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Evaluation of Chrysanthemum (*Dendranthema grandiflora* Tzvelev) for Desirable Horticultural Traits

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A B S T R A C T

An experiment was conducted to evaluate the performance of forty-nine chrysanthemum genotypes for desirable horticultural traits at ICAR-Indian Institute of Horticultural Research, Hesaraghatta Lake Post, Bengaluru from 2015-17. Significant variations were observed for various vegetative and flowering traits during both years. The results from the pooled data of two years showed that among the genotypes evaluated, maximum plant height was recorded in Arka Chandrakant (69.59 cm), maximum flower diameter in Arka Ravikiran (9.00 cm) and maximum weight of 100 flowers in Marigold (925.04 g). The genotype Roopanjali produced maximum number of flowers per plant (1199.17). Pusa Anmol recorded the minimum number of days to first flowering (60.48 days) while Roopanjali the longest period to first flowering (201.56 days). The genotypes with superior vegetative and floral traits desirable for the different segments of the floriculture industry like loose flower, cut flower and pot plant trade can be utilized in further improvement of chrysanthemum.

Introduction

Chrysanthemum (*Dendranthema x grandiflora* Tzvelev) is one of the important floriculture crops in the cut flower, potted plant and herbaceous perennial markets of the world. The word chrysanthemum is derived from the Greek words ‘chrysos’ (gold) and ‘anthemon’ or ‘anthos’ (flower). It belongs to family Asteraceae (Anderson, 1987). It is believed to be native to the Northern hemisphere chiefly Europe and Asia and was believed to have been originated in China (Bose *et al.*, 2002). Chrysanthemum inflorescences consist of central hermaphrodite disc florets (pistillate + staminate) and marginal ray florets (pistillate). The wide variations exhibited by a large number of cultivars with respect to growth habit, size, colour, and shape of blooms make the chrysanthemum flower suitable for various

purposes such as borders, as cut flowers, pot plants, for garland making, hair decoration and for the exhibition.

Chrysanthemum covers 20090 ha area with production of 185240 MT of loose flower and 14930 MT of cut flower in India during 2015-2016. Karnataka is the most prominent chrysanthemum growing state with an area of 5100 ha and production of 61200 MT of loose flower in 2014-2015 (Anonymous, 2018). Ease of cultivation, high returns, and increasing market demand are the main reasons for the popularity of this crop. As a photosensitive crop, chrysanthemum requires long days for vegetative growth and short days for flowering. Growth and flowering of chrysanthemum are very much influenced by light and temperature. Hence, the performance of genotypes varies with region, season and growing conditions. Selection as an important method of breeding is opted for identifying chrysanthemum genotypes with desirable horticultural traits for specific purposes and maximizing the production in commercial cultivation.

Materials and Methods

The present study was carried out at Division of Floriculture and Medicinal Crops, ICAR-Indian Institute of Horticultural Research, Hesaraghatta Lake Post, Bengaluru, India during 2016 (I year) and 2017 (II year). Data of both the years was pooled and analysed statistically. The experimental field was located at an altitude of 890 meters above MSL, $13^0$7' N latitude and $77^0$29' E longitudes. Forty-nine chrysanthemum genotypes were used for this study as mentioned in Table 1. The experiment was laid out in randomized block design with two replications.

Uniform terminal cuttings five to seven cm long were taken from healthy stock plants, dipped in IBA (Indole-3-butyric acid) 2500 ppm solution for 10 seconds and planted in plug trays containing the coco-peat medium for rooting. The rooted plants were transplanted on raised beds at a spacing of 30 x 30 cm. The recommended dose of fertilizer was applied to the plants and irrigation was done through drip lines. Pinching was done 30 days after transplanting by removing the terminal portion of the plants. Regular monitoring of plants was done for disease infection and pest infestation. Prophylactic plant protection at the regular intervals was done during the course of the experiment to keep a check on diseases and pests. Observation was recorded on the vegetative traits like plant height (cm) at the time of bud appearance, number of branches; and floral traits like days taken to bud appearance, days taken to first flowering, duration of flowering (days), number of flowers, flower diameter (cm) and flower weight (g). The shelf life (days) of flowers was recorded by keeping the flowers in polythene bag (thickness 200 micron) at room temperature. Flower colour was recorded using RHS colour chart. The salient floral traits of the genotypes evaluated are detailed in Table 1.

