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## Performance and flower characterization of newly evolved genotypes of chrysanthemum (*Dendranthema grandiflora* Tzvelev) for cut flower production

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### Abstract

An experiment was conducted on Performance and flower characterization of newly evolved genotypes 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 and ICAR-IARI Regional Research Station, Katrain, Kullu Valley of H.P. for two successive years 2017 and 2018 on nineteen genotypes of chrysanthemum, including cultivar 'Ajay' as check. On the bases of number of cut stems per plant genotypes 'UHFSChrs117', 'UHFSChrs122', 'UHFSChrs125', and 'UHFSChrs131' found suitable for cut flower production.

**Keywords:** Performance, flower characterization, genotypes, production, floriculture

### 1. Introduction

Chrysanthemum (*Dendranthema grandiflora* Tzvelev) is a multi use flower crop, belongs to family Asteraceae. It is native to northern hemisphere chiefly Europe and Asia. It is national flower of Japan and species in the genus chrysanthemum varies from 100 to 200. It ranks second after rose (Anonymous, 2017) [1]. In India during 2016-2017 the area under chrysanthemum was 20090 hectare and production of cut flower was 14930 MT (Anonymous, 2018) [2]. Total area under chrysanthemum in Himachal Pradesh for cut flower is 67.01ha and with annual production of 5360 lakh number of cut flower respectively during the year 2018-2019 (Anonymous, 2019) [3].

There are large numbers of germplasm available but could not fulfill the requirements in terms of new colors, forms, types and various characteristics. However; there is always a demand of superior and new flowers over the existing cultivars. Therefore, there is urgent need to identify stable genotypes having wider adaptability and easy availability to the growers at cheaper rate. Therefore, an investigation was conducted on performance and flower characterization of newly evolved genotypes of chrysanthemum (*Dendranthema grandiflora* Tzvelev) for cut flower production. The present study was therefore aimed to evaluate chrysanthemum to check their performance for yield and yields components across different environments.

### 2. Materials and methods

The experiment was conducted to study the performance and characterization of newly evolved genotypes of chrysanthemum for cut flower production trial was conducted at experimental farm of Department of Floriculture and Landscape Architecture, Dr. Yashwant Singh Parmar University of Horticulture and Forestry, Nauni, Solan and ICAR-IARI, Regional Research Station, Katrain, Kullu Valley of H.P. for two successive years 2017 and 2018 on nineteen genotypes of chrysanthemum. Genotypes namely 'UHFSChr111', 'UHFSChr113', 'UHFSChr114', 'UHFSChr115', 'UHFSChr117', 'UHFSChr118', 'UHFSChr120', 'UHFSChr121', 'UHFSChr122', 'UHFSChr123', 'UHFSChr124', 'UHFSChr125', 'UHFSChr126', 'UHFSChr128', 'UHFSChr129', 'UHFSChr130', 'UHFSChr131', 'UHFSChr132' including 'Ajay' as check. The plants were planted in three replications in Randomized Block Design in open field conditions using FYM 5 kg/m<sup>2</sup> and half dose of

nitrogen and full dose of phosphorus and potassium was also mixed in the soil at the time of bed preparation. The remaining half dose of nitrogen was applied 45 days after transplanting. Data were recorded in terms of different plant parameters viz., days taken for flowering, plant height (cm)

recorded at the time of flowering and measured from bottom to tip of the plant, number of plants and flowers per plant, flower diameter (cm) and duration of flowering, number of flowers per stem etc. The data was subjected to analysis by using (Gomez and Gomez 1984)<sup>[7]</sup>.

