

EVALUATION OF CHINA ASTER (*Callistephus chinensis* L. Ness) VARIETIES FOR GROWTH AND FLOWERING UNDER CHHATTISGARH PLAINS AGROCLIMATIC ZONE CONDITIONS

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ABSTRACT

The present investigation was conducted in the year 2015 -16 at the Department of Floriculture and Landscape Architecture, IGKV, Raipur for evaluating the performance of China aster varieties. Among the eight varieties studied, the results showed a highly significant variation for various growth, flower, and flower yield parameters among the varieties. Varieties Phule ganesh pink recorded maximum plant height, plant spread, number of leaves plant⁻¹, number of branches plant⁻¹, number of flowers plant⁻¹, flower stalk length, flower diameter, weight of flower, duration of flower, flower yield plant⁻¹ and also flower yield. However flower yield recorded in Phule ganesh pink was at par with Phule ganesh white, Arka poornima and Arka archana. The variety Arka aadya recorded earlier days to first bud appearance and days to 50 per cent flowering which was at par with Arka archana and Arka shashank. The variety Arka poornima recorded maximum vase life, which was at par with Arka kamini and Phule ganesh pink.

INTRODUCTION

China aster (*Callistephus chinensis* L. Ness) is a half hardy annual and commercial flower crop belonging to the family 'Asteraceae' and is native to China. The genus *Callistephus* is derived from two Greek words *Kalistos* meaning 'most beautiful' and *Stephus*, 'a crown' referring to the flower head. The evolution of China aster is a history of remarkable variations. The original plant had single flowers with two or four rows of blue, violet or white ray florets. The stature was medium tall, eighteen to twenty four inches in height. The first change in the flower type had been the prolongation or development of central florets and the production of quilled flowers. Millar (1983) evaluated twenty five dahlia germplasm at Bangalore and reported DV-019 and DV-021 as outstanding. Moreover, DV-021 performed better than local varieties with regard to stalk length, color, size, shape and number of flowers. Ashwath and Parthasarathy (1993) reported that the estimates of heritability and co-heritability showed that all characters (plant height, plant spread, flower diameter, flower weight and number of flowers) were controlled by additive gene effects in China aster. The flowers of China aster are used for flower arrangement, interior decoration, garland making and worshipping. It is also grown in garden as herbaceous borders and formal beds. However, the flowers are used commercially as cut flowers for higher profit. It is grown throughout the world and is one of the most important annual flower crops of India. Among annual flowers, it ranks third next only to chrysanthemum and marigold (Zosiamliana, et al., 2012). Although, there are number of China aster cultivars

under cultivation in India but their performance are region specific and varies from place to place. Increased flower quantity and quality with perfection in the form of plants are important objectives to be reckoned in commercial flower production. The quality of flowers is primarily a varietal trait, besides being influenced by nutritional and climatic conditions that prevail during the growing period. The climatic factors like photoperiod, temperature, relative humidity and also soil moisture influence both vegetative and reproductive phases of the plant, ultimately leading to variation in the performance of the varieties. Though China aster has been grown in Chhattisgarh for landscaping purposes, however, in the recent part its value as commercial crop is gaining momentum. But no systematic research has been carried out for recommending varieties but also for Chhattisgarh plain agroclimatic zone. Therefore, keeping the point in view the present investigation on Varietal evaluation of China aster under Chhattisgarh plain condition was taken up.

MATERIALS AND METHODS

The present experiment was conducted at the Horticultural Research cum Instruction Farm of the Department of Floriculture and Landscape Architecture, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh. The experiment was laid out in Randomized Block Design (RBD) with threereplication. The study consisted of eight varieties viz. Arka kamini, Arka archana, Arka aadya, Arka poornima, Arka shashank, Phule ganesh pink, Phule

ganesh white and Secure aster mix. Standard cultivation and recommended cultural practices were followed. The plants were transplanted at a distance of 30x20 cm. All the recommended package of practice was followed to raise a healthy crop. The observations for vegetative parameters including plant height (cm), plant spread (cm), number of leaves plant⁻¹, number of branches plant⁻¹, were recorded at 30, 60 and 90 days after transplanting (DAT). The floral characters observed were days to first bud appearance, days to fifty per cent flowering, flower stalk length (cm), flower diameter (cm), number of flower plant⁻¹, weight of flower (g/plant), duration of flowering (days), flower yield plant⁻¹ (g), flower yield ha⁻¹ (t) and vase life (days) of cut flower.

