

Variation in seed production potential of China aster genotypes in the New Alluvial Zone of West Bengal

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ABSTRACT

China aster [*Callistephus chinensis* (Linn.) Ness] is an important commercial ornamental annual flower plant. Seven genotypes of China aster were chosen to evaluate the growth, flowering and seed production and the field experiment was carried out in new alluvial zone at Horticulture Research Station, Mondouri, Bidhan Chandra Krishi Vishwavidyalaya, Mohanpur, Nadia, West Bengal, India during Rabi seasons of 2016-17 to 2017-18. Seeds of China aster were raised in individual plots following standard agronomic practices and intercultural operations. Field performance of seven genotypes of China aster was observed for different parameters like plant height, number of flowers plant⁻¹, flower diameter, days to flower initiation, days to 50% flowering and seed yield plant⁻¹. Highest seed yield plant⁻¹ was recorded in Arka Poornima (3.50g, 3.40 g, and 3.45 g in 1st year, 2nd year and pooled respectively) whereas lowest seed yield plant⁻¹ was recorded in Arka Aadya (1.93g in 1st year; 1.80 g in 2nd year and 1.87 g in pooled respectively).

Keywords : China aster, flower and seed yield

China aster belongs to the family Asteraceae, is an important commercial ornamental annual grown in many parts of the world for cut flowers. The wide spectrum of colour ranges available in China aster are pink, bluish, violets, purple and white and their long shelf life have made them a popular cut flower. Some of the dwarf plant types have potential for use as flowering potted plant. According to Desai, 1967 China aster is a native of China, has been under wide spread cultivation in Europe since 1731 and it was introduced from China into France by a missionary during 18th century. The present day China asters have been developed from wild species, *Callistephus chinensis*. The genus *Callistephus* is derived from two Greek words *Kalistos* meaning 'most beautiful' and *Stephus*, 'a crown' referring to the flower head. It is a half hardy annual flower crop with the basic chromosome number of n=9 but most of the species are diploid in nature i.e., 2n=18 (Huziwarra, 1954). 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. The most suitable character for the classification of China aster is by the shape of ray florets (Janakiram and Rao, 2002). Having the potentiality to adapt well to varying soil and climatic conditions, it can be grown successfully under different agro-climatic conditions like India, France, Germany, Netherlands, U.K., Siberia, Russia, Japan, North America, Switzerland and Europe. In India, China aster is largely grown on commercial scale by the farmers in southern states like Karnataka, Tamil Nadu, Andhra Pradesh, Maharashtra and West Bengal (Raghava, 1984, Kumari *et al.*, 2016). It ranks third next to *Chrysanthemum* and *Marigold*,

among the annual flowers. Floral biology of China aster was described by Strube (1965). Fleming (1937) estimated approximately 10 per cent natural crossing in China aster. North (1979) grouped China aster under self-pollinated crops. In India, breeding in China aster was first pioneered by S.S. Negi and S.P.S Raghava during 1984-85 which resulted in development of many improved varieties. Although, China aster is being grown in considerable areas, its cultivation is concentrated around big cities and there is a need to popularize under different agro-climatic conditions and the deterioration of flower seed quality very quickly (Kumari *et al.*, 2017). The present investigation has been carried out with an objective Although, China aster is being grown in considerable areas, its cultivation is concentrated around big cities and there is a need to popularize under different agro-climatic conditions. The present investigation has been carried out to evaluate the variation in seed production potential of China aster.

Seven genotypes of China aster were raised in individual plots following standard agronomic practices and intercultural operations during *rabi* season of 2016-17 and 2017-18 to study growth, flowering and seed production in Randomized Block Design with three replications at Horticulture Research station, Mondouri, Bidhan Chandra Krishi Viswavidyalaya. Seeds of the seven varieties of China aster *viz.* Arka Aadya, Arka Archana, Arka Kamini, Arka Poornima, Local White, Local Pink, Ranaghat 1 were raised in plots (Fig. 1, 2). The field was located at 23.5° N latitude and 89° E longitude. Nursery beds of size 1.0 × 1.0 m were prepared for raising seedlings and 35 days after sowing

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the seedlings were transplanted at main field. The spacing was maintained at 45cm between the plots. The entire experimental land was divided into plots measuring 2.5 × 2 m. and 21 plots in total. The individual seedlings were transplanted by the spacing of 40 × 40 cm. In each plot, there were six rows, with each row having five plants each and a total of 30 plants. At the time of transplanting, nitrogen were applied in furrows @ 50g plot⁻¹ with 10 : 26 : 26 (mixed fertilizer) @ 50g plot⁻¹ after 20 days of transplanting. Observations were recorded on various parameters like plant height, days to flower initiation, days to 50% flower, flower diameter, number of flowers plant⁻¹, test weight and seed yield plant⁻¹.

Performances of seven genotypes of China aster for various characters in the field are presented in the tables. Observation were taken for different parameters like plant height, days to flower initiation, days to 50% flowering, flower diameter, number of flowers plant⁻¹ and seed yield flower⁻¹. Significant variation in yield as well as other characters was noticed among the genotypes.

