

## Evaluation of Different Chrysanthemum (*Chrysanthemum morifolium*) Genotypes under Shade Net House in Northwest Himalaya

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### ABSTRACT

Eighteen chrysanthemums (*Chrysanthemum morifolium* Ramat.) genotypes were evaluated for their performance under shade net house in mid hill conditions of Northwest Himalaya during 2011-12. Uniform healthy rooted plants were planted at a spacing of 30×20 cm in randomized block design with three replications. Significant differences were obtained among the genotype for quantitative and qualitative attributes studied. Genotype Sunil recorded maximum (104.3 cm) plant height followed by Professor Harris (92.8cm) however it was minimum in Pusa Anmol (38.7cm). Maximum number of flower per plant (185) was recorded with H-1 followed by Pusa Centenary (151.6) whereas significantly minimum number of flower per plant was recorded with H-3 (17) and Miller White (15.3). Genotype Miller White took minimum days (43) for first bud appearance while H-5 took maximum days for first bud appearance. Duration of the flowering was found to be maximum in H-5 (32.6 days) followed by Miller White (31.8days) while it was shortest in H-3 cultivar (160 days). Extended period of vase life were recorded in Sunil (18 days) followed by Professor Harris (17 days) and Snowball Yellow (17) while the lowest keeping quality was in cultivar Baggi (12) and Ratlam (12). On the basis of quantitative and qualitative traits of eighteen genotype evaluated, Snowball Yellow, Snowball White, Sunil, Andaman Star Red, Pusa Anmol, H-3 and Miller White were found to be promising for commercial cultivation as cut flower as well as loose flower under shade net in mid hills of Kumaon region of North West Himalayas.

**Key words:** *Chrysanthemum*, Evaluation, Genotype, Greenhouse

### INTRODUCTION

Chrysanthemum (*Chrysanthemum morifolium* Ramat) presently known as *Dendrathera grandiflora* Tzvelev<sup>1</sup> 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 the

East belonging to family Asteraceae. Chrysanthemum is gaining popularity in Uttarakhand mostly as potted plants at house hold level<sup>9</sup>. The climate of the state favours for its high and easy production which can fetch higher price in big cities, especially during off season.

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The wide variation exhibited by large number of genotype makes it conceivable for flower crop. It requires long days for vegetative growth and short days for flowering. It is grown under wide range of climatic conditions but the performance of the genotype varies with the region, season and other growing conditions. Therefore, an evaluation of different *Chrysanthemum* genotypes in Kumaon region is of great importance so that suitable cultivars can be recommended for commercial cultivation in mid hill condition of North West Himalayas. Some works have been reported in other region by various workers<sup>7,11,12</sup> and in Garhwal region of the state<sup>9</sup>.

Keeping the importance of such studies in view, the present investigation was under taken to evaluate different genotype under greenhouse for quantitative and qualitative traits in mid hill condition of Kumaon Himalayas.

#### MATERIALS AND METHODS

The present investigation was conducted at Research Station and KVK, Lohaghat, (GBPUA&T, Pantnagar), Champawat, Uttarakhand which is situated at a latitude of 29° 60'; Longitude of 80° 1' and altitude of 1700-1800 m from MSL in North West Himalaya of India involving 18 genotypes during 2012-2014. The raised beds of 80 cm width with 50 cm path in between were made under shade net house. The rooted plants of eighteen varieties viz. Professor Harris, Snowball Yellow, Snowball White, Miller White, Sunil, Andaman Star Red, H-1, H-2, H-3, H-4, H-5, H-6, Baggi, Ratlam, Genotype-14, Pusa Anmol, Pusa Centenary and Pompon Dry Yellow were procured from Model Floriculture Centre, G.B.Pant University of Agriculture and Technology, Pantnagar, Udham Singh Nagar, Uttarakhand. The rooted plant were planted in naturally ventilated shade net house at spacing of 30X20 cm apart in Randomized Block Design with three

replication consisting 16 plants in each replication. Three 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 flower yield attributes like number of flower per branch, number of flowers per plants and flower quality attributes like days taken for first bud appearance, bud burst, flowering duration (days), peduncle length (cm), flower diameter (cm), flower dry weight(gm), vase life (days) and plant height using the standard method. The collected data was analyzed as suggested by Cochran and Cox<sup>2</sup>.

