



Evaluation of different cultivars of *Chrysanthemum* for off-season cut flower production in mid hill situation of Sikkim

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Abstract

Ten genotypes of *Chrysanthemum* (*Dendranthema grandiflora* Tzvelev.) namely Rosy Salmon, Laspalmas, Topaz, Terror, Amadores, Bonfire, Safin Imp, Salvador, Safin Purple and Vega were evaluated for different characters suitable for off-season cut flower production at the Model Floriculture Centre, Maniram, South Sikkim. The cultivars (cv.) revealed that all genotypes differed significantly with respect to growth and flowering parameters. Cultivar Safin Purple recorded the maximum plant height (153.01 cm) followed by cv. Amadores (145.08 cm) and cv. Rosy Salmon (125.58 cm) respectively. Cultivar Rosy Salmon recorded maximum number of branches per plant (6.8) while minimum was in cv. Vega (2.8). The maximum number of days taken for first flower bud appearance (104.4) was recorded in cv. Terror while flower diameter (9.06 cm) was recorded maximum in cv. Amadores. Cultivar Rosy Salmon was found to be early flowering which took 102.2 days while cv. Terror took maximum (131.0 days) for flowering. On the basis of morphological characters Rosy salmon, Amadores, Safin purple, Salvador and Laspalmas can be grouped as cut flower genotypes suitable for commercial off-season production under Sikkim conditions.

Keywords: *Chrysanthemum*, cut flower, cultivars, photoperiod, Sikkim

INTRODUCTION

Chrysanthemum (*Dendranthema grandiflora* Tzvelev.) is a high value commercial crop known for its wide range of attractive coloured flowers and is used as cut-flower, loose flower and as a potted plant. In India *Chrysanthemum* is grown commercially and it occupies third rank (Janakiram and Rao, 2001). It ranks second after rose in the world and fifth as pot plant (Anonymous 2000). Environment/season is the most important limiting factor for growth and flowering of *Chrysanthemum* for off-season cut flower production. In the open cultivation, the flowering of *Chrysanthemum* is confined only to limited period from October to December, thus the monitoring of photoperiod provides growers with an efficient crop schedule according to the demand of flowers in the market. The usual and simultaneous seasonal planting of *Chrysanthemum* results a market glut during period of peak production. Off season production

not only helps overcome the natural barrier of *Chrysanthemum* flowering but also helps controlling better marketability. In many floriculture crops like Poinsettias, Kalanchoe etc. the photoperiod, day light exposure of plants regulates morphological development, *Chrysanthemum* is also a photo periodically controlled ornamental crop (Van and Heuvelink, 2006). The commercial growers provide long days through artificial lighting to maintain vegetative growth for cut flower production in *Chrysanthemum* (Dole and Wilkins, 2005) and to regulate flowering of photoperiod sensitive species (Yamada *et al.*, 2008, Blanchard and Runkle, 2009, Chen *et al.*, 2010). *Chrysanthemum* is a short day plant with a critical day length of 13.5 hrs (Furuta, 1954) whereas the long days (day length > 12 hrs) are maintained for 10-25 days (Carvalho, 2003) leading to flower induction and development. The phytochrome photoreceptor (R/FR) initiate light quality perception, stem elongation and flowering in photoperiodic plants (Van and Heuvelik, 2006; Craig and Runkle, 2012). The flowering of *Chrysanthemum* was inhibited by illuminating the plants with fluorescent or incandescent lamp by night interruption (night break) with red light (660 nm) but subsequently irradiated far red light (730 nm) induced the flowering. This photo reversible flowering response was regulated by the plant photoreceptor phytochrome (Hong *et al.*, 2013). Ishikura *et al.* (2009) reported that night break by emission of red light from an LED showed a similar effect with the use of an INC (incandescent) lamp on *Chrysanthemum* flowering inhibition. Incandescent lamps are used for night break treatment because of their good inhibitory effect (Hakuzan and Kooriyama, 2013). This experiment was designed to investigate the performance of various *Chrysanthemum* cultivars with due recommendation of suitable and best performing varieties for large scale commercial cultivation under mid hill situation of Sikkim.