Maximum plant height was recorded for Arka Kamini (56.33 cm in 1st year, 58.00 cm in 2nd year and 57.17 cm in pooled analysis), whereas lowest plant height recorded for Local White (25.60 cm in 1st year, 26.90 cm in 2nd year and 26.25 cm in pooled) over other genotypes. Highest days to flower initiation was recorded in Local Pink (31.00 in 1st year, 30.00 in 2nd year and 30.50 in pooled analysis) and it was lowest for genotypes Arka Archana (17.33, 17.67, 17.50 in 1st year, 2nd year and pooled respectively) over other genotypes. In case of days to 50% flowering, it was highest for genotype Arka Poornima (127.67 days in 1st year, 126.67 days in 2nd year and 127.17 in pooled analysis) and shortest days to 50% flowering was recorded in Local White (87.33 in 1st year), Arka Archana (88.33 in 2nd year and 88.00 in pooled). With regards to flower diameter, it was highest in Local Pink (7.67 cm in 1st year, 7.47 cm in 2nd year and 7.57 cm in pooled) whereas lowest was in Arka Archana and Local White (6.03 cm in 1st year) and in Arka Archana (5.90 cm in 2nd year and 5.967 cm in pooled). Flowers plant⁻¹ is highest in Arka Archana (39.00 in 1st year, 37.67 in 2nd year and 38.33 in pooled)

Table 1: Mean value of plant height and days to flower initiation of different genotypes in 1st year, 2nd year and pooled

Genotypes	Plant height (cm)			Days to flower initiation		
	1 st year	2 nd year	Pooled	1 st year	2 nd year	Pooled
Arka Aadya	48.97	49.67	49.32	24.67	24.33	24.50
Arka Archana	34.37	35.10	34.73	17.33	17.67	17.50
Arka Kamini	56.33	58.00	57.17	21.67	21.33	21.50
Arka Poornima	42.20	41.07	41.63	23.33	22.67	23.00
Local White	25.60	26.90	26.25	26.00	27.00	26.50
Local Pink	51.77	53.80	52.78	31.00	30.00	30.50
Ranaghat 1	29.67	30.13	29.90	18.67	19.33	19.00
SEm (±)	0.46	0.74	0.62	0.73	0.73	0.73
LSD (0.05)	1.43	2.28	1.90	2.25	2.25	2.25

Table 2: Mean value of days to 50% flowering and flower diameter of different genotypes in 1st year, 2nd year and pooled

Genotypes	Days to 50% flowering			Flower diameter		
	1 st year	2 nd year	Pooled	1 st year	2 nd year	Pooled
Arka Aadya	92.33	90.67	91.50	6.17	6.23	6.20
Arka Archana	87.67	88.33	88.00	6.03	5.90	5.97
Arka Kamini	113.67	114.33	114.00	6.43	6.27	6.35
Arka Poornima	127.67	126.67	127.17	6.70	6.70	6.70
Local White	87.33	89.67	88.50	6.03	6.13	6.08
Local Pink	94.00	93.67	93.83	7.67	7.47	7.57
Ranaghat 1	104.67	103.33	104.00	7.23	7.23	7.23
SEm (±)	1.25	1.97	1.65	0.07	0.11	0.09
LSD (0.05)	3.86	6.07	5.09	0.20	0.34	0.28



Fig. 1 : Views of experimental field



Arka Aadya



Arka Archana



Arka Kamini



Arka Poornima



Local White



Local Pink



Ranaghat 1

Fig. 2 : Seed of China aster genotypes

Table 3: Mean value of flowers plant⁻¹ and seed yield plant⁻¹ of different genotypes in 1st year, 2nd year and pooled

Genotypes	Number of flowers plant ⁻¹			Seed yield plant ⁻¹		
	1 st year	2 nd year	Pooled	1 st year	2 nd year	Pooled
Arka Aadya	35.00	35.33	35.17	1.93	1.80	1.87
Arka Archana	39.00	37.67	38.33	2.57	2.40	2.48
Arka Kamini	20.67	22.33	21.50	2.50	2.50	2.50
Arka Poornima	18.33	21.00	19.67	3.50	3.40	3.45
Local White	16.00	15.33	15.67	2.30	2.43	2.37
Local Pink	31.33	28.33	29.83	2.20	2.43	2.32
Ranaghat 1	21.67	23.67	22.67	1.83	2.03	1.93
SEm (±)	0.87	1.13	1.01	0.09	0.11	0.10
LSD (0.05)	2.67	3.49	3.11	0.28	0.35	0.31

and greatly reduced in Local White (16.00, 15.33 and 15.67 in 1st year, 2nd year and pooled analysis, respectively). Among the genotypes, Arka Poornima recorded maximum seed yield plant⁻¹ (3.50g, 3.40 g, and 3.45 g in 1st year, 2nd year and pooled, respectively). The minimum seed yield was recorded in Arka Aadya (1.93 g in 1st year, 1.80 g in 2nd year and 1.87 g in pooled).

So, from the field experiment over the seasons, it can be concluded that Arka Poornima is the best genotype from others with respect to seed yield because the highest pooled seed yield plant⁻¹ was recorded in Arka Poornima at new alluvial zone (Mahato *et al.*, 2017). Other genotypes also showed the good seed yield. There is a great possibility of seed production of China aster in new alluvial zone.

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