

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

Reshma Negi¹, S. R. Dhiman², Y.C. Gupta³

The Department of Floriculture and Landscape Architecture, College of Horticulture, Dr. Yashwant Singh Parmar University of Horticulture and Forestry, Nauni – Solan (Himachal Pradesh) India – 173230

Abstract: An experiment was conducted to see the growth and flowering of newly evolved genotype of chrysanthemum (*Dendranthema grandiflora* Tzvelev) for cut 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 2017 and 2018 on nineteen genotypes including 'Ajay' as standard check. Among different genotype, maximum plant height was recorded of 'UHFSChr117' (114.67cm) followed by 'UHFSChr115' (114.33cm). The number of stems per plants was observed maximum in 'UHFSChr115', (6.62). The genotype, 'UHFSChr111' took minimum number of days for visible flower bud formation (97.40 days). The earlier flowering was observed in genotype 'UHFSChr129' (142.97 days). The largest flowers were found in genotypes, 'UHFSChr124' (10.15cm). The maximum number of flowers per plant were observed in genotype 'UHFSChr117' (414.50) followed by 'UHFSChr128' (384.83) and 'UHFSChr132' (380.00) where as minimum number of flowers were observed in genotype 'UHFSChr124' (29.33).

Keywords: Chrysanthemum, Standard Check, Cut flower, Bud formation, Flower Production

1. Introduction

Chrysanthemum (*Dendranthema grandiflora*) belongs to family Asteraceae (Andreson, 1987) is an important flower crop grown throughout the world for its attractive coloured flowers, which are used as loose and cut flowers. It is commonly known as Guldaudi, Autumn Queen or Queen of East. It is the national flower of Japan. Flower symbolizes optimism and joy a perfect fall blooming plant or November birth flower, the 13th wedding anniversary flower and the official flower of the city of Chicago. In Japan, there's even a "Festival of Happiness" to celebrate this flower each year. It includes over 200 species of annuals and herbaceous perennials. The inflorescence is called as capitulum or head consisting of large number of tiny florets closely mounted on a flattened stem end. It ranks second after rose in spray type while seventh in standard type in term of consumption (Anonymous, 2017). Chrysanthemum have various uses, small flowered chrysanthemum for making garlands, venis (plaits), in religious offerings whereas, cut blooms are also used in cemeteries in Japan (Matsuo 1990). Nevertheless, the modern chrysanthemum is now being cherished as a long stem cut flower also. Chrysanthemum is also known as queen of East. Chrysanthemum owes this much popularity due to wide range of form and color of flowers, their excellent keeping quality and availability throughout the year as a result of intensive studies by scientists and growers. It is a short day plant and cannot normally form flower buds when the day length exceeds 14.5 hours or developed them when it exceeds 13.5 hours (Machin *et al.*, 1978). As it is one of the leading cut flower and can fetch good price to the farmers, therefore, growing chrysanthemum on scientific footing is of immense need for getting the quality blooms with exportable standards. 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, Therefore, aim of present study was to understand the nature and extent of variability present in existing selected genotypes of chrysanthemum for growth, flowering, yield and quality parameters, the genotypes were evolved at the deptt. of Floriculture and landscape Architecture, College of Horticulture, Dr. Yashwant Singh Parmar University of Horticulture and Forestry, Nauni, Solan (Himachal Pradesh). The objective of study to check the suitability of newly evolved genotype of chrysanthemum (*Dendranthema grandiflora* Tzvelev) as cut flower production.

2. Materials and Methods

2.1 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 2017 and 2018.

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 /m² and 22.5 g P (Single Super Phosphate-140.62 g /m²) and K (Muriate of Potash-37.5 g / m²) and 11.25 g of N (Urea-24.46g /m²) 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

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number of flower per plant, days taken for bud initiation, days taken to flowering, plant height (cm), flower diameter (cm) and weight of cut stem(g/stem), using the standard method. The data were collected for two consecutive years during 2017 and 2018 and data were analysed statistically as per standard methods of Gomez and Gomez (1984).

2.2 Genotypes used

There were nineteen newly evolved genotype used in the present investigation in order to check their growth and flowering along with 'Ajay' (standard check) under open field conditions:

Sr. no.	Genotype	Sr. no.	Genotype
1	UHF5Chr111	10	UHF5Chr123
2	UHF5Chr113	11	UHF5Chr124
3	UHF5Chr114	12	UHF5Chr125
4	UHF5Chr115	13	UHF5Chr126
5	UHF5Chr117	14	UHF5Chr128
6	UHF5Chr118	15	UHF5Chr129
7	UHF5Chr120	16	UHF5Chr130
8	UHF5Chr121	17	UHF5Chr131
9	UHF5Chr122	18	UHF5Chr132
19	Ajay (Standard check)		