#### RESULTS AND DISCUSSION

Data presented in Table 1 reveal that there is a significant variation among all the genotypes taken for evaluation. Plants growth is usually a good index of plant vigor which may contribute towards greater productivity. It also serves as guide to determine the suitable varieties for obtaining maximum yield. The maximum plant height at the time of first bud appearance was recorded for genotype Sunil (104.3 cm) followed by Professor Harris (92.8cm) while significantly lowest plant height was attained by genotype Pusa Anmol (38.7cm).The variation in plant height can be attributed to genetic constitution<sup>11</sup>.Number of flower per plant is an important character which signifies plant yield and among evaluated genotypes. H-1 produced maximum flowers per branch (16.6) followed by H-4 (13.6) and H-2 (13) whereas minimum number of flower per branch was observed with Miller White (4.0) and Andaman Star Red (4.6). Considerably maximum number of flower per plant (185) was recorded with H-1 followed by Pusa Centenary (151.6) whereas significantly minimum number of flower per plant was recorded with H-3 (17) and Miller White (15.3). Similar variations among varieties with regards of number of flower per plant have

been reported by Dahiya *et al*<sup>3</sup>. The time taken for first bud appearance and days to first bud burst by different genotype was significantly different. Genotype Miller White took minimum days (43) for first bud appearance while H-5 took maximum days for first bud appearance. In contrary to this minimum days taken for first bud burst was recorded with genotype-14 (8.5) while maximum days taken for first bud burst was recorded with Pusa Anmol (14.4) days. Variation for the early flowering seems to be genetically controlled in the genotype and have been reported by Kanamadi and Patil<sup>5</sup>. Duration of flowering is very important character of the flowering plants which signifies that availability of the flowers in the Market. Among the evaluated cultivar, duration of the flowering was found to be maximum in H-5 (32.6 days) followed by Miller White (31.8 days) while it was shortest in H-3 cultivar (160 days). The variations for the blooming among the genetic makeup of the genotype.

Peduncle length is another important character as the genotype having more peduncle length is generally preferred for preparation of bouquets. The peduncle length was found to vary significantly among all the cultivars evaluated. Significantly maximum peduncle length was recorded with cultivar Sunil (15.2cm) followed by cultivar H-5 (15.2 cm) and minimum peduncle length was recorded with cultivar Ratlam (4.7) which was at par with cultivar H-14 and Pusa Anmol. The peduncle length measuring 8-13 cm was recorded with cultivar Professor Harris, Snowball Yellow, Snowball White, H-2, H-3, Baggi, Pusa dryYellow and minimum peduncle length measuring 4-8 cm was recorded with Andaman Star Red, H-1, H-4, Pusa Anmol and Pusa Centenary.

Flower diameter was significantly maximum with cultivar Andaman Star Red (13 cm) followed by Baggi (10.9 cm) and Snowball white (9.0.cm) while minimum flower diameter was recorded with H-2 (4.3)