MATERIALS AND METHODS

The present study was carried out at the Model Floriculture Centre, Maniram, South Sikkim, India. Ten cultivars (cv.) viz, Rosy Salmon, Laspalmas, Topaz, Terror, Amadores, Bonfire, Safin imp, Salvador, Safin Purple and Vega, were evaluated for their performance under the mid hill situations (4600 ft msl) under protected cultivation. The terminal cuttings were taken from the mother stock plants during the beginning of March. The terminal cuttings (3-4 leaf stage) were treated with IBA powder and planted in beds having a mixture of soil and sand in the ratio of 2:1 as the rooting media. The rooted cuttings were then transplanted during the end of last week of March in beds prepared by adding FYMs, dolomite, leaf mould and vermicompost. The beds were prepared with a dimension: 1 m width, 25 cm height and length corresponding to the polyhouse design. The soil in the beds was sterilized with crop shield prior to 2-3 days of planting. Nylon nets were installed as a support material. The planting was carried out at a 20cm plant to plant distance with alternating 3

and 4 plants per row. Five plants were selected for taking observation in each cultivar and replication which were recorded on various growths and flowering parameters. Standard cultural operations were followed to all the treatments throughout the experiment. The observation was recorded at the time when plants were fully in bloom stage.

RESULTS AND DISCUSSION

Vegetative growth is usually a good index of plant vigour, which may contribute towards greater productivity. It also serves as a guide to determine the suitable genotype for obtaining maximum yield. The data presented in Table 1 indicate that significant differences were recorded amongst all the vegetative and floral characters studied. The results revealed that cv. Safin Purple recorded maximum plant height 153.01 cm during the period of study followed by cv. Amadores which recorded 145.08 cm whereas cv. Vega recorded minimum 78.63 cm. Cultivar Rosy Salmon recorded maximum number of branches per plant (6.8 cm) while minimum (2.8 cm) was observed in the cv. Vega. The flower diameter was observed maximum (9.06 cm) in cv. Amadores followed by cv. Safin purple (9.02 cm) the least was observed in cv. Vega (4.6 cm). Days taken for first bud appearance are an important character which signifies the earliness or late flowering habit (Swaroop et al., 2008). Both the characters are helpful in the availability of flowers for longer period. Earliest bud appreance (78.4 days) was observed in cv. Rosy salmon whereas in cv. Terror (104.4 days) it was the last. The maximum number of days taken to first flowering (131.0 days) was recorded in cv. Terror, followed by cv. Safin imp and cv. Salvador both of which recorded 124.2 days. The minimum number of days taken to first flowering (102.2 days) was recorded in cv. Rosy Salmon. Dilta *et al.* (2005) also observed a wide range of diversity in flower number, size and flower duration in different *Chrysanthemum* cultivars. Anuradha *et al.* (2000) evaluated large number of *Chrysanthemum* varieties under Ludhiana condition and observed significant differences among the varieties for all morphological and floral characters studied. On the basis of data for various morphological traits in plant height, flower size and other characters it can be concluded that out of 10 genotypes evaluated these cultivars were found promising for growing under Sikkim agro climatic conditions: Rosy Salmon, Amadores, Safin Purple, Salvador and Laspalmas.

Table 1. Variation in flowering characters of *Chrysanthemum* genotypes under Sikkim condition

Genotype	Plant height (cm)	No of branches/ plant	Flower diameter (cm)	Number of days taken to first bud appearance	Number of days taken to first flower
Safin Salmon	13.5	1.6	3.6	28.4	42.6

(Control)					
Rosy Salmon	125.58	6.8	8.76	78.4	102.2
Laspalmas	117.04	4.6	7.16	98.0	125.8
Amadores	145.08	4.2	9.06	90.4	115.4
Terror	113.11	3.6	5.66	104.4	131.0
Joker	121.92	3.0	5.60	96.4	120.6
Safin Imp	92.66	3.4	6.32	101.4	124.2
Salvador	109.11	3.4	8.04	100.6	124.2
Bonfire	98.75	3.2	7.76	82.8	113.6
Safin Purple	153.01	4.4	9.02	97.6	124.0
Vega	78.63	2.8	4.6	92.8	112.0
Mean	104.28	3.73	6.87	88.26	112.33
P<=0.05	2.26	0.29	0.64	1.24	1.82

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