

Short Communication

**Morphological characterization of standard chrysanthemum
(*Chrysanthemum morifolium* Ramat.)**

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ABSTRACT

Ten diverse chrysanthemum varieties were evaluated for their suitability as cut flower, flower arrangement and pot plant. The maximum plant height at bud appearance (71.82 cm) and at anthesis (77.23 cm) was recorded in Snow Ball, while, it was recorded minimum at bud appearance (44.08 cm) and flower opening stage (48.10 cm) in Purnima. The longest duration of flowering (33.73 days) was recorded in Thai Chen Queen, whereas, the least flowering duration (23.63 days) was recorded in Swan Dance. The variety Pusa Centenary exhibited the longest vase life (22.00 days), however, the least vase life (16.00 days) was recorded in Valliant. Depending upon the compactness, medium size and vase life, Thai Chen Queen, Purnima, Pusa Centenary, Otam Blaze and Denise Oatridge were found suitable for pot culture, cut flower and flower arrangements, whereas, the varieties with big flower such as Snow Ball, Kikobiory, Sonar Bangla, Valliant and Swan Dance were identified for pot culture and exhibition purpose.

Keywords : Chrysanthemum, evaluation, floral characters, vase life

Chrysanthemum belongs to the family Asteraceae, native of Asia and Europe (Asha *et al.*, 2016), is commercially cultivated in for the exquisite flowers. It is a leading flower in the global market and commonly grown for cut flower, loose flower, pot plant and garden decoration throughout the world. In India, is being commercially grown in 31.40 thousand hectare area with 482.54 thousand metric tons loose flower and 28.73 thousand metric tons of cut flower production (Anon., 2022). Chrysanthemum flowers have high potential and price because of its variable flower shape, size, forms and distinctiveness for flower hues and shades (Kaushal and Bala, 2019). There is demand for superior varieties over the existing ones, thus, there is need to evaluate and categorize chrysanthemum varieties on the basis of their commercial significance (Bala, 2015). The objective of this study was to evaluate diverse standard varieties of chrysanthemum having potential for pot culture, exhibition, and cut flower with commercial significance.

The experiment was conducted with ten standard varieties of chrysanthemum *i.e.*, Snow Ball, Pusa Centenary, Sonar Bangla, Thai Chen Queen, Purnima, Kikobiory, Swan Dance, Otam Blaze, Valliant, Denise Oatridge, in 8 inch pots, replicated thrice in completely

randomized block design (CRD) at Research Farm, Department of Floriculture and Landscaping, Punjab Agricultural University, Ludhiana, during 2018-19. Substrate media of soil : leaf mold : sand (2:1:1) was used for pot filling. Disbudding was done in September and October to maintain a healthy terminal flower on the single stem. The observations on various growth and flowering parameters such as plant height at bud appearance and at anthesis, number of leaves per plant, days to bud initiation, days to flower opening stage, maturity group (early, medium, late), flower diameter, duration of flowering, flower colour, vase life, flower form and commercial use were recorded. Data were subjected to statistical analysis by using CPCS-1 software and comparisons were made at 5% level of significance.

All the varieties differed significantly with each other with regard to various vegetative and floral parameters (Table 1). The maximum plant height at bud appearance (71.82 cm) and anthesis (77.23 cm) was recorded in variety Snow Ball which was significantly higher than at bud appearance (68.30 cm) and at anthesis (73.47 cm) in Kikobiory, however, the minimum plant height (44.08 cm) at bud appearance and at anthesis (48.10 cm) was observed in Purnima. The height of plants should be proportionate *i.e.*,



Table 1 : Evaluation of chrysanthemum varieties for vegetative and floral characters