RESULTS AND DISCUSSION

Vegetative growth

Significant variation in growth characters of China aster varieties was observed (Table 1). At 60 and 90 DAT, maximum plant height was recorded in the treatment Phule ganesh pink (41.30 cm) and (65.20 cm) respectively. Similar variation in plant height of varieties was observed by Poornima *et al.* (2006) in China aster. Similar variation in plant height due to varieties and genotypes has also been reported by Chavan *et al.* (2010) in China aster; Chourasia *et al.* (2015) and Bhujbal *et al.* (2013) in gladiolus. At different stages of plant growth, China aster varieties differ significantly for plant spread. The maximum plant spread was recorded in variety 'Phule ganesh pink' at 30 DAT (13.95 cm), 60 DAT (23.30 cm) and 90 DAT (27.77 cm), while minimum plant spread was observed in treatment

Secure aster mix both at 30 and 60 DAT (9.25 cm) and 90 DAT (20.83 cm). Similar findings have also been reported by Choudhary *et al.* (2014) in marigold and Munikrishnappa *et al.* (2013) in China aster.

Similar finding were also obtained by Rai and Chaudhary (2016) in china aster. The results showed high variation in performance of all the ten cultivars for growth and flowering characters. Maximum plant height (102.25 cm) and flower head diameter (6.82 cm) was noted in Phule Ganesh Violet. With respect to number of branches per plant variety Phuleganesh pink recorded in maximum number of branches at 60 DAT (12.67) and 90 DAT (18.80). However, minimum number of branches per plant was recorded in variety Arka kamini at 60 DAT (1.33). While at 90 DAT 'Secure aster mix' recorded in the minimum number of branches (1.42). Such difference observed in production of branches among the varieties might be due to inherent genetic factors, influence of genetical makeup of the genotypes and existing environment condition of chhattisgarh plains. Similar variations for number of branches were also observed by Ravi kumar (2002) and Munikrishnappa *et al.* (2013) in China aster.

Maximum number of leaves per plant was observed in variety Phule ganesh pink at 30 DAT (18.00), 60 DAT (40.87) and 90 DAT (115.07). Whereas, the minimum number of leaves per plant was recorded in the variety 'Secure aster mix' at 30 DAT (9.13), 60 DAT (17.80) and 90 DAT (27.40). Similar variations for number of leaves plant⁻¹ were also observed by Kanamadi and Patil (1993) in Chrysanthemum.

Flower characters and yield

From the Table 2, it is apparent that, 'Arka aadya' (70.33 days) and 'Arka archana' (71.33 days), took significantly less number

Table 1: Growth characters of some varieties of China aster

Varieties	Plant height (cm)			Number of branches per plant		Plant spread (cm)			Number of leaves per plant		
	30 DAT	60 DAT	90 DAT	60 DAT	90 DAT	30 DAT	60 DAT	90 DAT	30 DAT	60 DAT	90 DAT
Arka kamini	6.6	17.2	44	1.33	16.67	11.55	19.25	26.17	13.53	29.87	63.6
Phule ganesh pink	11.4	41.3	65.2	12.67	18.8	13.95	23.3	27.77	18	40.87	115.07
Phule ganesh white	6.7	31.2	62.7	2.33	15.27	12.23	22.02	26.87	12.73	32.27	83.13
Arka poornima	9.4	19.4	61.1	7.07	17.8	12.9	19.56	26.07	12.67	33.27	67.53
Arka archana	10.3	35.3	38.9	9.87	18.67	12.52	22.17	22.33	17.13	36.07	114.47
Arka shashank	8.9	23.1	48.1	3.27	13.93	9.3	17.54	21.48	12.87	28.2	74.6
Arka aadya	9.1	17.5	36.9	5.47	13.73	11.57	21.5	22.4	16.2	35	83.87
Secure aster mix	7.7	16.7	24.2	4.27	6.47	6.17	9.25	20.83	9.13	17.8	27.4
SEm ±	1.97	1.81	1.94	1.58	1.42	1.06	1.1	1.08	1.14	2.25	8.01
CD at 5 % level	NS	5.49	5.88	4.8	4.3	3.22	3.34	3.28	3.45	6.82	24.31

