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Studies on Growth and Flowering Behavior of Newly Evolved Genotypes of Chrysanthemum (*Dendranthema grandiflora* Tzvelev) for Loose Flower Production

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A B S T R A C T

An experiment was conducted to study the growth and flowering behavior of newly evolved nineteen genotypes of chrysanthemum (*Dendranthema grandiflora* Tzvelev) including cultivar 'Surf' as standard check for loose flower production at the Experimental Farm of Department of Floriculture and Landscape Architecture, Dr. Yashwant Singh Parmar University of Horticulture and Forestry, Nauni, Solan, Himachal Pradesh during the year 2016-17. Among different genotypes, maximum plant height was recorded in genotype 'UHFSChr128' (120.33cm). The number of stems per plant were observed maximum in 'UHFSChr 131' (6.67) followed by 'UHFSChr'118' (6.33).The cultivar 'Surf' took minimum number of days for visible flower bud formation (76.07 days) followed by genotypes 'UHFSChr 111' (95.80 days), 'UHFSChr 123' (96.33 days) and 'UHFSChr 115' (96.93 days). In contrast, genotype 'UHFSChr129' took maximum number of days for visible flower bud formation (123 days). Significantly lesser number of days taken for flowering was recorded in cultivar 'Surf' (109.13 days) whereas, genotype 'UHFSChr129' (154 days) took maximum days for flowering. Maximum number of flowers per plant were observed in cultivar 'UHFSChr128' (474.93) followed by 'UHFSChr132' (435.93) and 'UHFSChr117' (408.33) where as minimum number of flowers were observed in genotype 'UHFSChr124' (29.59). The duration of flowering was found maximum in genotype 'UHFSChr111' (34.00 days).

Keywords

Chrysanthemum, Genotypes, Flowering, Production Technology, Germplasm

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Introduction

Chrysanthemum (*Dendranthema grandiflora* Tzvelev) belongs to family Asteraceae (Andreson, 1987) and native to Northern hemisphere chiefly Europe and Asia. It is the national flower of Japan and commonly called as "Queen of the East," Guldaudi in India and mum in America. The number of species in the genus chrysanthemum varies from 100 to 200. It ranks second after rose in spray type while seventh in standard type in term of consumption (Anonymous, 2017). It is most popular due to its wide range of flower colour,

growth habit, size and shape. It is used for cut flower and loose flower as well as making garlands, venis, gajras and religious offering.

The extra large-bloomed cultivars are prized for their exhibition value. The utility and popularity of chrysanthemum have increased immensely with the introduction of the techniques for year round blooming based on scientific research in the field of photoperiodism and genetics.

Chrysanthemum is a short day plant and cannot normally form flower buds when the day length exceeds 14.5 hours and developed them when it exceeds 13.5 hours (Machin and Scopes, 1978). Due to nature of flowering under short-day conditions, availability of chrysanthemum flower is restricted to short span of not more than three months. As, it requires long days for vegetative growth and short days for flowering. It is grown under wide range of climatic conditions but the performance of the genotype varies with the region, season and other growing conditions. Due to of intensive research done by scientists and practical experience of many growers, its flowers can be produced throughout the year to precise schedules at any time by environmental manipulation, fertilization and using growth regulating chemical. However, ability to produce chrysanthemum year round depends on an understanding the complex interaction between the plant and its environment. A sound knowledge of its physiology and management practices can ensure the continued success of chrysanthemum crop despite increasing production cost.

Somehow, the available germplasm could not fulfill the requirements in terms of new colors, forms, types and various characteristics. Therefore, urgent need is felt to develop new cultivars having wide genetic adaptability and easily availability to the growers at cheapest rate, the genotypes were evolved at the deptt. of Floriculture and landscape Architecture, College of Horticuture, Dr. Yashwant Singh Parmar University of Horticulture and Forestry, Nauni, Solan (Himachal Pradesh). An investigation was carried out with the objective to study the growth and flowering behavior of newly evolved genotype of chrysanthemum (*Dendranthema grandiflora* Tzvelev) for loose flower production.