| Variety | Plant height (cm) | | Number of leaves/plant | Flower diameter (cm) | Duration of flowering (days) | Floret colour code (RHS colour chart) |
|-----------------|-------------------|-------------|------------------------|----------------------|------------------------------|---------------------------------------|
| | at bud appearance | at anthesis | | | | |
| Denise Oatridge | 61.27 | 65.07 | 13.65 | 14.33 | 32.97 | Purple Violet group (N 80 D) |
| Kikobiory | 68.30 | 73.47 | 10.80 | 15.82 | 26.87 | Yellow group (6 A) |
| Otam Blaze | 57.59 | 60.73 | 13.20 | 14.50 | 26.70 | Orange Red group (31 A) |
| Purnima | 44.08 | 48.10 | 11.37 | 13.30 | 30.60 | White group (15 N) |
| Pusa Centenary | 61.33 | 65.80 | 18.50 | 14.41 | 29.57 | Yellow group (6 C) |
| Snow Ball | 71.82 | 77.23 | 13.37 | 17.69 | 31.07 | White group (155 A) |
| Sonar Bangla | 58.84 | 62.70 | 13.03 | 16.85 | 25.17 | Yellow White group (158 C) |
| Swan Dance | 66.94 | 70.80 | 14.87 | 19.50 | 23.63 | White group (155 B) |
| Thai Chen Queen | 54.10 | 58.70 | 14.67 | 15.80 | 33.73 | Yellow Orange group (22 C) |
| Valliant | 60.13 | 64.27 | 13.07 | 16.73 | 27.90 | Red Purple group (62 D) |
| SEm± | 0.47 | 0.23 | 0.32 | - | - | - |
| LSD (0.05) | 1.40 | 0.68 | 0.94 | 0.77 | 1.24 | - |

2-2.5 times to the size of pot for its effective display. The seasonal variation pertaining to environmental conditions such as light and temperature also affect the plant architecture (Suvija *et al.*, 2016). The variation in plant height could be due to genetic and environmental factors (Baskaran *et al.*, 2010). The highest number of leaves per plant (18.50) was recorded in the variety Pusa Centenary, whereas, the lowest leaf count per plant (10.80) was observed in Kikobiory. The diverse genetic makeup of different genotypes along with variable response to prevailing environmental conditions likely resulted in variation in leaf number (Suvija *et al.*, 2016).

The number of days to bud appearance and flower opening differed significantly among the varieties (Fig. 1). The variety Swan Dance (71.30 days) recorded early bud initiation and it was statistically at par with Kikobiory (72.20 days). The variety Pusa Centenary registered the highest number of days to bud initiation (84.03 days) and was found statistically at par with Sonar Bangla (83.33 days) to initiate the flower buds. The days to bud initiation to first flower bud appearance is an important parameter reflecting

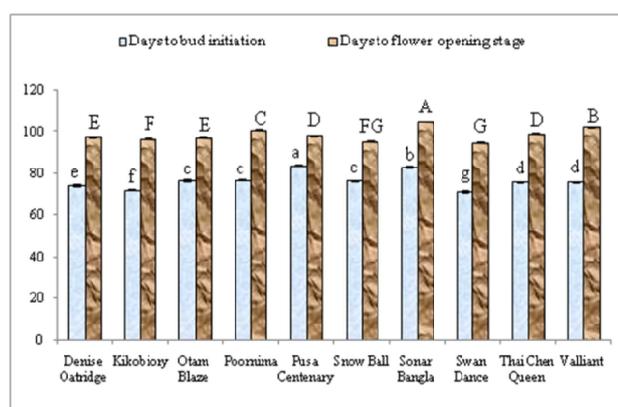


Fig. 1 : Days to bud appearance and flower opening stage

earliness as well as late flowering habit of a variety, and holds a significance pertaining to the availability of flowers in the market (Behera *et al.*, 2002). The highest number of days to flower opening (104.87 days) was observed in the variety Sonar Bangla. The variety Swan Dance bloomed earliest (94.87 days) to anthesis, which was statistically at par with Snowball and Kikobiory. The cultivar which bloom early likely to reach or capture the market relatively earlier and could be a decisive factor for the farmer to cultivate

colourful varieties taking into consideration their varying response groups and their optimum stage for marketing (Laxmi *et al.*, 2008).

The flower diameter is an important floral parameter that determines the likely weight of a flower which can be used as loose flower or for exhibition purpose. The large sized chrysanthemum inflorescence is desired for exhibition purpose and sometimes raised by the growers owing to consumer demand (Kireeti *et al.*, 2017). The maximum diameter of flower was observed in Swan Dance (19.50 cm) followed by ‘Snow Ball’ (17.69 cm), while, minimum flower diameter (13.30 cm) was observed in Purnima. Similar variations in diameter of flower have been reported by Kumar and Polara (2017).

