Original Research Article

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

Reshma Negi¹*, S.R. Dhiman¹, Y.C. Gupta¹, R.K. Dogra¹, R.K. Gupta¹ and M.R. Dhiman²

¹College of Horticulture, Dr. Yashwant Singh Parmar University of Horticulture and Forestry, Nauni, Solan, Himachal Pradesh, PIN-173230, India
²ICAR-IARI Regional Research Station, Katrain, Kullu, India

*Corresponding author

Abstract

An experiment was conducted on Evaluation of chrysanthemum on growth and flowering yield of newly evolved genotypes of chrysanthemum (*Dendranthema grandiflora* Tzvelev) 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 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 ‘Surf’ as check for loose flower production. On the bases of flower weight it was concluded that genotype namely ‘UHFSChr 117’, ‘UHFSChr111’,‘UHFSChr132’ including cultivar ‘Surf’ were recommended for loose flower production.

Keywords

Flower yield, Horticulture, Growth, Production, Himachal Pradesh

Introduction

Chrysanthemum (*Dendranthema grandiflora* Tzvelev) belongs to family Asteraceae (Andreson, 1987). It is commonly known as guldaudi/autumn queen/queen of East. It is native to northern hemisphere chiefly Europe and Asia. Species in the genus chrysanthemum varies from 100 to 200. It ranks second after rose in spray and seventh in standard type of flower production and also ranked second in loose flower production after marigold (Anonymous, 2017). In India, Karnataka is the most prominent chrysanthemum growing state with an area of 5,453 ha with production of 59,543 MT and productivity of 10.92 t/ha. In India during 2016-2017 the area under chrysanthemum was 20090 hectare and production of loose flower was 185240 MT (Anonymous, 2018). Chrysanthemum have wide range of flower colour, growth habit, size and shape. It
is used for making garlands, venis, gajras and religious offering.

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 for evaluation of chrysanthemum on growth and flowering yield for general cultivation over wide range of environment to increase the income of farmer.

**Materials and Methods**

A trial was conducted to evaluate newly evolved genotypes of chrysanthemum for loose flower production 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 ‘Surf’ as check. The plants were planted in three replications in Randomized Block Design in open field conditions using FYM 5 kg/m² and half dose of nitrogen and full dose of phosphorus and potassium were 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, flower weight per plant and flower weight per square meter. The data was subjected to analysis by using (Gomez and Gomez 1984).

**Results and Discussion**

The mean performance of nineteen genotypes is presented in Table 1 indicated significant variation among different genotypes. Plant height was found significantly varied among genotypes maximum was observed in ‘UHFSChr114’ (114.42 cm) and minimum was recorded in cultivar ‘Surf’ (44.03 cm).Plant height varied significantly some genotypes were taller in growth and some were less vigorous, this might be caused by varietal traits. The taller plant height could be due to increased photosynthetic capacity of plant. Similar variation in plant height was also observed by Khan et al., (2003), Dhiman (2003) and Prabhu et al., (2018).Genotype minimum was observed in cultivar ‘Surf’ (80.40 days) whereas, genotype ‘UHFSChr129’ (129.30 days) recorded maximum number of days taken to bud formation and similar variations were also reported by Hamalata et al.,(1992), Talukdar et al.,(1992) and Baskaran et al., (2004) and Shabnam (2017). Minimum days taken to flowering was observed in cultivar ‘Surf’(135.81 days) and maximum was observed in genotype ‘UHFSChr129’(170.26 days). The present findings are in close conformity with earlier findings by Behra et al.,(2002) and Negi et al., (2015).
### Table 1