Materials and Methods

Study Area and experimental design

The experiment was conducted at Experimental Farm of Department of Floriculture and Landscape Architecture, College of Horticulture, Dr. Yashwant Singh Parmar University of Horticulture and Forestry, Nauni- Solan (Himachal Pradesh), India during 2016-17.

Uniform healthy rooted plants were planted at a spacing of 30×30 cm in randomized block design with three replications consisting nine plants in each replication under open field conditions. Using FYM and NPK @ 5 kg /m^2 and 22.5 g P (Single Super Phosphate-140.62 g /m^2) and K (Muriate of Potash-37.5 g / m^2) and 11.25 g of N (Urea-24.46g /m^2) should be applied after 30 days of planting respectively. Five plants were selected from each replication for getting observation. The observations were recorded after bud initiation stage and uniform package and practices were followed throughout the cropping season. Data were recorded for both vegetative and flowering attributes like number of flower per plant, days taken for bud initiation, days taken to flowering, flowering duration (days), plant height (cm), plant spread (cm^2), flower diameter (cm) and flower weight(kg/m^2), using the standard method. The collected data were analysed statistically as per standard methods of Gomez and Gomez (1984).

Genotypes used

In total, following nineteen newly evolved genotypes were used in the present investigation in order to assess their growth and flowering along with 'Surf' (standard check) under open field conditions:

Results and Discussion

Among different genotypes, maximum plant height was recorded in genotype 'UHFSChr128' (120.33cm) whereas minimum in cultivar 'Surf' (39.27cm) as depicted in Table 1. The variation in plant height of different cultivars of chrysanthemum has also been reported by Barigidad and Patil (1997), Laxmi *et al.,* (2008), Sawaroop *et al.,* (2008), Palai (2009), Banerji *et al.,* (2012) and Kumar *et al.,* (2012) and Punetha *et al.,* (2011).

The number of stems per plant were observed maximum in 'UHFSChr125' and 'UHFSChr125' (6.67) in contrast, minimum number of stems were noted in genotype 'Surf' (4.37). The number of stem varied with the genotypes which resulted best after pinching. Swaroop *et al.,* (2008) evaluated different genotypes of chrysanthemum recorded maximum number of branches per plant. The cultivar 'Surf' took minimum number of days for visible flower bud formation (76.07 days). In contrast, genotype 'UHFSChr129' took maximum number of days for visible flower bud formation (123 days). Significantly lesser number of days taken for flowering by genotype 'Surf' (109.13 days) whereas, 'UHFSChr129' (154 days) took maximum days for flowering. In similar study Negi *et al.,* (2015) also reported the variation for days taken to flowering different cultivars of chrysanthemum. The largest flowers were found in genotype 'UHFSChr124' (10.17cm). In contrast, smallest sized flowers were observed in 'UHFSChr128' (3.07cm).

The variation in flower size in the genotypes may be attributed due to inherent genetic characters of the individual cultivars and environmental factors reported by Biradur and Khan (1996); Singh and Ramchandran (2002). The increase in flower size may be due to disbudding also. It was however, found to be statistically at par with genotype 'UHFSChr118' (3.3cm). The perusal of data from Table 2 envisages that maximum numbers of flowers per plant were observed in genotype 'UHFSChr128' (447.49) followed by 'UHFSChr132' (435.93) and 'UHFSChr117' (408.33). On the other hand, minimum numbers of flowers were observed in genotype 'UHFSChr124' (29.59).The number of flowers per plant determines the better growth and flower yield of chrysanthemum. Poonam and Ashok Kumar (2007) and Kumar *et al.,* (2015) reported that vegetative growth significantly contribute towards the flower yield of chrysanthemum. Variation in number of flowers was observed by Yadav *et al.,* (2014).