## Results and discussion

Genotype	Plant height (cm)	Days taken to bud formation	Days taken to flowering	Plant spread (cm)	Duration of flowering	Flower diameter (cm)	Stem length (cm)	Number of cut stems/plant	Weight of cut stem(g)	Number of flowers per stem
UHF5Chr 111	68.15	122.87	160.75	36.85	35.00	5.20	56.33	5.30	43.00	54.00
UHF5Chr 113	83.67	124.60	160.85	37.50	25.92	6.05	63.58	5.08	27.83	38.26
UHF5Chr 114	114.97	125.88	156.68	36.25	25.08	4.03	78.84	5.67	24.17	49.06
UHF5Chr 115	114.90	124.27	158.75	36.22	25.92	6.33	97.00	6.16	25.00	35.47
UHF5Chr 117	116.08	124.29	157.18	37.39	27.00	3.59	77.27	5.92	30.67	63.75
UHF5Chr 118	75.53	124.00	158.57	34.18	25.67	3.90	65.17	4.75	26.83	29.95
UHF5Chr 120	71.33	126.13	161.82	35.94	33.25	5.27	64.58	5.60	27.58	33.17
UHF5Chr 121	84.68	122.70	155.35	35.76	24.50	4.15	73.83	5.19	26.50	46.60
UHF5Chr 122	82.31	123.98	153.20	37.28	27.50	4.98	75.25	6.02	38.42	52.12
UHF5Chr 123	82.53	119.55	156.75	35.83	26.67	5.49	71.33	5.63	25.50	13.68
UHF5Chr 124	70.42	125.08	157.50	27.47	33.67	10.19	58.58	4.17	33.25	8.25
UHF5Chr 125	90.33	124.47	160.23	37.24	24.75	4.29	78.50	5.93	29.00	42.56
UHF5Chr 126	82.75	124.73	161.23	35.10	35.42	5.21	70.67	5.50	42.08	39.54
UHF5Chr 128	84.68	124.07	158.95	37.98	25.83	3.63	70.92	5.83	32.33	74.04
UHF5Chr 129	85.08	130.35	165.15	33.33	26.17	5.38	71.00	5.25	30.83	23.25
UHF5Chr 130	85.27	125.04	156.09	33.07	34.67	5.14	71.08	5.80	38.25	23.64
UHF5Chr 131	87.00	123.63	167.75	34.87	28.08	4.06	70.17	5.85	27.42	47.30
UHF5Chr 132	88.33	124.12	160.23	37.28	35.33	4.97	73.08	5.30	38.83	59.84
Ajay	80.85	123.78	160.47	35.06	34.75	4.03	67.08	5.08	39.08	54.00
CD 0.05									0.85	
Genotypes (G)	2.04	2.00	3.71	2.24	1.44	0.26	2.35	5.92	1.93	35.47
Year (Y)	0.93	0.92	1.85	36.85	0.66	0.12	1.08	4.75	0.88	63.75
G X Y	4.07	4.01	0.85	37.50	2.89	0.52	4.69	5.60	43.00	29.95

The mean performance of nineteen genotypes is presented in Table 1 which showed the significant variation among the different genotypes. Maximum plant height was found in genotype 'UHF5Chr117' (116.08 cm) and minimum height was recorded in genotype 'UHF5Chr111' (68.15 cm). The finding was agreement with findings of Pal and George, Kanamandi and Patil (1993)<sup>[9]</sup>, Vetrivel and Jawaharlal (2014)<sup>[17]</sup>, Shabnam (2017)<sup>[13]</sup>. Genotype 'UHF5Chr123' (119.55 days) initiated earlier bud formation and maximum days taken to bud formation was observed in genotype 'UHF5Chr129' (130.35 days) also reported by Negi *et al.*, (2015). Minimum days taken to flowering was observed of genotype UHF5Chr131(151.92 days) and maximum was recorded in genotype 'UHF5Chr129'(165.15 days). Significant variation in days taken to flowering were also observed by Kanamandi and Patil (1993)<sup>[9]</sup>, Deka and Paswan (2001). Maximum plant spread was observed in genotype 'UHF5Chr128' (37.98 cm) and minimum was observed of genotype 'UHF5Chr124' (27.47cm) similar variation in plant spread was observed by Gondhali *et al.*, (2000a), Talukdar *et al.*, (2003)<sup>[14]</sup>. Maximum flower duration was recorded in genotype 'UHF5Chr126' (35.42 days) and minimum was observed of genotype 'UHF5Chr124' (24.75

