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Research Article

Assessment of Qualitative and Quantitative Parameters of Different Chrysanthemum Genotypes

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ABSTRACT

Chrysanthemum is an important global floriculture crop leader due to its unparalleled diversity in plant and flower colour, shape, form and blooming pattern. Although, it is suited for a wide range of climates, performance of chrysanthemum plants varies in various climatic conditions. An investigation was conducted in Rabi season at Floriculture Research Farm, ASPEE college of Horticulture and Forestry, Navsari with an object to evaluate suitable varieties under south Gujarat conditions. Among varieties, highest plant height (54.87cm) was noted in Maghi. Maximum plant spread in North-South (29.63cm) and in East-West directions (40.09cm) was observed in variety Ratlam Selection and Maghi, respectively. Biggest leaf size in terms of leaf length (5.61 cm), leaf width (4.25 cm) and petiole length (3.10 cm) was noted in Thai Chen Queen, Harvest and Flirt respectively. A thorough glance of leaf area (17.50cm^2) was found maximum in Dolly White. Early flower bud initiation (63.99 days) and flower opening (71.73 days) were recorded in variety Red-2. The variety Thai Chen Queen has biggest flower (12.65 cm) and maximum flower weight (9.78g). While variety Maghi has significantly highest number of ray florets per flower (344.83). With respect to flower duration, longest duration of flower (56.67 days) was observed in Ratlam Selection. The variety Maghi was superior with respect to production of number of flowers (99.67 per plant and 1898.94 per plot) whereas, variety Thai Chen Queen noted maximum weight of flower yield (199.33 g per plant and 4330.27 g per plot).

Key words: *Chrysanthemum, Vegetative, Flowering, Yield characters.*

INTRODUCTION

Chrysanthemum (*Chrysanthemum morifolium* Ramat.) belongs to family Asteraceae, is a popular commercial flower grown for cut flowers, loose flowers as well as a pot plant in all over the world. Apart from its unsurpassed beauty wide array of flower colours, shape, size and keeping quality of flowers has gain popularity among the consumers and commercial growers.

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In India, chrysanthemum is grown commercially and major use of this in our country is for making garlands, veni, bracelets, flower decoration and in religious offerings. In recent years, demand for chrysanthemum for use in amenity horticulture has steadily increased not only for their aesthetic beauty and a long lasting quality but also for their good prospect of marketing as cut flowers and potted plants to many countries in the world (Bose & Yadav, 1993).

Yield is a complex variable and depends upon a large number of factors and their interactions. Hence, assessment of yield contributing character is an important pre-requisite in the formulation of effective breeding programme. With the introduction of new germplasm from diverse sources, it becomes mandatory to carry out evaluation studies in order to identify suitable cultivars for utilization in breeding programme for developing improved cultivars. Varietal evaluation can be helpful for the commercial chrysanthemum growers to choose their preferable one. Keeping in the view, this investigation has been planned to evaluate the performance of different varieties in respect to their different traits under South Gujarat conditions.

MATERIALS AND METHODS

The experiment comprising fifteen chrysanthemum cultivars evaluated at Floriculture Research Farm, ASPEE College of Horticulture and Forestry, Navsari Agricultural University, Navsari during 2016-17. Chrysanthemum cultivars *viz*., Ravi Kiran, Shyamal, Flirt, Maghi, Jaya, Lalpari, Red-2, Nilima, Ratlam Selection, Ajina Purple, Pancho, Harvest, Dolly White, Mayur and Thai Chen Queen were selected for the study. The recommended agronomic packages and practices were followed to grow a crop. The soil was incorporated with well decomposed farmyard manure. Uniform, well developed 1 to 1.5 months old terminal rooted plants were planted in raised bed at spacing at 30 cm x 30 cm in double row zig-zag system. A light irrigation was given immediately after transplanting for better establishment of plants in the field. The experiment was laid out in a Randomized Complete Block Design with three replications. The observations were recorded on vegetative, flowering, quality and yield parameters and analysed statistically as advocated by Panse and Sukhatme (1985).