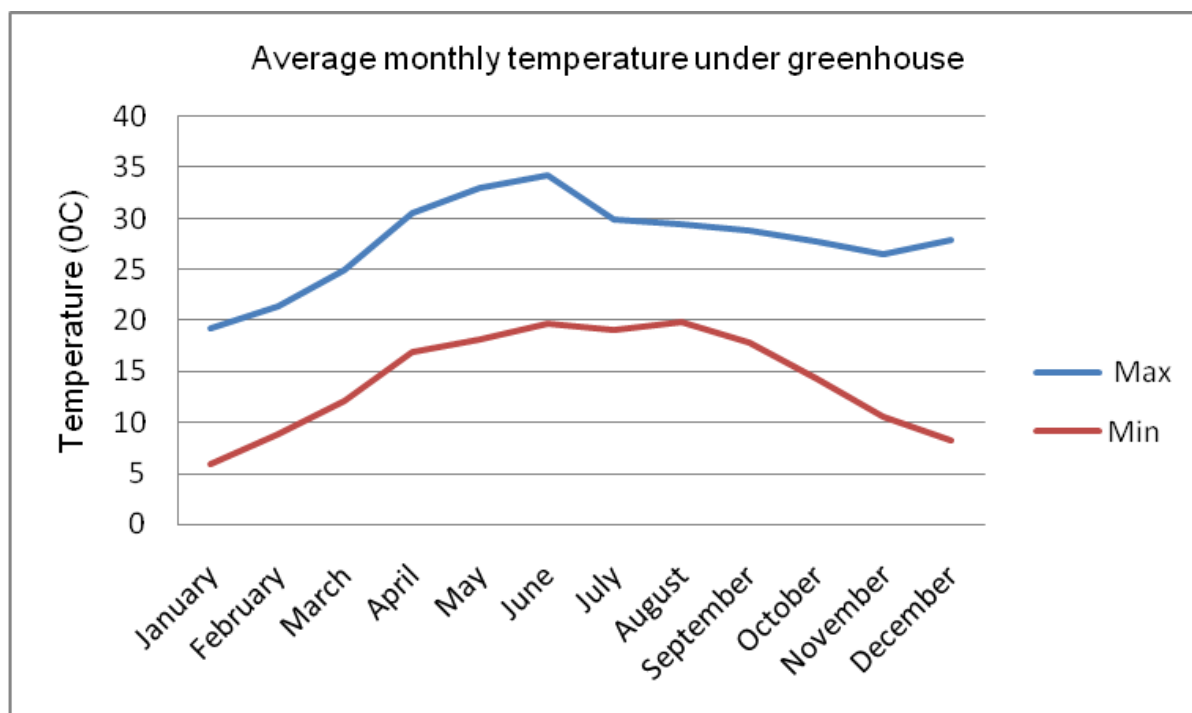
and Pusa Centenary (4.8cm). Variation in flower diameter might be due to the genetic makeup of the varieties and their interaction with prevailing genotype and environment. Present finding are in agreement with the finding of Rao and Pratap<sup>10</sup> (2006) and Punetha *et al*<sup>9</sup>, 2011. Heaviest flower at time of harvest was recorded with Andaman Star Red (16.2 gm) followed by Snowball Yellow (10.6 gm) while H-1 produced lightest flower 1.5 gm. Similar variation among the different Chrysanthemum genotype have been observed by Punetha *et al*<sup>9</sup>, and Laxmi *et al*<sup>8</sup>. Data presented in Table (1) showed that maximum no of Ray florets per flower was recorded with Snowball Yellow (264.6) followed by Snowball White (251.6) and minimum number of ray floret was recorded with H-1(27.4). These variations may be due to genetic makeup of the genotype and similar results were also recorded by Gupta and Dutta<sup>4</sup>, Punetha *et al*<sup>9</sup>.

Vase life or keeping quality of the flowers is of great importance in determining the safe marketing of flowers to the distant markets. At room temperature, there was significantly extended period of vase life was recorded in Sunil (18 days) followed by Professor Harris (17 days) and Snowball Yellow (17) while the lowest keeping quality was in cultivar Baggi (12) and Ratlam (12). These variations in vase life of flowers must be due to the difference in senescencing behaviour of the cultivars by producing higher amount of Ethylene forming enzymes. This fact was also in agreement with Kandpal *et al*<sup>6</sup>, in Gerbera flower.

On the basis of quantitative and qualitative traits of eighteen genotype evaluated, the genotype of Snowball Yellow, Snowball White, Sunil, Andaman Star Red, Pusa Anmol, H-3 and Miller White were found to be promising for commercial growing as cut flower as well as loose flower under agro climatic condition of the mid hills of Kumaon region of North west Himalayas.

**Table 1: Performance of Chrysanthemum genotypes for quantitative and qualitative attributes under naturally ventilated greenhouse**