Results and Discussion

Wide variation was recorded among the forty-nine genotypes and these differed significantly for all the characters studied during both the years (Table 2). Chrysanthemum genotypes exhibit wide range of diversity with respect to growth habit, flower form and flower colour which can utilized for various purposes. These differences among genotypes provide variation for making selection in the crop improvement programme.

The genotypes recorded significant variation for plant height ranging from 16.07 cm to 69.61 cm with a mean value of 47.97 cm. Arka Chandrakant (69.61 cm) was the tallest plants at first bud appearance stage whereas

Arka Pink Star (16.07 cm) the shortest. In Chrysanthemum, taller plants are generally ideal for cut flower production, whereas medium to short with erect stem are preferred as compared to taller plants under open field condition to evade staking. Very short plants are ideal for bedding and pot plant production. The difference in vegetative attributes of different genotypes may be due to varied growth rate and their genetic makeup. Similar variation for plant height among genotypes was also observed by Madam *et al.,* (2016), Kumar *et al.,* (2014), Banerji *et al.,* (2012) and Rao and Pratap (2006) in chrysanthemum genotypes.

Number of primary branches per plant is an important character which decides the canopy architecture of the plant. The genotype Sadbhavana (17.47 cm) had maximum number of primary branches per plant. Least number of primary branches per plant was recorded in Gulmohar (5.03). Differences observed in production of branches among the genotypes might be due to inherent genetic factors and similar results were reported by Srilatha *et al.,* (2015), Kumar (2014), Gupta and Datta (2005) and Kulkarni and Reddy (2004).

Pusa Anmol (35.69) recorded the minimum days to first bud appearance while maximum number of days to first bud appearance (120.24) was recorded under Local Yellow Semi Double. These results are also corroborated with the findings of Yadav *et al.,* (2014), Joshi *et al.,* (2009), Swaroop *et al.,* (2008) and Rao and Pratap (2006).

Days to first flowering gave an idea about the earliness of the genotypes which is useful to determine the flowering duration. Among all the genotypes, Pusa Anmol was the earliest and took 60.48 days for flowering followed by Ajay (75.32 days) and Vijay Kiran (76.69 days). The maximum numbers of days for flowering (201.56) was recorded in Roopanjali followed by Local Yellow Semi Double (189.57) and Autumn Joy (173.78) and are considered to be late flowering type. The variation for early and late blooming among chrysanthemum genotypes seems to be the genetically controlled character in the genotypes and similar observations were made by Negi *et al.,* (2015), Yadav *et al.,* (2014), Kumar and Poonam (2008) and Dilta *et al.,* (2005).

The genotype Pusa Aditya flowered for a longer period of 45.53 days which was statistically at par with Arka Nilima (45.43 days) and also Rajat (44.62 days). The minimum flowering duration (21.10) was recorded in genotype Ajay. The variation for the duration of flowering among the genotypes can be attributed to differences in genetic makeup of the plants. Similar findings for variation in flowering duration among chrysanthemum genotypes have also been reported by Madam *et al.,* (2016), Srilatha *et al.,* (2015), Kumar (2014) and Kumar and Poonam (2006).

The number of flowers per plant varied from 44.06 to 1199.17. The genotype Roopanjali (1199.17) had maximum number of flowers per plant followed by Basanti (858.62) and Aparajita (732.57) whereas Pusa Anmol (44.06) had minimum number of flowers.

The variation in number of flowers in these genotypes may be attributed to the inherent genetic and environmental factors. More number of branches per plant in some genotypes might be a reason for getting more number of flowers per plant. Similar variation for number of flowers per plants was reported earlier by was Reddy *et al.,* (2016), Srilatha *et al.,* (2015), Negi *et al.,* (2015) and Punetha *et al.,* (2011).

The flower size ranged from 2.5 cm to 9.00 cm in the forty-nine genotypes evaluated.

