral characters were observed on harvesting the flowers when they were fully opened. Data on different characters were tabulated and statistically analysed using the WASP 2.0 package.

The data pertaining to vegetative characters of China aster genotypes under study are presented in Table 1. Significant variation was observed for the vegetative growth among the different genotypes studied. The greatest plant height was recorded in variety Phule Ganesh Pink (68.86 cm) and was at par with Phule Ganesh Violet (55.88 cm), whereas the lowest plant height was observed in variety Mat White (14.32 cm). The variation in the genetic makeup of the variety might be the reason for variation in plant height. Similar variations among China Aster varieties were reported by Chavan et al. (2010). Number of primary branches of plant influences the plant architecture and also the number of flowers per plant. In the present investigation highest number of primary branches was observed in variety Phule Ganesh Pink (14.25), which was followed by Phule Ganesh Purple (10.93), while lowest number of primary branches was recorded in Mat White (2.39). The superiority of variety Phule Ganesh Pink, might be due to the genetic makeup of the variety, and similar variation in China aster was found by Poornima et al. (2006).

In the present study, number of leaves per plant was highest in variety Phule Ganesh Pink (56.48), and

was at par with Phule Ganesh White (48.22). The lowest number of leaves was recorded in variety Mat White (12.69). The superiority of Phule Ganesh Pink in terms of number of leaves might be due to the genetic makeup and the environmental factors, as was observed by Poornima et al. (2006) in China aster. The variety Phule Ganesh Pink (11.09 cm) registered highest stem girth which was on par with Phule Ganesh White (11.04 cm) and Phule Ganesh Violet (8.95cm). The lowest stem girth was recorded in variety Mat White (3.19 cm). Stem girth is also a varietal trait like other characters and its expression depends on the genotype of the plant. Plant spread varied significantly among the varieties and the variety Phule Ganesh Pink recorded the highest plant spread (50.08 cm), followed by variety Phule Ganesh Violet (40.08 cm). The lowest plant spread was recorded in variety Mat White (7.69 cm). These results were in conformity with those of Rai and Choudhary (2016) and Bhargav et al. (2019) in China aster. Highest leaf area was registered in variety Phule Ganesh White (34.31 cm<sup>2</sup>) which was on par with Phule Ganesh Purple (30.52 cm<sup>2</sup>), Phule Ganesh Pink (28.66 cm<sup>2</sup>) and Local Pink (28.65 cm<sup>2</sup>). Similar variation among China aster varieties were observed and reported by Munikrishnappa and Chandrashekhar (2015), and Dharmendra et al. (2019).

There was a significant difference among the varieties with respect to different floral characters (Table 2). The number of days taken for bud

*Table 1.* Vegetative characters of China aster genotypes

Treatments	Plant height (cm)	Number of primary branches	Number of leaves	Stem girth (cm)	Plant spread (cm)	Leaf area (cm <sup>2</sup> )
Arka Kamini	36.05	7.13	26.47	5.12	17.18	23.49
Arka Shashank	44.23	5.98	31.69	5.05	22.44	22.14
Arka Archana	30.85	7.07	28.43	4.56	19.67	24.03
PG White	54.65	10.63	48.22	11.04	29.22	34.31
PG Violet	55.88	10.44	41.84	8.95	40.08	27.46
PG Pink	68.86	14.25	56.48	11.09	50.08	28.66
PG purple	49.34	10.93	38.40	7.41	28.51	30.52
AAC-1	39.68	10.35	39.18	6.21	26.83	27.32
Local Pink	40.99	8.52	29.97	5.61	20.85	28.65
Mat White	14.32	2.39	12.69	3.19	7.69	8.02
C.V (%)	17.70	16.27	18.62	19.05	17.43	17.70
C.D (p = 0.05)	13.20	2.45	11.28	2.23	7.85	5.94