| Genotype   | Plant height (cm) | Days taken to bud formation | Days taken to flowering (days) | Plant spread (cm) | Duration of flowering (days) | Flower diameter (cm) | Number of stems per plant | Number of flowers per plant | Flower weight per plant (g) | Flower weight per square meter |
|------------|-------------------|-----------------------------|-------------------------------|------------------|-----------------------------|----------------------|---------------------------|----------------------------|-----------------------------|-----------------------------|
| UHFSChr 111 | 68.77             | 122.90                      | 164.38                        | 34.94            | 33.08                       | 5.43                 | 4.75                      | 243.33                     | 511.00                      | 4599.00                     |
| UHFSChr 113 | 81.33             | 125.85                      | 161.02                        | 33.87            | 27.08                       | 5.71                 | 6.17                      | 230.75                     | 459.17                      | 4132.50                     |
| UHFSChr 114 | 114.42            | 122.33                      | 159.88                        | 36.36            | 25.92                       | 4.68                 | 6.58                      | 314.33                     | 377.20                      | 3394.80                     |
| UHFSChr 115 | 113.43            | 126.25                      | 161.87                        | 33.86            | 27.00                       | 6.24                 | 6.00                      | 199.67                     | 419.30                      | 3753.38                     |
| UHFSChr 117 | 113.33            | 123.90                      | 159.17                        | 35.29            | 27.83                       | 3.68                 | 6.50                      | 412.17                     | 659.47                      | 5941.88                     |
| UHFSChr 118 | 76.20             | 125.05                      | 161.92                        | 33.94            | 26.75                       | 3.34                 | 4.48                      | 139.17                     | 133.05                      | 1197.48                     |
| UHFSChr 120 | 75.77             | 122.02                      | 162.83                        | 34.74            | 32.17                       | 5.46                 | 5.53                      | 179.83                     | 192.42                      | 1731.75                     |
| UHFSChr 121 | 81.73             | 124.12                      | 156.50                        | 38.39            | 25.92                       | 4.63                 | 5.42                      | 243.50                     | 358.78                      | 3228.98                     |
| UHFSChr 122 | 83.97             | 123.30                      | 156.82                        | 35.60            | 27.50                       | 5.43                 | 6.67                      | 326.08                     | 572.74                      | 5154.64                     |
| UHFSChr 123 | 81.33             | 120.42                      | 159.07                        | 33.43            | 27.08                       | 5.65                 | 5.18                      | 66.00                      | 191.40                      | 1722.60                     |
| UHFSChr 124 | 67.75             | 124.83                      | 163.17                        | 26.75            | 32.00                       | 10.26                | 3.92                      | 30.25                      | 220.83                      | 1987.43                     |
| UHFSChr 125 | 86.08             | 122.56                      | 161.28                        | 34.77            | 26.08                       | 4.48                 | 6.00                      | 241.17                     | 219.04                      | 1971.15                     |
| UHFSChr 126 | 78.42             | 124.80                      | 164.53                        | 34.98            | 33.25                       | 4.91                 | 5.70                      | 216.42                     | 244.50                      | 2200.50                     |
| UHFSChr 128 | 82.17             | 123.70                      | 160.80                        | 35.28            | 27.08                       | 3.07                 | 5.60                      | 427.08                     | 279.53                      | 2515.66                     |
| UHFSChr 129 | 82.42             | 129.30                      | 170.26                        | 33.58            | 27.75                       | 5.30                 | 4.92                      | 109.83                     | 329.50                      | 2965.50                     |
| UHFSChr 130 | 87.17             | 124.94                      | 159.96                        | 34.52            | 32.67                       | 5.03                 | 5.12                      | 113.92                     | 170.88                      | 1537.50                     |
| UHFSChr 131 | 82.95             | 125.05                      | 160.84                        | 34.33            | 28.83                       | 4.90                 | 5.67                      | 259.50                     | 413.19                      | 3718.73                     |
| UHFSChr 132 | 83.15             | 121.23                      | 161.16                        | 34.41            | 33.67                       | 5.49                 | 6.75                      | 405.33                     | 645.83                      | 5812.50                     |
| Surf       | 44.03             | 80.40                       | 135.81                        | 34.06            | 32.33                       | 6.42                 | 4.18                      | 114.58                     | 733.30                      | 6599.68                     |

**CD 0.05**

| Genotypes (G) | 114.42 | 0.33 | 1.57 | 1.79 | 1.45 | 0.33 | 0.61 | 16.240 | 30.48 | 275.93 |
|---------------|--------|------|------|------|------|------|------|--------|-------|-------|
| Year (Y)      | 113.43 | 0.15 | 0.72 | 0.82 | 0.68 | 0.15 | 0.28 | 7.452  | 13.99 | 126.61 |
| G X Y         | 113.33 | 0.67 | 3.14 | 3.59 | 2.90 | 0.66 | 1.22 | 32.480 | 60.96 | 551.87 |

Maximum flower duration was observed in genotype ‘UHFSChr126’ (35.42 days) and minimum was observed in genotype ‘UHFSChr125’ (24.75 days) similar finding was also reported by Negi et al., (1994), Arora et al., (1999), Behra (2002) and Kameshwari et al., (2013). Plant spread recorded significant different result was measured in N-S and E-W direction of different genotypes and data are presented in Table 1. Among different genotypes ‘UHFSChr121’ (38.39 cm) and minimum plant spread was recorded in genotype ‘UHFSChr124’ (26.75 cm). The variation in plant spread is a varietal trait and also governed by genetic makeup. These results were close conformity with the results reported by Arora et al., (1999), Prakash et
Flower diameter was found maximum in genotype ‘UHFSChr124’ (10.26 cm) and minimum was observed in genotype ‘UHFSChr118’ (3.34 cm). Similar results were also reported by Talukdar et al., (1992). Number of side shoots per plant showed statistically significant difference among genotypes. Genotype ‘UHFSChr132’ (6.75) followed by ‘UHFSChr122’ (6.67) found maximum number of side shoots per plant and minimum was observed in genotype ‘UHFSChr124’ (3.92). Similar variation was also reported by Barigdad et al., (1992), Baskaran (2004), Negi et al., (2015) and Kumar et al., (2017). Number of flowers per plant was found maximum in genotype ‘UHFSChr121’ (38.39 cm). Maximum number of flowers per plant was recorded in genotype ‘UHFSChr128’ (427.08) followed by ‘UHFSChr117’ (412.17) and ‘UHFSChr132’ (405.33) and minimum was observed in genotype ‘UHFSChr124’ (30.25). Flower weight per plant was recorded at the time of plucking of it at harvest stage was found maximum in cultivar ‘Surf’ (733.30g) followed by ‘UHFSChr117’ (659.47g), and ‘UHFSChr132’ (645.83g) and minimum flower weight was recorded in genotype ‘UHFSChr118’ (133.05g). Flower weight per square meter was observed maximum in cultivar ‘Surf’ (6599.68g) followed by ‘UHFSChr117’ (5941.88g), ‘UHFSChr132’ (5812.50g) and ‘UHFSChr111’ (4599.00g). The variation in flower weight was attributed to genotype and environment influence and other management factors and also reported by Barigdad and Patil (1997), Talukdar et al., (1999), Kumar et al., (2017). On the bases of flower weight it was concluded that genotype namely ‘UHFSChr117’, ‘UHFSChr111’, ‘UHFSChr132’ including cultivar ‘Surf’ were recommended for loose flower production.