Table.1 Flower colour and flower form of chrysanthemum genotypes

Sl. No.	Genotype	Flower form	Flower colour
1.	Ajay	Decorative	70B, Red-Purple Group, Fan 2
2.	Anmol	Anemone	3A, Yellow Group, Fan 1
3.	Aparajita	Anemone	9AYellow Group, Fan 1
4.	Arka Chandrakant	Decorative	155B, White Group, Fan 4
5.	Arka Chandrika	Decorative	155A,White Group, Fan 4
6.	Arka Indira	Decorative	Primary (upper)- 8A, Yellow Group, Fan 1; Secondary (lower)- 34A, Orange-Red Group, Fan 1
7.	Arka Kirti	Double Korean	NN155A, White Group, Fan 4
8.	Arka Nilima	Decorative	72C, Red-Purple Group, Fan 2
9.	Arka Pankaj	Decorative	72D, Red-Purple Group, Fan 2
10.	Arka Pink Star	Semi-double	70B, Red-Purple, Fan 2
11.	Arka Ravi	Korean	22A, Yellow-Orange Group, Fan 1
12.	Arka Ravikiran	Stellate	181C, Greyed-Red Group, Fan 4
13.	Arka Red Gold	Double Korean	N34A, Orange-Red Group, Fan 1
14.	Arka Usha Kiran	Semi-double	5B, Yellow Group, Fan 1
15.	Arka Yellow Gold	Decorative	Primary (upper)- 5C, Yellow Group, Fan 1; Secondary (streaks)- N34 A, Orange-Red Group, Fan 1
16.	Arka Yellow Star	Decorative	5A, Yellow Group, Fan 1
17.	Autumn Joy	Decorative	64A, Red-Purple Group, Fan 2
18.	Basanti	Anemone	3A, Yellow Group, Fan 1
19.	CO.1 Chrysanthemum	Semi-double	5A, Yellow Group, Fan 1
20.	Coffee	Semi-double	N 34 B, Orange-Red Group, Fan 1
21.	Fitonia	Single	3A, Yellow Group, Fan 1
22.	Flirt	Decorative	71A, Red-Purple Group, Fan 2
23.	Garden Beauty	Spoon	53A, Red Group, Fan 1
24.	Gulmohar	Double Korean	N78 B, Purple Group, Fan 2
25.	Kargil	Spoon	Primary (lower)- N155D, White Group, Fan 4, Secondary (margins)- 70B, Red-Purple Group, Fan 2
26.	Lalpari	Single Korean	53A, Red Group, Fan 1
27.	Local Yellow Double	Pompon	2A, Yellow Group, Fan 1
28.	Local Yellow Semi Double	Pompon	4A, Yellow Group, Fan 1
29.	Marigold	Pompon	5A, Yellow Group, Fan 1
30.	Mother Teresa	Anemone	NN155D, White Group, Fan 4
31.	Pink Cloud	Semi-double	72 A, Red-Purple Group, Fan 2
32.	Punjab Anuradha	Semi-double	3A, Yellow Group, Fan 1
33.	Pusa Aditya	Single	Primary (upper)- 5A, Yellow Group, Fan 1; Secondary (lower)- 34 A, Orange-Red Group, Fan1
34.	Pusa Anmol	Decorative	186B, Grey-Purple Group, Fan 4
35.	Rajat	Stellate	NN155D, White Group, Fan 4
36.	Ratlam Selection	Decorative	NN155D, White Group, Fan 4
37.	Red Stone	Single	53A, Red Group, Fan 1
38.	Rekha	Single	Primary (upper)- 34A, Orange-Red Group, Fan 1; Secondary (lower)- 5A, Yellow Group, Fan1
39	Roopanjali	Single	6A, Yellow Group, Fan 1
40.	Sadbhavana	Double Korean	53A, Red Group, Fan 1
41.	Sharadmala	Double Korean	NN155D, White Group, Fan 4
42.	Shyamal	Pompon	14B, Yellow-Orange Group, Fan 1
43.	Sunil	Decorative	N34A, Orange-Red Group, Fan 1
44.	Vasanthika	Single	N34A, Orange-Red Group, Fan 1
45.	Vijay Kiran	Double Korean	9A, Yellow Group, Fan 1
46.	White Andaman	Single	NN155D, White Group, Fan 4
47.	White Dolley	Pompon	NN155A, White Group, Fan 4
48.	Winter Queen	Spoon	70B, Red-Purple Group, Fan 2
49.	Yellow Delight	Pompon	6B, Yellow Group, Fan 1

Table.2 Vegetative, floral traits and keeping quality of chrysanthemum genotypes (pooled data of 2016 (I year) - 2017 (II year))