Maximum flower yield per meter square was observed in genotype 'Surf' (6316.8gm/m^2), 'UHFSChr132'(6192.00/m^2) and minimum was in genotype 'UHFSChr124' (1253.52/m^2). The difference in yield may be due to the additive gene effect (Behera *et al.,* (2002). The increase in yield may be due to the increased flower size, flower weight and number of branches per plant (Suvija *et al.,* 2016). The duration of flowering was found maximum in genotype 'UHFSChr111' (34.00 days). Variation among different cultivars for duration of flowering was also been observed by Talukdar *et al.,* (2006), Kumar *et al.,* (2014).

Table.1

Sr. no.	Genotype	Sr. no.	Genotype
1	UHFSChr111	10	UHFSChr123
2	UHFSChr113	11	UHFSChr124
3	UHFSChr114	12	UHFSChr125
4	UHFSChr115	13	UHFSChr126
5	UHFSChr117	14	UHFSChr128
6	UHFSChr118	15	UHFSChr129
7	UHFSChr120	16	UHFSChr130
8	UHFSChr121	17	UHFSChr131
9	UHFSChr122	18	UHFSChr132
19	Surf (Standard check)		

Table.2 Variation in different growth and flowering parameters of newly evolved genotypes of Chrysanthemum under Nauni (Solan) conditions during 2016-17 for loose flower production

Sr No	Genotypes	Bud formation (Days)	Days taken to flowering	Plant height (cm)	Number of Stems /Plant	Plant spread (cm)	Flower size (cm)	Duration of flowering (days)	Number of flower/Plant	No of flower (gm)/Plant	Weight of flower g/m^2
1	UHFSChr111	95.80	137.33	62.66	4.67	40.00	5.47	34.00	235.33	494.20	4447.80
2	UHFSChr113	101.00	138.73	91.60	5.33	37.67	5.40	27.67	225.33	450.67	4056.00
3	UHFSChr114	97.00	137.67	113.33	5.67	36.33	4.83	27.00	284.67	341.60	3074.40
4	UHFSChr115	96.93	139.87	113.40	6.33	41.00	6.33	27.33	199.33	418.60	3767.40
5	UHFSChr117	98.60	135.33	101.00	6.00	39.67	3.84	28.00	402.67	644.27	5798.13
6	UHFSChr118	99.20	138.40	76.73	5.67	32.00	3.30	27.33	147.33	139.28	1253.52
7	UHFSChr120	99.40	138.33	69.73	5.67	36.00	5.50	33.00	191.00	204.35	1839.18
8	UHFSChr121	97.93	130.87	97.00	5.33	38.00	4.50	27.00	235.67	348.77	3138.90
9	UHFSChr122	97.40	130.27	78.00	6.67	36.00	5.33	27.67	346.67	627.46	5647.11
10	UHFSChr123	96.33	128.60	82.33	4.67	37.00	5.77	27.33	58.33	169.17	1522.50
11	UHFSChr124	98.00	138.67	72.00	4.67	26.67	10.33	30.33	30.33	221.43	1992.90
12	UHFSChr125	99.53	139.93	105.33	6.67	38.33	4.50	27.33	252.67	235.40	2118.60
13	UHFSChr126	97.87	135.67	65.16	5.33	35.00	4.83	33.67	206.33	237.27	2135.40
14	UHFSChr128	99.20	136.47	120.33	6.33	38.33	2.67	26.33	448.00	268.80	2419.20
15	UHFSChr129	104.00	154.93	46.53	5.00	31.33	5.07	29.00	102.33	307.00	2763.00
16	UHFSChr130	101.40	136.00	89.26	6.67	34.00	4.57	32.67	113.00	169.50	1525.50
17	UHFSChr131	103.60	136.73	91.40	6.33	37.00	5.03	28.67	262.00	419.20	3772.80
18	UHFSChr132	99.27	139.60	89.60	6.67	37.33	5.33	32.33	430.00	688.00	6192.00
19	Surf	76.07	109.13	39.33	4.33	33.00	6.60	32.33	109.67	701.87	6316.80
	CD $_{0.05}$	2.596	3.205	8.22	1.220	4.746	0.643	3.13	26.536	44.471	400.295

It was concluded that 'UHFSChr 132', 'UHFSChr 117', 'UHFSChr 122', 'UHFSChr 111', including 'Surf' performed comparatively better w.r.t. flower yield so these genotypes are suitable for cultivation as loose flower production.