RESULTS AND DISCUSSION

Vegetative growth parameters

The data on variation in vegetative growth parameters in different varieties of chrysanthemum are presented in Table 1. Plant height of chrysanthemum exposed significant variation among 15 genotypes (Table 1). The variety Maghi resulted significantly tallest plant (54.87 cm) whereas, it was minimum (23.93 cm) in variety Mayur could be utilized for pot mum purpose. Plant height is attributed to be an important varietal character that depends upon the genetic constitution. The variation in plant height among the various genotypes might be due to genotypic differences in phenotypic expression of plant height and variations in different genotype-environmental interaction effects on plant height. The difference in plant height may be due to growth character of the genotypes as reported by Kanamadi and Patil (1993) and Behera et al. (2002) in chrysanthemum. Significantly maximum plant spread in North-South direction (29.63 cm) and East-West direction (40.09 cm) was observed in varieties Ratlam Selection and Maghi, respectively. Variation in plant spread might be due to the inherent character of genotypes. Variation in plant spread has also been resulted by Mishra (1999) and Kulkarni and Reddy (2004) in chrysanthemum. Significantly increased leaf size with respect to length (5.61 cm) was observed in variety Thai Chen Queen, width (4.25 am) was observed in variety Harvest and petiole length (3.10 cm) was observed in variety Flirt while width of leaf was found non significant although maximum was noted in variety Harvest and maximum leaf area (17.50 cm^2) was recorded in variety Dolly White. Leaves are the prime important functional units for photosynthesis, transpiration and

respiration which greatly influence the growth and flower yield. Greater leaf area may lead to more dry matter accumulation, which resulted in the accumulation of maximum photosynthates that contributed to produce bigger sized flower or more number of flowers. Variation in leaf area indicates additive gene effects would be effective for increase in leaf size. The result is in agreement with the earlier studies conducted in gerbera (Nair & Shiva, 2003), dahlia (Vikas et al., 2011) and in chrysanthemum (Barigidad & Patil, 1992).

Flowering and Quality parameters

The data on variation in flowering and flower quality parameters in different varieties of chrysanthemum are presented in Table 2. Number of days taken for flower bud initiation and first flowering is an important character that signifies earliness or late flowering which determines the flower availabilty. Significant variation was found for the emergence of flower bud and days to flowering. Variety Red-2 noted significantly early for flower bud initiation (63.99 days) followed by the variety Shyamal (65.47 days). However, late first flower bud initiation (88.51 days) was observed in variety Jaya. Further the less number of days taken to flowering (71.73 days) was observed in variety Red-2 whereas, it was delayed (94.12 days) in variety Maghi. The variation in time to flowering might be due to the genotype or the influence of genotype and environment. It is an important genotypic character that might be primarily governed by the genetic makeup of the genotypes. These results are in agreement with Kanamadi and Patil (1993), Behera et al. (2002), Vasanthachari (2003) and Palai (2009) in chrysanthemum. Maximum flower diameter (12.65 cm) was recorded from variety Thai Chen Queen followed by variety Ratlam Selection *i.e* 6.41 cm whereas, minimum flower diameter (4.32 cm) was reported in variety Red-2. Significantly maximum weight of flower (9.78 g) was observed in variety Thai Chen Queen followed by variety Shyamal (3.74 g) and variety Ratlam Selection (3.54 g), while minimum flower weight (1.25 g) was recorded in variety Red-2. Further, highest number of ray florets (344.83) was noted in variety Maghi which was at par with variety Jaya (342.67) and variety Thai Chen Queen (326.67) could be suitable for loose flower purpose, while lowest number of ray florets (33.67) was observed in variety Pancho. Similar variations for the chrysanthemum cultivars were also reported by Dhahiya et al. (2003) and Damke et al. (1997) in chrysanthemum. The weight of flowers are clearly in relation with the size of flowers. The greater the size of the flowers, greater would be the fresh weight of flowers. This variation in flower weight among varieties might be attributed to the higher water and carbohydrates level in the flower. Water plays a very important role to maintain flower turgidity, freshness and petal orientation. The ultimate effect of all these factors resulted into strong and long flower stalks, large sized buds or flower and finally increases in flower weight. The maximum flowering duration was observed in variety Ratlam Selection (56.67 days) followed by Ajina purple (51.31 days), while the minimum flowering duration 35.67 days was observed in Red-2. The variation in flowering duration among the varieties was attributed to genotype of the plant, environmental influence and other management factors. Similar results for variation in flowering duration among the genotypes have also been reported in chrysanthemum under different environmental conditions (Swaroop et al., 2008; Singh et al., 2008 & Rao & Pratap, 2006). The observation on flower color according to RHS colour chart display a moderate range of variation in colour of different chrysanthemum varieties have been represented in Table- 2.