Sl. No.	Genotype	Plant height (cm)	No. of primary branches	Days taken to bud appearance	Days taken to first flowering	Duration of flowering (days)	No. of flowers	Flower diameter (cm)	Flower weight (g)	Shelf life (days)
1.	Ajay	36.72	7.76	44.93	75.32	21.10	56.20	4.77	167.76	3.00
2.	Anmol	49.17	7.02	62.17	142.88	40.33	203.61	3.73	88.00	2.00
3.	Aparajita	54.43	13.22	72.34	150.12	31.71	732.57	3.47	126.05	2.00
4.	Arka Chandrakant	69.61	8.00	82.55	125.59	35.51	142.40	7.98	809.72	5.25
5.	Arka Chandrika	62.41	9.31	65.29	103.88	39.32	305.06	6.40	350.50	5.25
6.	Arka Indira	47.51	10.15	60.81	111.95	42.68	161.43	8.19	647.08	5.00
7.	Arka Kirti	49.54	9.71	63.01	132.84	41.37	388.53	5.99	226.72	4.50
8.	Arka Nilima	61.20	7.82	76.52	153.65	45.43	250.11	6.74	366.09	5.00
9.	Arka Pankaj	53.24	10.54	70.92	142.57	41.07	287.33	7.75	349.91	5.00
10.	Arka Pink Star	16.07	14.80	44.25	78.64	23.25	322.67	3.00	82.29	2.00
11.	Arka Ravi	59.97	8.57	55.58	116.65	33.60	115.29	6.71	268.95	2.75
12.	Arka Ravikiran	61.91	10.75	79.42	150.02	34.64	264.75	9.00	341.41	4.00
13.	Arka Red Gold	50.00	10.59	70.96	143.97	31.80	305.92	6.61	260.15	4.00
14.	Arka Usha Kiran	47.99	8.82	66.05	125.26	41.04	314.32	6.49	223.11	6.00
15.	Arka Yellow Gold	59.81	8.43	66.95	153.92	37.55	312.08	7.77	299.37	5.00
16.	Arka Yellow Star	67.39	10.23	60.53	154.62	33.28	215.16	7.26	313.14	5.00
17.	Autumn Joy	45.94	12.30	58.51	100.14	36.40	385.96	7.86	284.01	3.00
18.	Basanti	55.04	16.82	63.34	151.05	34.36	858.62	4.47	151.12	3.00
19.	CO.1 Chrysanthemum	52.62	11.39	65.13	117.05	38.10	484.05	5.48	248.24	3.50
20.	Coffee	50.99	7.51	82.33	150.51	34.79	463.85	5.07	254.08	5.75
21.	Fitonia	43.96	8.77	69.00	150.33	23.45	574.36	3.49	100.38	3.00
22.	Flirt	51.97	8.01	73.18	149.60	40.89	140.48	7.89	505.07	4.00
23.	Garden Beauty	63.19	6.97	87.81	141.03	26.88	194.50	4.83	97.82	1.00