References

Anderson RL.1987. Reclassification of genus chrysanthemum *HortScience* 22: 313.

Anonymous. 2017. Flora Holland https://www.royalfloraholland.com/en/speciale-paginas/ in.../bloemenagenda-2017.

Biradur MS and Khan MM.1996.performance of exotic gerbera varieties under low cost plastic greenhouse. *The Lalbaugh* 41:46-52.

Behera TK,PS Sirohi and Anand Pal.2002. Assessment of chrysanthemum germplasm for commercial cultivation under Delhi condition. *Journal of ornamental Horticulture New series* 5; 11-14.

Banerji BK, Dwivedi AK and Atul Batra 2012. Morphology and Biochemical characterization of chrysanthemum. *Journal of Ornamental Horticulture* 7:32-36.

Anonymous. 2019. Directorate of Horticulture. Nabahar Shimla, Himachal Pradesh.

Gomez L A and Gomez A. 1984. Statistical procedure for agriculture research. 3rd ed. Singapore: Jhon Wiley and Sons, p 680.

Kumar R Deka BC and Roy AR. 2012. Evaluation of Orchid species under sub-tropical mid hill of Meghalaya. Horticulture Flora Research Spectrum 1:49-51.

Kumar R. 2014. Evaluation of chrysanthemum genotypes for flowering traits under open grown condition. *HortFlora Research Spectrum* 3: 388-389.

Kumar A, Dubey P, Patanwar M and Sharma R. 2015. Evaluation of chrysanthemum for loose flower production in Chhattisgarh plains. *Trends in Bioscience* 8: 175-177.

Laxmi P. Pratap M and Amrender Reddy S. 2008. Evaluation of yellow coloured chrysanthemum cultivar for growth, flowering and yield. *The Orissa Journal of Horticulture* 36:116-119.

Machin BJ, Scopes NEA 1978. Chrysanthemum year round growing. Bladford Press, Poole-Dorset, p 233.

Matsuo E. 1990. Analysis of flower appreciation and its international comparison contribute to progress of flower production and international flower trade. *Horticultural Science* 25:1468-1471.

Negi R, Jarial K, Kumar S and Dhiman SR. 2015. Evaluation of different cultivars of chrysanthemum suitable for low hill conditions of Himachal Pradesh. *Journal of Hill Agriculture* 6: 144-146.

Punetha P, Rao VK and Sharma SK. 2011. Evaluation of different chrysanthemum genotype under mid hill conditions of Garhwal Himalaya. *The Indian Journal of Agriculture Sciences* 9:830-833.

Poonam and Kumar A. 2007. Garden Beauty-A promising chrysanthemum cultivar for garden decoration. *Journal of Ornamental horticulture* 10:165-168.

Palai SK. 2009. Comparative studies on performance of spray chrysanthemum under open and naturally ventilated polyhouse. *Journals of Ornamental Horticulture* 12: 138-141.

Swaroop K, Prasad KV and Raju DVS.2008. Evaluation of chrysanthemum germplasm in winter season under Delhi conditions Journal of Ornamental horticulture 11:58-61.

Suvija NV, Suresh J, Kumar SR and Kannan M.2016. Evaluation of chrysanthemum

(*Chrysanthemum morifolium* Ramat) genotypes for loose flower cut flower and pot mums. *International Journals of innovative Research and Advanced Studies* 3: 100-104.

Talukdar MC, Mahanta S and Sharma BJ. 2006. Evaluation of standard chrysanthemum (*Dendranthema grandiflora* Tzvelve) cultivars under polyhouse cum rain shelter and open field conditions. *Journal of Ornamental Horticulture* 9:110-113.

Yadav A, Sharma G and Dubey P. 2014. Flowering attributes of chrysanthemum varieties of loose flower production. *Progressive Horticulture* 46: 168-176.

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