3. Results and Discussion

From perusal of data in Table 1 shows that days taken to bud formation genotype 'UHF5Chr 111' (97.40 days) took minimum number of days and maximum days was taken by the genotype 'UHF5Chr129' (108.87 days). The variation in flower bud formation was may be due to genetic makeup of different genotype ;Behra *et al.*, 2002; joshi *et al.*, 2010; ona *et al.*, 2015; Kumar *et al.*, 2015 and Palai, 2009. Days taken to flowering were recorded earlier in genotype 'UHF5Chr 122' (130.57 days) and maximum days was observed in genotype 'UHF5Chr129' (142.97 days) flowering is an important character that signifies

characteristics of the genotype as early or late flowering which determines the availability of flowers. The earlier and late flowering was also recorded by Rao and pratap,(2006). Maximum plant height was recorded in genotype 'UHF5Chr 117' (114.67 cm) and minimum plant height was recorded in genotype 'UHF5Chr 111' (68.33 cm). Variation in plant height was also recorded by Shankar and Tewari,1993, 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 in genotype maximum number of stems per plant were recorded in genotype 'UHF5Chr 115' (6.62) and minimum number of stem per plant was observed in genotype UHF5Chr 129' (4.33).The number of stems per plant varies from genotype to genotype it may be due to inherent genetic factors reported by Hemlata *et al.*, (1992) ,Negi *et al.*, (2015) and Behra *et al.*, (2002).The size of flower was recorded in genotype 'UHF5Chr 124' (10.15 cm) and minimum in genotype 'UHF5Chr 128' (3,60cm) the number of flowers per plant was recorded maximum in genotype UHF5Chr 114' (454.40) and minimum number of flowers per plant was recorded in genotype 'UHF5Chr117' (414.50) followed by UHF5Chr 128' (384.83) and UHF5Chr 132'(380). The number of flowers per plant vary from genotype to genotype and signifies the better growth and flower yield of chrysanthemum. Poonam and Ashok Kumar 2007 and Kumar *et al.*, 2015 observed that vegetative growth significantly contribute towards the flower yield of chrysanthemum. Variation in number of flowers was also observed by Yadav *et al.*, 2014. Maximum plant height was recorded in genotype 'UHF5Chr 117' (114.67 cm) and minimum was recorded in genotype 'UHF5Chr 111' (68.33 cm). maximum weight of cut stem 'UHF5Chr111' (42.83g/stem) and minimum was recorded in 'UHF5Chr114' (23.33 g/stem) also reported by Meeteren *et al.*,(2005)and Ona *et al.*,(2016).

Table 1: Pooled data on variation in different growth and flowering parameters of newly evolved genotypes of Chrysanthemum under Nauni (Solan) conditions during 2017 and 2018 for cut flower production.

Sr No.	Genotypes	Bud initiation	Days taken to flowering	Plant height (cm)	Number of stems / plant	Flower size(cm)	Number of flower /plant	weight of cut stem (g)
1	UHF5Chr111	97.40	142.50	68.33	5.10	5.01	240.33	42.83
2	UHF5Chr113	100.37	139.03	82.83	5.00	6.24	229.67	27.50
3	UHF5Chr114	97.77	135.03	112.93	5.50	4.03	320.00	23.33
4	UHF5Chr115	98.03	138.33	114.33	6.48	6.62	204.17	23.67
5	UHF5Chr117	98.58	135.02	114.67	5.83	3.76	414.50	30.50
6	UHF5Chr118	98.67	138.63	73.90	5.33	4.00	146.17	26.67
7	UHF5Chr120	100.10	139.13	70.67	5.60	5.23	185.00	26.17
8	UHF5Chr121	97.90	133.20	85.70	5.18	4.38	240.33	26.17
9	UHF5Chr122	99.97	130.57	81.80	6.33	4.93	338.17	39.17
10	UHF5Chr123	89.77	133.50	81.22	5.58	7.00	65.00	24.83
11	UHF5Chr124	99.50	136.17	69.33	4.33	10.15	29.33	33.67
12	UHF5Chr125	98.93	139.63	89.17	5.85	4.74	245.33	29.00
13	UHF5Chr126	99.47	141.30	80.33	5.33	5.00	218.50	42.67
14	UHF5Chr128	98.63	138.57	82.80	5.67	3.60	384.83	32.83
15	UHF5Chr129	108.87	142.97	83.83	5.33	5.48	104.50	31.00
16	UHF5Chr130	100.08	134.68	85.97	6.17	5.05	111.83	40.00
17	UHF5Chr131	97.60	138.67	87.33	6.00	4.07	260.33	26.50
18	UHF5Chr132	98.24	140.12	90.13	5.83	5.14	380.00	40.50
19	Ajay	95.57	138.27	77.83	5.22	4.23	115.50	40.67
	CD _{0.05} %	5.86	4.49	4.57	1.47	0.46	41.20	4.46

4. Conclusion

From above finding it is concluded that genotypes namely 'UHF5Chr117', 'UHF5Chr128', 'UHF5Chr132', 'UHF5Chr122' and 'UHF5Chr125' performed better hence can be recommended for cut flower production.

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