24.	Gulmohar	67.77	5.03	82.96	159.05	36.34	161.18	7.94	631.22	3.25
25.	Kargil	39.34	17.11	93.25	159.17	26.02	491.19	3.66	51.76	1.50
26.	Lalpari	47.00	9.34	74.23	156.50	27.47	580.31	3.06	52.73	2.00
27.	Local Yellow Double	48.62	7.27	73.77	133.37	37.92	330.41	6.52	465.96	5.75
28.	Local Yellow Semi Double	48.84	6.29	120.24	189.57	23.24	96.25	4.65	184.52	4.75
29.	Marigold	42.44	7.46	62.63	97.65	29.74	134.11	5.99	925.04	8.00
30.	Mother Teresa	33.09	17.07	64.08	138.35	33.85	425.09	3.63	95.06	3.00
31.	Pink Cloud	56.64	12.28	69.01	131.95	34.55	448.23	4.38	132.74	2.00
32.	Punjab Anuradha	55.44	11.00	65.35	119.22	32.00	410.71	5.48	261.08	3.50
33.	Pusa Aditya	39.95	11.65	64.94	139.53	45.53	441.14	5.05	112.97	1.00
34.	Pusa Anmol	23.81	7.73	35.69	60.48	23.20	44.06	4.55	123.37	2.00
35.	Rajat	51.69	9.24	64.51	137.76	44.62	420.77	8.12	415.54	5.25
36.	Ratlam Selection	63.46	11.27	70.25	125.89	34.25	315.04	8.13	796.52	5.25
37.	Red Stone	35.19	8.71	63.75	106.52	35.24	294.84	4.20	81.23	2.75
38.	Rekha	28.34	10.25	63.40	131.25	27.11	285.72	3.60	74.69	1.00
39.	Roopanjali	52.37	11.94	94.79	201.56	31.30	1199.17	2.50	57.14	1.25
40.	Sadbhavana	18.74	17.47	69.30	125.69	25.09	441.76	3.03	90.89	1.25
41.	Sharadmala	36.18	8.97	52.37	98.50	28.89	220.73	4.93	178.36	3.00
42.	Shyamal	54.49	12.48	81.19	159.25	30.27	496.19	3.53	174.45	4.00
43.	Sunil	50.10	10.43	68.47	138.96	35.50	355.18	6.15	238.40	4.00
44.	Vasanthika	51.79	10.83	69.90	137.31	42.31	231.78	4.93	110.18	2.75
45.	VijayKiran	30.48	8.95	58.62	76.69	31.51	159.36	4.26	93.55	2.00
46.	White Andaman	19.29	9.34	63.94	102.67	34.64	345.63	3.67	47.47	1.00
47.	White Dolley	24.73	8.15	65.14	112.42	29.98	218.73	3.97	222.08	2.50
48.	Winter Queen	51.89	11.45	91.55	173.77	33.39	466.98	5.81	64.67	1.00
49.	Yellow Delight	68.13	5.60	65.20	102.70	35.54	81.84	4.56	322.55	4.75
	Range	16.07-69.61	5.03-17.47	35.69-120.24	60.48-201.56	21.10-45.53	44.06-1199.17	2.50-9.00	47.47-925.04	1.00-8.00
	Mean	47.97	10.10	69.18	130.35	33.84	338.38	5.45	256.43	3.42
	SEm ±	0.52	0.10	0.66	1.15	0.29	3.35	0.05	3.93	0.04
	C.D. (p=0.05)	1.02	0.19	1.31	2.27	0.57	6.63	0.10	7.77	0.07
	C.V. (%)	1.52	1.33	1.36	1.24	1.19	1.40	1.36	2.17	1.50

Table.3 Grouping of genotypes based on promising traits for different purposes

Sl. No.	Genotype	Promising for use as
1.	Arka Indira, Arka Nilima, Arka Pankaj, Arka Yellow Gold, Arka Yellow Star, Ratlam Selection and Yellow Delight	Cut flower
2.	Arka Chandrika, Arka Usha Kiran, CO.1 Chrysanthemum, Marigold, Punjab Anuradha, Sharadmala and Local Yellow Semi Double and Local Yellow Double	Loose flower
3.	Arka Pink Star, Lalpari, Mother Teresa, Sadbhavana, Vijay Kiran, White Andaman and White Dolley	Pot Plant and bedding purpose

Largest flower size (9.00 cm) was recorded in Arka Ravikiran. The flower size is minimum (2.5 cm) in Roopanjali. The variation in flower size might be due to genetic makeup of genotypes. This finding is also in accordance with Negi *et al.,* (2015), Kumar *et al.,* (2015), Kumar *et al.,* (2014) and Gupta and Datta (2005) who reported significant difference in diameter different varieties of chrysanthemum.

The 100 flower weight also varied significantly, the maximum being recorded in the genotype Marigold (925.04 g) followed by Arka Chandrakant (809.72 g) and Ratlam Selection (796.52 g) whereas the genotype White Andaman (47.47 g) had minimum weight. This may be due to variation in number of ray florets. Similar observations were reported earlier by Reddy *et al.,* (2016), Kumar (2014) and Swaroop *et al.,* (2008).

The genotype Marigold (8.00 days) had maximum shelf life of the flowers followed by Arka Usha Kiran (6.00 days) and Coffee (5.75 days) whereas Pusa Aditya (1.00 day) minimum shelf life of the flowers. Variations in shelf life may be due to the different flower form, flower size and sensitivity of genotypes to ethylene. Significant differences among genotypes for various traits were also reported by Kumari *et al.,* 2017 and Bhargav *et al.,* 2018 in China aster.