Variety	Days taken for first flower bud appearance	Days taken for first bud burst	Number of flower per branch	Number of flower per plant	Peduncle length (cm)	Plant height (cm)	Flowering duration	Number of ray florets	Flower weight (gm)	Flower diameter (cm)	Vase life (days)
Prof. Harris	53.73	12.9	9.5	27.6	10.6	92.8	21.3	162.6	9.7	8.06	17
Snowball Yellow	50.6	13.3	6.1	33.3	13.1	91.1	27.7	264.6	10.6	7.5	17
Snowball White	54.2	14.2	7	40.6	10.6	91.1	25.4	251.6	12.1	9	13
Miller White	43.0	11.7	4	15.3	6.4	59.4	31.8	201.0	3.7	6.8	15
Sunil	51.6	11.9	10.6	78.3	17.2	104.3	27.8	233.3	5.5	7.7	18
Andaman Star Red	51.3	14	4.6	16.3	6.8	64.1	22.3	240.6	16.2	13	15
H-1	49.6	12.7	16.6	185.0	7.5	73.8	18.3	27.4	1.5	3.8	12
H-2	46.2	9.4	13	109.0	9.5	73.8	19.8	33.6	1.46	4.3	13
H-3	51.1	9.5	5.3	17	8.0	60.9	16	146.6	2.0	5.2	13
H-4	46.3	10.5	13.6	131	7.3	65.9	22.6	99.3	2.2	5.6	14
H-5	54.4	10.4	8	55.3	15.2	73.8	32.6	63.3	1.8	9.4	15
H-6	53.9	11.3	9.3	98	10	85.4	16.6	61.3	2.6	4.6	13
Baggi	51.06	9.8	7.3	65	15.7	81.1	18.3	39.0	1.5	10.9	12
Ratlam	45.83	11.6	7	76	4.7	71.2	17.6	102	3.9	7.4	12
Var-14	39.8	8.5	6	43.3	4.8	63.3	31.3	101	2.1	5.7	13
Pusa Anmol	49.6	14.4	7.6	24	4.9	38.7	22.6	191.3	10.7	7.7	13.3
Pusa Centenary	53.3	11.2	9.3	151.6	7.8	68.9	24.6	96.0	2.4	4.8	14.6
Pusa Dry yellow	45.4	14.2	7.3	49.3	9.2	80.9	28.6	198.0	3.8	4.9	14.3
CD at 5%	7.66	5.64	6.78	8.1	5.5	1.85	3.08	1.62	1.6	1.2	5.21

**Fig.1: Average monthly temperature under greenhouse**

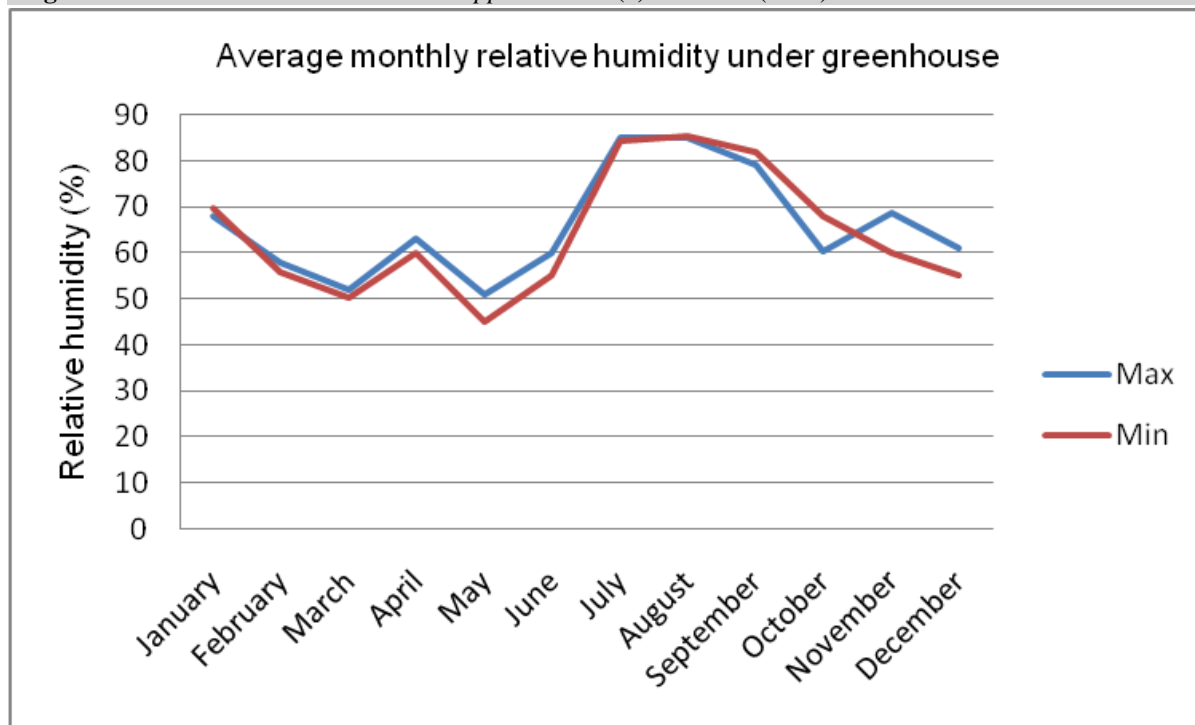


Fig. 2: Average monthly relative humidity under greenhouse

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