Yield Parameters

The total flower yield is also contribution of its attributing characters and evaluation of chrysanthemum varieties for yield attributes showed significant variation presented in Table 3. From the results, significant variation among the varieties with respect to number of flowers per plant per plot and yield of flowers per plant per plot were observed. The

maximum number of flowers per plant (99.67) and per plot (1898.95) was recorded in variety Maghi. Further, highest flower yield per plant (199.33 g) and per plot (4330.27 g) was observed in variety Thai Chen Queen followed by variety Ratlam Selection. Higher yields were due to the more number of flowers and heavier flowers. Even the genetic constituents of the cultivar will govern the growth and flower yield. It could be stated that variation among the genotypes for number of flowers per plant per plot might be due to genotypic and environmental differences. Similar trend was observed by Bhaskaran (2001) and Vasanthachari (2003) in chrysanthemum.

Table 1: Variation in vegetative growth parameters in different varieties of chrysanthemum

Variety	Plant height (cm)	Plant spread (cm)		Leaf size (cm)			Leaf area (cm^2)
		N-S	E-W	Length	Width	Petiole length	
Ravi Kiran	52.27	24.00	35.78	5.26	4.02	2.63	11.77
Shyamal	37.93	21.83	29.68	5.22	4.20	2.65	15.17
Flirt	39.53	23.73	33.25	4.42	4.08	3.10	13.67
Maghi	54.87	28.77	40.09	3.84	3.40	1.65	9.20
Jaya	49.07	28.97	37.89	5.25	3.63	2.63	13.00
Lalpari	37.80	28.93	32.08	5.54	3.96	2.09	15.37
Red-2	35.48	20.97	25.34	3.95	3.61	2.29	8.00
Nilima	48.37	21.33	34.27	4.73	4.01	1.67	13.10
Ratlam Selection	45.73	29.63	34.73	5.33	4.02	2.63	13.73
Ajina Purple	24.43	23.00	22.40	5.06	3.90	2.45	14.20
Pancho	31.53	25.20	27.21	4.05	3.96	2.47	8.97
Harvest	27.87	25.20	26.40	4.57	4.25	2.52	13.07
Dolly White	24.07	27.87	29.67	5.52	4.13	2.19	17.50
Mayur	23.93	17.07	25.99	5.15	3.87	2.52	13.93
Thai Chen Queen	37.47	25.80	33.03	5.61	3.97	2.75	15.37
S. Em. ±	1.79	1.55	1.63	0.28	0.27	0.15	1.19
C. D. at 5 %	5.18	4.50	4.71	0.81	NS	0.42	3.45
C. V. %	8.14	10.84	9.03	9.94	11.78	10.47	15.77

Table 2: Variation in flowering and flower quality parameters in different varieties of chrysanthemum