RHS colour and flower form of the forty-nine chrysanthemum genotypes has been presented in Table 1. The forty-nine chrysanthemum genotypes were grouped into following colours, Yellow-Orange (Arka Ravi and Shyamal), White (Arka Chandrika, Arka Chandrakant, Arka Kirti, Rajat, White Dolley, White Andaman, Kargil, Ratlam Selection, Sharadmala and Mother Teresa), Yellow (Arka Indira, Arka Yellow Gold, arka Yellow star, Arka Usha Kiran, Pusa Aditya, Marigold, Basanti, Punjab Anuradha, CO.1 Chrysanthemum, Aparajita, Vijay Kiran, fitonia, Local Yellow semi Double, Anmol, Roopanjali, Yellow Delight and Local Yellow Double), Red-Purple (Arka Nilima, Arka Pankaj, Arka Pink Star, Flirt, Pink Cloud, Winter Queen, Ajay and Autumn Joy), Orange-Red (Vasantika, Coffee and Arka Red Gold), Greyed-Red (Arka Ravikiran), Red (Garden Beauty, Lalpari, Red Stone, Sadbhavana), Grey-Purple (Pusa Anmol), Purple (Gulmohar) and some genotypes having flowers with a dominant colour on top and tinge of another colour at the base of petals (Arka Indira, Arka Yellow Gold, Pusa Adiya and Kargil).

The forty-nine chrysanthemum genotypes showed different flower forms like Single Korean (Lalpari), Double Korean (Arka Ravi, Arka Kirti, Vijay Kiran, Gulmohar, Lalpari, Sharadmala, Sadbhavana and Arka Red

Gold), Decorative (Arka Chandrika, Arka Chandrakant, Arka Indira, Arka Nilima, Arka Pankaj, Arka Yellow Gold, Arka Yellow Star, Flirt, Pusa Anmol, Ratlam Selection, Ajay, Autumn Joy and Sunil), Stellate (Arka Ravikiran and Rajat), Single (Vasantika, Pusa Aditya, White Andaman, Fitonia, Rekha, Red stone and Roopanjali), Semi-double (Arka Usha Kiran, Arka Pink Star, Punjab Anuradha, Pink Cloud and CO.1 Chrysanthemum), Pompon (Marigold, White Dolley, Local Yellow Semi Double, Yellow Delight, Local Yellow Double and Shyamal), Spoon (Garden Beauty, Kargil and Winter Queen), Anemone (Basanti, Aparajita, Anmol and Mother Teresa). Similar description of flower colour and flower type was also earlier recorded by Reddy *et al.*, (2016), Poonam and Kumar (2008), Poonam and Kumar (2007) and Gupta and Datta (2005).

Arka Chandrakant, Yellow Delight, Gulmohar, Arka Yellow Star and Ratlam Selection are taller genotypes and Arka Pink Star, Sadbhavana, White Andaman, Pusa Anmol and White Dolley are shorter genotypes among the forty-nine chrysanthemum genotypes. Pusa Anmol, Ajay, Vijay Kiran, Arka Pink Star and Marigold are promising early flowering genotypes while Roopanjali, Local Yellow Semi Double, Winter Queen, Shyamal and Kargil are late flowering genotypes. Pusa Aditya, Arka Nilima, Rajat, Arka Indira and Vasantika are longer flowering duration genotypes whereas Ajay, Pusa Anmol, Local Yellow Semi Double, Arka Pink Star and Fitonia are shorter flowering duration genotypes. Based on these results the promising genotypes have been classified accordingly to their utility into the following Table 3.

Roopanjali, Basanti, Aparajita, Lalpari and Fitonia were highly floriferous among the forty-nine chrysanthemum genotypes. Arka Ravikiran, Arka Indira, Ratlam Selection, Rajat and Arka Chandrakant are found promising for larger sized flower whereas Roopanjali, Arka Pink Star, Sadbhavana, Lalpari and Aparajita for small sized flower. Marigold, Arka Chandrakant, Ratlam Selection, Arka Indira and Gulmohar have higher 100 flower weight whereas White Andaman, Kargil, Lalpari, Roopanjali and Winter Queen have lower 100 flower weight among the forty-nine chrysanthemum genotypes. Marigold, Arka Usha Kiran, Coffee, Local Yellow Double and Arka Chandrika have longest shelf life among the chrysanthemum genotypes evaluated.

Considerable morphological variation was observed in all vegetative and flowering traits among the genotypes. These traits could be considered as useful selection criteria for further improvement in chrysanthemum.

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