References

Anonymous. 2017. Royal Floraholland Facts and Figures. https://www.royalfloraholland.com.
Anonymous. 2018. Ministry of Agriculture, Government of India.(https://www.indiastat.com/).
Anonymous. 2019. Status of floriculture in Himachal Pradesh. Directorate of Horticulture, Shimla, Himachal Pradesh, India.
Barigdad H and Patil AA. 1997. Relative performance of chrysanthemum cultivars under transistional tract of Karnataka. Karnataka Journal of Agriculture Science 10:98-10.
Behera T, Sirohi PS and Pal A. 2002. Assessment of chrysanthemum germplasm for commercial cultivation under Delhi condition. Journal of Ornamental Horticulture 5: 11-14.
Baskaran V, Janakiram T. and Jayanthi R. 2004. Correlation and path coefficient analysis studies in chrysanthemum. Journal of Ornamental Horticulture 7: 37-44.
Dhiman MR. 2003. Assessment of chrysanthemum germplasm for commercial cultivation under Kullu – Valley condition. Journal of Ornamental Horticulture 6:394-396.
Gomez KA and Gomez AA. 1984. Statistical procedures for Agricultural Research. John Wiley and Sons, NewYork, 680p.
Gondhali BV, Yadav ED, Dhemre JK. 1997. Evaluation of chrysanthemum cultivars for cut flowers. Orissa J. Hort., 25(2):1013.
Kanamadi VC and Patil AA. 1993. Performance of chrysanthemum varieties in the transitional tract of Karnataka. South Indian Horticulture 41(1): 58-60.
Kameswari P L, Pratap M, Hameedunnisabegum and Anuradha G.
2015. Studies on genetic variability and character association for yield and its attributes in chrysanthemum (Dendranthema grandiflora Tzvelev). Agric. Sci. Digest., 35(1): 25-30.
Kumar AS and Polara ND, 2017. Evaluation of chrysanthemum varieties on Growth and quality under south saurashtra region, Int. J. Pure App. Biosci. 5(4): 1989-1997.
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.
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(2): 144-146.
Prakash A, Kumar M, Kumar A, Kumar M, Gupta A, Badal D. 2018. Performance and flower characterization of chrysanthemum (Dendranthema grandiflora Tzvelev) genotypes under Agro climatic region of western U.P. International Journal of Chemical Studies 6(5): 1439-1442.
Prabhu G, SP Thamaraiselvi, P Aruna, Dr. R Sudhakar, 2018. Evaluation of chrysanthemum (Dendranthema grandiflora Tzvelev.) genotypes for loose flower production under Coimbatore conditions. International Journal of Chemical Studies 6(4): 1618-1621.
Shabnam.2017. Evaluation of newly evolved genotypes of chrysanthemum (Dendranthema grandiflora Tzelev) for commercial use. M.Sc. Thesis. Department of Floriculture and Landscape Architecture, Dr Y.S.Parmar UHF, Nauni ,Solan, (H.P) India.
Talukdar M C, Mahanta S, Sharma B and Das S. 2003. Extent of genetic variation for growth and floral characters in chrysanthemum cultivars under Assam condition. Journal of Ornamental Horticulture 6(3): 201-211.
Thakur N, Nair SA, Kumar R, Bharathi T U, Dhananjaya MV and Venugopalan R. 2018. Evaluation of Chrysanthemum (Dendranthema grandiflora Tzvelev) for Desirable Horticultural Traits. International Journal of Current Microbiology and Applied Sciences 7(08): 565-574.

How to cite this article:
Reshma Negi, S.R. Dhiman, Y.C. Gupta, R.K. Dogra, R.K. Gupta and Dhiman, M.R. 2020. Evaluation of Chrysanthemum on Growth and Flowering Yield of Newly Evolved Genotypes of Chrysanthemum (Dendranthema grandiflora Tzvelev) for Loose Flower Production. Int.J.Curr.Microbiol.App.Sci. 9(07): 2660-2664. doi: https://doi.org/10.20546/ijcmas.2020.907.312