Variety	Days to bud initiation	Days to flowering	Flower diameter (cm)	Number of ray florets/ flower	Flower duration (days)	Flower weight (g)	Flower colour
Ravi Kiran	69.25	79.21	5.66	125.67	47.49	2.11	Light yellowish pink
Shyamal	65.47	82.42	6.41	325.67	48.03	3.74	Strong reddish purple
Flirt	67.19	76.15	5.11	223.00	44.21	2.70	Moderate reddish orange
Maghi	86.32	94.12	4.80	344.83	43.97	2.27	Brilliant greenish yellow
Jaya	88.51	92.11	4.75	342.67	46.19	2.63	Moderate red
Lalpari	76.73	81.11	4.87	81.00	43.27	1.70	Strong red
Red-2	63.99	71.73	4.30	46.00	35.67	1.25	Brilliant yellow
Neelima	72.46	84.83	6.13	208.71	47.67	2.26	Light reddish purple
Ratlam Selection	71.91	77.39	7.14	243.33	56.67	3.54	White-B
Ajina Purple	70.57	79.89	4.47	78.00	51.31	2.63	Strong purplish red
Pancho	76.42	82.19	4.44	33.67	45.60	1.47	Deep purplish pink
Harvest	73.63	79.48	4.79	42.67	43.27	1.67	Brilliant yellow
Dolly White	80.01	80.20	4.74	114.33	46.27	1.78	White-B
Mayur	76.82	80.71	4.32	47.33	41.45	2.17	Brilliant greenish yellow
Thai Chen Queen	76.04	83.45	12.65	326.67	43.00	9.78	Light yellow
S. Em. ±	3.13	3.86	0.36	10.45	2.87	0.18	Light yellowish pink
C. D. at 5 %	9.07	11.17	1.09	30.28	8.32	0.53	Strong reddish purple
C. V. %	7.30	8.18	11.02	10.51	10.92	11.46	Moderate reddish orange

Table 3: Evaluation of chrysanthemum varieties for yield attributes.

Parameters/ Cultivars	Number of flowers/plant	Number of flowers/plot	Yield of flowers/plant (g)	Yield of flowers/plot (g)
Ravi Kiran	21.00	704.48	57.23	1260.40
Shyamal	21.67	434.46	92.13	1756.92
Flirt	27.00	651.49	75.03	1736.13
Maghi	99.67	1898.94	161.97	4152.56
Jaya	59.00	1458.83	144.06	3901.01
Lalpari	98.33	1653.16	182.65	4040.70
Red-2	20.00	412.51	26.50	585.95
Neelima	20.33	442.81	34.70	851.30
Ratlam Selection	71.33	1293.32	162.90	4219.86
Ajina Purple	22.67	580.35	34.67	826.50
Pancho	38.67	979.83	57.77	1155.14
Harvest	29.67	667.46	50.17	846.71
Dolly White	45.33	963.49	76.10	1381.96
Mayur	26.33	536.87	49.27	1061.94
Thai Chen Queen	17.67	510.70	199.33	4330.27
S. Em. ±	2.33	49.75	6.42	104.10
C. D. at 5 %	6.76	144.09	18.59	301.51
C. V. %	9.80	9.80	11.87	8.42

CONCLUSION

The results of this investigation suggested that the chrysanthemum varieties could be effectively categorized and characterized based on morphological characters and as such, these traits could be utilized as good descriptors in the identification and maintenance of chrysanthemum varieties. This existed ample variation and diversity in chrysanthemum could be utilized for cut flower, loose flower and pot mum purpose. The varieties Ravi Kiran, Shyamal, Flirt, Neelima, Ratlam Selection and Thai Chen Queen are best suitable for cut flower purpose, whereas varieties Jaya, Pancho, Maghi can be selected for loose flower purpose because of attaining more number of flowers per plant. However varieties Red-2, Ajina Purple, Pancho, Lalpari, Dolly White and Mayur are best suitable for pot mums.

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