*Table 2.* Floral characters of China aster genotypes

Treatments	Days to bud initiation	Days to 50% flowering	No. of flowers/plant	Flower stalk length (cm)	Flower head diameter(cm)	Flower yield/plant (g)	Duration of flowering (days)
Arka Kamini	45.27	68.33	16.27	11.95	5.46	21.39	51.53
Arka Shashank	44.40	70.67	20.20	9.71	3.89	21.62	48.40
Arka Archana	47.13	67.00	18.47	11.07	4.71	24.58	47.83
PG White	73.67	104.06	16.93	17.77	5.78	44.50	58.47
PG Violet	59.80	88.00	15.27	19.73	6.27	33.73	53.37
PG Pink	55.53	81.67	17.73	21.13	7.07	55.99	60.60
PG Purple	55.87	90.00	14.80	20.61	6.22	38.09	56.20
AAC-1	52.87	80.20	13.47	18.27	6.04	35.19	52.80
Local Pink	51.07	82.13	18.47	13.56	5.66	40.43	62.40
Mat White	42.27	69.33	5.20	3.02	3.31	4.16	45.20
C.V (%)	4.51	3.99	15.17	15.23	11.35	18.98	3.99
C.D (p = 0.05)	4.12	4.37	4.08	3.84	1.06	10.41	3.67

initiation signified the flowering habit of the varieties and was genetically controlled (Zosiamliana et al., 2013). Early bud initiation was observed in variety Arka Shashank (44.40 days after planting DAP) which was on par with varieties Arka Kamini (45.27 DAP), Mat White (46.27 DAP) and Arka Archana (47.13 DAP). The variety Phule Ganesh White (73.67 DAP) took greatest number of days for bud initiation. The results were in accordance with the findings of Poornima et al. (2006) and Kaushal et al. (2014) in China aster. The variety Arka Archana required lowest number of days for 50 per cent flowering (67.00 DAP), and was on par with varieties Arka Kamini (68.33 DAP), Mat White (69.33 DAP) and Arka Shashank (70.67 DAP). The results were in agreement with the data of Rai and Choudhary (2016) in China aster.

The number of flowers per plant varied significantly among the varieties and highest number of flowers per plant was observed in variety Arka Shashank (20.20) and was at par with varieties Arka Archana (18.47), Local Pink (18.47), Phule Ganesh Pink (17.73), Phule Ganesh White (16.93) and Arka Kamini (16.27). The variety Mat White recorded the lowest number of flowers per plant (5.2). Similar findings were observed in the reports on China aster of Kishanswaroop et al. (2004), Poornima et al. (2006), and Chowdhuri et al. (2016). Long flower stalk is regarded as the character preferred for cut flowers. The highest flower stalk length was recorded in the variety Phule Ganesh Pink (21.13)

which was on par with varieties Phule Ganesh Purple (20.61 cm), Phule Ganesh Violet (19.73 cm), AAC-1 (18.27 cm) and Phule Ganesh White (17.77 cm) whereas the lowest flower stalk length was reported in variety Mat White (3.02 cm). The results were in accordance with the findings of Sreenivasulu et al. (2004) in China aster. Flower yield per plant varied significantly among varieties of China aster, and the highest flower yield was recorded in variety Phule Ganesh Pink (55.99 g) followed by Phule Ganesh White (44.50 g). The increase in yield might be due to the large sized flowers. Similar findings were reported by Kulkarani and Reddy (2006) in China aster. The longest flowering duration indicated the prolonged availability of flowers for the market. Choice for landscaping uses was also dependent on flowering duration. The longest duration of flowering was recorded in variety Local Pink (62.40 DAP) which was significantly superior compared to all other varieties of China aster, and was on par with Phule Ganesh Pink (60.60 DAP). These results were in accordance with the findings of Pandey and Rao (2014) in China aster.

Vase life and shelf life are the important post-harvest parameters which determine the longevity of flower. Shelf life indicates the suitability as loose flower whereas vase life shows the suitability as cut flower. The post-harvest parameters of the study are presented in Table 3. The vase life of cut flowers held in distilled water (at an average temperature of 32°C and RH of 74%) was highest in variety

**Table 3.** Post harvest characters of China aster genotypes

Treatments	Shelf life (days)	Vase life (days)
Arka Kamini	1.67	11.07
Arka Shashank	2.33	10.07
Arka Archana	2.33	9.07
PG White	3.33	11.20
PG Violet	2.67	12.20
PG Pink	3.67	13.93
PG Purple	2.33	11.67
AAC-1	1.67	10.47
Local Pink	2.00	11.13
Mat White	1.67	6.95
C.V (%)	16.43	15.28
C.D (p = 0.05)	0.93	2.21