days). Maximum flower diameter was observed of genotype 'UHF5Chr124' (10.19 cm) and minimum was observed of genotype 'UHF5Chr117' (3.59 cm). Similar variation was also reported by Talukdar *et al.*, (1992), Baskaran *et al.*, (1992)<sup>[6]</sup> and Vaidya (2006)<sup>[16]</sup>. Genotype 'UHF5Chr115' (97.00 cm) recorded maximum stem length and minimum was observed of genotype 'UHF5Chr111' (56.33 cm). The variation in stem length might be due to the genetic makeup of the plant also reported by Kumar *et al.*, (2014). Variation in number of cut stems per plant was observed of genotypes and found maximum with genotype 'UHF5Chr115'(6.16) followed by 'UHF5Chr122'(6.02), 'UHF5Chr125'(5.93), 'UHF5Chr114'(5.92) 'UHF5Chr131' (5.85) and minimum was observed of genotype 'UHF5Chr 124'(4.17). Weight of cut stem showed significant variation among different genotypes and found maximum with genotype 'UHF5Chr111'(43.00g) and minimum was observed in genotype 'UHF5Chr114'(24.17g) similar variation was also reported due to interaction between genotype and environment has also reported by Barigdad and Patil (2014). Number of flowers per stem was observed maximum with genotype 'UHF5Chr117' (63.75) and minimum was observed in genotype 'UHF5Chr124' (8.25).

**Table 2:** Variation among different genotypes of chrysanthemum for flower colour (RHS colour chart) and flower type

Genotypes	Flower colour (RHS colour charts)	Flower type
UHF5Chr 111	Yellow (9 B)	Double
UHF5Chr 113	Greyed orange (171 A)	Intermediate in curve
UHF5Chr 114	Yellow orange (23 A)	Pompon
UHF5Chr 115	Greyed red (181 A)	Spoon
UHF5Chr 117	Yellow (12 A)	Double
UHF5Chr 118	Greyed red (178 C)	Pompon
UHF5Chr 120	Yellow (9 A)	Anemone

UHFSChr 121	Red purple (69 A)	Semi-double
UHFSChr 122	Greyed orange (163 B)	Semi-double
UHFSChr 123	Yellow (9 A)	Semi-double
UHFSChr 124	White (155 B)	Spoon
UHFSChr 125	Red purple (64 A)	Pompon
UHFSChr 126	Red purple (65 A)	Semi-double
UHFSChr 128	Greyed red (180 A)	Single
UHFSChr 129	Orange red (34 B)	Semi-double
UHFSChr 130	Red purple (62 C)	Single
UHFSChr 131	Yellow (8 C)	Single
UHFSChr 132	Purple (75 A)	Double
Ajay	Yellow	Double

### Flower colour and flower type

The RHS (Royal Horticulture Society) colour chart was used at the time of peak flowering to record the flower colour. Among all the genotypes, maximum of six genotypes namely; 'Ajay', 'UHFSChr111', 'UHFSChr117', 'UHFSChr120', 'UHFSChr123' and 'UHFSChr 121' belong to yellow group, while 'UHFSChr114' belong to yellow orange group. While, 'UHFSChr113', and 'UHFSChr122' belong to greyed orange group and 'UHFSChr129' belong to orange red group. Three genotypes 'UHFSChr115', 'UHFSChr118' and 'UHFSChr128' belong to greyed red group and 'UHFSChr132' belong to purple group while remaining genotypes 'UHFSChr131', 'UHFSChr125', 'UHFSChr126' and 'UHFSChr130' belong to red purple group. Only two genotypes belong to white group i.e. 'UHFSChr124'.

For flower type varied among all the genotypes, maximum of three genotypes ('UHFSChr128', 'UHFSChr130' and 'UHFSChr131') were single type. Genotypes namely; 'UHFSChr123', 'UHFSChr121', 'UHFSChr122', 'UHFSChr126' and 'UHFSChr129' belong to semi-double type, and genotypes ('UHFSChr111' 'UHFSChr117', 'UHFSChr132', 'Ajay' was double type respectively. Three genotypes 'UHFSChr115' and 'UHFSChr124', belongs to spoon type. The genotypes 'UHFSChr114', 'UHFSChr118' and 'UHFSChr125' belong to pompon type. One genotype, 'UHFSChr113' belong to intermediate curve type and the genotype 'UHFSChr120' was anemone type. The data have been supported by Thakur *et al.*, (2018)<sup>[15]</sup> and Prakash *et al.*, (2018)<sup>[12]</sup>.

### Conclusion

On the bases of number of cut stems per plant it was concluded that genotype namely 'UHFSChr 117', 'UHFSChr122' 'UHFSChr125' and 'UHFSChr 131' were recommended for cut flower production.

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