Considerable variations were recorded for the duration of flowering in different chrysanthemum varieties (Table 1). The variety Thai Chen Queen exhibited longest flowering duration (33.73 days), whereas, the shortest duration (23.63 days) was recorded in Swan Dance. These variations in flower diameter are requisite for the commercial flower market which provides an opportunity to select the varieties with profuse flowering with long blooming period. Similar variation in flowering among chrysanthemum varieties have also been reported (Srilatha *et al.*, 2015).

Flower colour of different varieties was observed and the colour codes were designated as per the standard

Royal Horticultural Society Colour Charts (RHSCC), London. Variations in flower colour were observed among the ten varieties and are categorized into white, yellow, yellow white, orange red, red purple and purple violet group. The variation in flower colour among chrysanthemum varieties may also be due to the distinct genetic makeup and different proportion of pigments present in a particular genotype. The longest vase life (22 days) was observed in ‘Pusa Centenary’ and the shortest vase life (16.00 days) was observed in variety Valliant (Fig. 2). The variation in vase life may be due to genetic makeup of cultivars (Singh *et al.*, 2017).

The varietal differentiation according to the maturity group is important for consumer preference. The variation among maturity and flowering duration is determining factors, especially for pot cultivation of chrysanthemum. The observations revealed that all the ten varieties assessed matured between 8 to 12 weeks, thus have been categorized under the medium maturity group (Table 2). Wide range of variation with respect to flower form *viz.*, regular incurve, decorative, irregular incurve and spider etc. was observed. The trait such as flower shape and flower form is totally accredited to the genetic factor (Behera *et al.*, 2002). All the evaluated varieties can be used for pot culture and exhibition purposes depending upon consumer preferences.

Table 2 : Characterization of chrysanthemum varieties for different maturity groups and commercial utilization

| Variety | Flowering season | Maturity group | Flower form | Pot culture/ Exhibition | Cut flower |
|-----------------|-------------------|-----------------|-------------------|-------------------------|------------|
| Denise Oatridge | November-December | Medium | Irregular Incurve | √ | √ |
| Kikobiory | November | Medium | Regular incurve | √ | × |
| Otam Blaze | November | Medium | Decorative | √ | √ |
| Purnima | November | Medium | Decorative | √ | √ |
| Pusa Centenary | November | Medium | Decorative | √ | √ |
| Snow Ball | November | Medium | Regular incurve | √ | × |
| Sonar Bangla | November | Medium | Regular incurve | √ | × |
| Swan Dance | October-November | Early to medium | Spider | √ | × |
| Thai Chen Queen | November | Medium | Decorative | √ | √ |
| Valliant | November | Medium | Spider | √ | × |

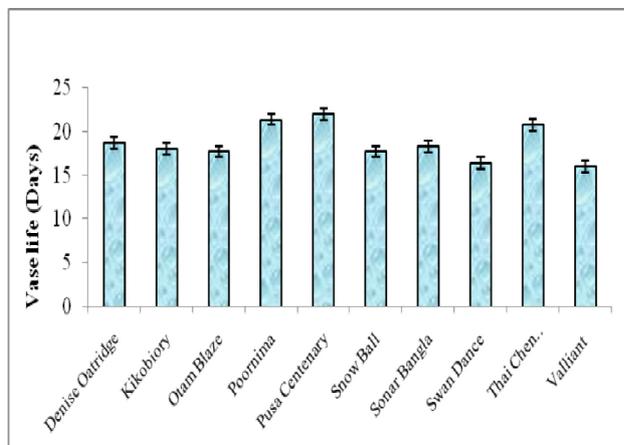


Fig. 2 : Vase life (days) of standard chrysanthemum

Therefore, the varieties Thai Chen Queen, Purnima, Pusa Centenary, Otam Blaze and Denise Oatridge with medium sized flowers and better keeping quality were found to be most suitable for pot culture, cut flower and flower arrangement, whereas, the varieties Snow Ball, Kikobiory, Sonar Bangla, Valliant and Swan Dance with bigger sized flowers were found suitable for pot culture and exhibition purpose.

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(Received : 05.03.2021; Revised : 01.02.2023; Accepted 03.02.2023)