Phule Ganesh Pink (13.93 days) which was on par with Phule Ganesh Violet (12.20 days). Variations in vase life might be due to the genetic makeup of varieties. Similar variations in vase life was observed by Zosiamliana et al. (2013) and Rai and Choudhary (2016) in China aster. Shelf life which was observed by keeping the flowers in open ambient conditions, and the longest shelf life was recorded for the variety Phule Ganesh Pink (3.67 days) which was at par with Phule Ganesh White (3.33 days). Similar results were reported by Kishanswaroop et al. (2004), Pandey and Rao (2014) and Rai and Choudhary (2016) in China aster.

China aster var. Phule Ganesh Pink was found to be promising in the tropical plains of Kerala, followed by Local Pink and Phule Ganesh White when planted in October. Further studies on application of irrigation, nutrients, and plant growth regulators have to be conducted to assess the performance so as to recommend these varieties for commercial cultivation in Kerala.

## References

Bhargav, V., Kumar, R., Rao, T. M., Anuradha, S., Venugopalan, R., and Kumari, P. 2019. Evaluation of China aster genotypes for vegetative, flowering, yield and post harvest life. *Indian J. Plant Genet. Resour.*, 32(1): 80-84.

- Chavan, M. D., Jadhav, P. B., and Rugge, V. C. 2010. Performance of China aster varieties and their response to different levels of nitrogen. *Indian J. Hortic.*, 67:378-381.
- Chaitra, R. and Patil, V. S. 2007. Integrated nutrient management studies in China aster. *Karnataka J. Agric. Sci.*, 20(3): 689-690.
- Chowdhuri, T. K., Rout, B., Sadhukhan, R., and Mondal, T. 2016. Performance evaluation of different varieties of China aster in sub-tropical belt of West Bengal. *Int. J. Pharma. Sci. Invent.*, 5(8): 15-18.
- Dharmendra, N., Kandpal, K., Hugar, H., Patil, M. G., and Kulkarni, V. 2019. Performance of different varieties of China aster for North eastern dry zone of Karnataka. *J. Pharmacognosy Phytochem.*, 8(4): 1486-1494.
- Kaushal, S., Dilita, B. S., Choudhary, S. V. S., Sharma, B. P., and Gupta Y. C. 2014. Effect of planting dates on growth and flowering of China aster. *Int. J. Farm. Sci.*, 4(1): 60-70.
- Kishanswaroop, S. K. P., Saxena, N. K., and Singh, K. P. 2004. Evaluation of China aster varieties under Delhi conditions. *J. Ornament. Hort.*, 7(1): 127-128.
- Kulkarni, B. S. and Reddy, B. S. 2006. Vegetative growth and flower yield as influenced by different cultivars of China aster. *Haryana J. Hortic. Sci.*, 35 (3/4): 269.
- Munikrishnappa, P. M. and Chandrashekhar S. Y. 2015. Varietal analysis of China aster genotypes for different physiological growth parameters. *Trends. Biosci.*, 8(10): 2548-2554.
- Pandey, N. and Rao, V. K. 2014. Influence of planting geometry on performance of China aster genotypes under mid hill conditions of Uttarakhand. *J. Hill Agric.*, 5(2): 139-143
- Poornima, G., Kumar, D. P., and Seethukumar, G. K. 2006. Evaluation of China aster genotypes under hill zone of Karnataka. *J. Ornament. Hort.*, 9(3): 208-211.
- Rai, T. S. and Chowdhary, S. V. S. 2016. Evaluation of China aster cultivars under mid hill conditions of Himachal Pradesh. *Bioscan*, 11(4): 2367-2370.
- Sreenivaslu, G. B., Kulkarni, B. S., Reddy, B. S., and Adiga, J. D. 2004. Yield and quality parameters as influenced by seasons and genotypes in China aster. *J. Ornament. Hort.*, 7(3-4): 122-124.
- Zosiamliana, J. H., Reddy, G. S. N., and Rymbai, H. 2013. Growth, flowering and yield characters of some cultivars of China aster. *J. Nat. Prod. Plant Resour.*, 2(2): 302-305.