Table 2 : Flowering characters of some varieties of China aster

Varieties	Days to first bud appearance	Days to 50 % flowering	flowering duration (days)	Flower diameter (cm)	Flower stalk length(cm)	flower weight (g)	Number of flower per plant	Flower yield per plant (g)	Flower yield per plant (t/ha)	Vase life (days)
Arka kamini	82.33	90.67	46.33	3.44	24.17	1.73	29.27	49.36	7.4	5.67
Phule ganesh pink	75.33	85	52.33	5.54	30.77	3.17	46.87	94.84	14.23	5.33
Phule ganesh white	81.33	88.67	47.33	3.85	26.21	2.4	25.73	81.45	12.22	4.67
Arka poornima	75	85	52	4.68	25.93	2.53	31.87	84.05	12.61	6
Arka archana	71.33	82	49	4.42	21.69	1.97	38.09	92.9	13.94	4.33
Arka shashank	73.33	81.33	47	3.26	21.32	1.51	25.6	37.58	5.64	5.33
Arka aadya	70.33	77	50	4.3	21	1.55	32.33	48.57	7.29	4.67
Secure aster mix	83	90.33	52	4.26	22.05	1.37	24.33	32.2	4.83	4.33
SEm ±	1.14	0.19	1.47	0.42	0.82	0.17	4.55	7.44	1.12	0.29
CD at 5 % level	3.47	0.6	4.459	1.29	2.49	0.53	13.81	22.56	3.38	0.89

of days to first bud appearance while the maximum number of days to first bud appearance (83.00 days) was observed in Secure aster mix. In case of days taken for 50 % flowering, 'Arka aadya' (77 days) and 'Arka shashank' (81.33 days) were the earliest to reach 50 % flowering while the latest was observed by 'Arka kamini' (90.67 days). The difference in days to 50 per cent flowering might be due to the different time period taken by the different genotypes based on their genetic makeup. The findings also corroborates with the findings of Palai *et al.* (2008) and Zosiamliana *et al.* (2012) in China aster. The maximum stalk length was observed in 'Phule ganesh pink' (30.77cm), whereas, the minimum stalk length was observed in 'Arka aadya' (21cm). The difference in flower stalk length might be due to inherent characters of the individual varieties in China aster. The findings also corroborates with the findings of Pal and George (2002) and Jamal Uddin (2015) in chrysanthemum. With respect to flower diameter, the variety 'Phule ganesh pink' recorded maximum (5.54 cm) while the 'Arka aadya' (4.30 cm). The results are in line with the findings of Poornima *et al.* (2006) in China aster and Panwar *et al.* (2013) in African marigold.

The maximum flowering duration was observed in the treatment Phule ganesh pink (52.33 days), while the minimum flowering duration (46.33 days) was observed in Arka kamini. Panwar *et al.* (2013) reported a general high range for duration of flowering in African marigold. These findings are in the line with the previous findings of Rao *et al.* (2006) in chrysanthemum and Raghuvanshi and Sharma (2011) in African marigold.

The flower yield also showed a highly significant difference as indicated in table 2. The maximum number of flowers per plant were recorded in 'Phule ganesh pink' (46.87) and 'Arka archana' (38.09). The variation in number of flower plant⁻¹ might be due to hereditary traits of the genotypes. Number of flowers plant⁻¹ may have increased with the increase in number of branches plant⁻¹ (Laishram *et al.*, 2013). Moreover, different photosynthesis efficacy of genotypes may have enhanced food accumulation resulting in better plant growth and subsequently higher number of flowers per plant (Sunitha *et al.*, 2007). These results are in accordance with the findings obtained by Singh and Sangama (2000) in China aster.

The varieties exhibited significant variation for flower yield per plant and per hectare also. The maximum flower yield per plant (94.84g) and also per hectare (14.23 tonnes) was recorded in Phule ganesh pink. The increased flower yield was because of increase number of flowers per plant. The minimum flower yield per plant (32.20 g) and per hectare (4.83 tonnes) was recorded in Secure aster. Several studies reported varietal difference grown in similar environments for number of flowers, flower weight and yield, and is genetically determined (Singh *et al.*, 2008, Swaroop *et al.*, 2008). Variation in flower yield of varieties was also observed in China aster by Poornima *et al.* (2006) in China aster.

The perusal of data presented in table 2 also shows high significant varieties on vase life of flower. The variety 'Arka poornima' recorded in the maximum vase life (6 days) followed by 'Arka kamini' (5.67 days). The variation in vase life of different varieties of China aster might be attributed to genetic variability. Similar variations in vase life have also been observed by Zosiamliana *et al.* (2012) in China aster.

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