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Influence of polyhouse conditions on flower weight and vase life of chrysanthemum (*Chrysanthemum morifolium*) genotypes

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Abstract
The present investigation on "Studies on flower weight and vase life of chrysanthemum (*Chrysanthemum morifolium*) genotypes under polyhouse conditions." was carried out at College of Horticulture, Dr. Balasaheb Konkan Krishi Vidyapeeth, Dapoli Dist. Ratnagiri, Maharashtra at Polyhouse Near the Energy Park, CAET, during 2021-2022. Chrysanthemum is one of the most important flower crops. Nowadays, chrysanthemums cultivated for cut flower purposes and it can be grown in polyhouse for getting maximum production. The experiment was laid out with ten different genotypes in a Randomized Block Design (RBD) with three replications. The genotypes include CHY-1, CHY-2, CHY-3, CHY-4, CHY-5, CHY-6, CHY-7, CHY-8, CHY-9 and CHY-10. Among all the genotypes, genotype CHY-1 has shown best performance with respect to flowering weight and vase life.

Keywords: Chrysanthemum genotypes, polyhouse, flower weight and vase life

Introduction
Chrysanthemum (*Chrysanthemum morifolium*) is one of the most important flower crops. Chrysanthemum is annuals, herbaceous perennials. It is a short-day plant. In the 17th century, the chrysanthemum was introduced to Europe. It originated from Asia and Europe but some researchers claim that it has originated from China (Bose *et al*., 2002) [2]. Chrysanthemum chromosome number is 18 and it is belonging to the family Asteraceae. In the cut flower trade, the chrysanthemum ranks next to the rose. In USA chrysanthemum is also known as 'mums'. Many different names for chrysanthemums in our country like 'Guldawri' in Hindi, 'Chandramallika' in Bengal, 'Bagauri' in Punjabi, 'Shevanti' and 'Gulsevati' in Marathi, 'Gavanthi' in Tamil and 'Chamanti' in Telugu. The word chrysanthemum is derived from the Greek word 'chrysos' means 'golden' and 'anthemon' means 'flower'. It is known as 'Queen of East', 'Glory of the East', 'Guldaudi', and 'Autumn Queen' (Thiripurasundari *et al*., 2019) [11].
Chrysanthemums are mainly classified under two categories such as large-flowered (standard types) and small- flowered (spray types). Standard types are mostly grown for cut flowers and small types are grown for loose flowers (Siddiqua *et al*., 2017) [8]. The genus chrysanthemum contains 30 spp. of plants. Chrysanthemum requires long days for good vegetative growth and short days for flowering. Providing artificial light to the chrysanthemum after planting to initiate vegetative growth. After sufficient vegetative growth, short days are provided to induce flowering in treated plants. Short-day treatment consisted of complete shading of plants. Shading is done with the black polythene sheet. Chrysanthemum growth and flowering are influenced by light and temperature and also influenced by the performance of genotypes. Genotypes vary with the season, region, and other growing conditions. (Swaroop *et al*., 2008) [9].
Chrysanthemums thrive in sandy loam soil that drains well. The optimal conditions for growing chrysanthemums include good soil aeration and good soil texture. organically dense soil with a pH range of 5.5 to 6.5. It is a cool-season crop that is impacted by light and temperature. The ideal temperature range for plant growth is between 16 °C and 25 °C. CO_2 levels of 600-900 ppm and relative humidity of 70-85% are found in polyhouses. For cut flower production of chrysanthemum, the value of production is 15.94 thousand tonnes and for loose flower, the

production value is 454.20 thousand tonnes means the total production value of chrysanthemum is 470.14 thousand tonnes (NHB, 2021). Number of varieties in the world is about 2000 and in India, there are about 1000 varieties (Datta and Bhattacharjee, 2001) [3].

In Pune and Nashik districts of Maharashtra farmers are growing cut chrysanthemum flowers under polyhouse conditions for improving the quality and vase life flower and also getting a better height of plants, increasing the maximum number of flowers, increasing yield, and enhancing production. As Konkan region is an endowed with hot and humid condition and high precipitation, therefore to take this crop under polyhouse condition is only way to complete three cycle in a year and to make it lucrative crop of this region. Also growing tourism in Konkan and major metro cities like Mumbai and even peri-urban areas are having peak demand to this cut flowers throughout the year due to its aesthetic value. Accordingly this research work was planned to test the performance of various genotypes of cut chrysanthemum under polyhouse condition in Konkan region.

Material and Methodology

The "Studies on performance of chrysanthemum (*Chrysanthemum morifolium*) genotypes under polyhouse conditions" was carried out at College of Horticulture, Dr. Balasaheb Konkan Krishi Vidyapeeth, Dapoli Dist. Ratnagiri, Maharashtra at Polyhouse Near the Energy Park, CAET, during year 2021-2022. The experiment was laid out in Randomized Block Design with ten treatments and three replications. Sixty-four plants of each genotypes are planted in each replication (12.5 cm x 12.5 cm).

Treatment details

Sr. No.	Treatment	Particulars
1	T_1	CHY-1
2	T_2	CHY-2
3	T_3	CHY-3
4	T_4	CHY-4
5	T_5	CHY-5
6	T_6	CHY-6
7	T_7	CHY-7
8	T_8	CHY-8
9	T_9	CHY-9
10	T_{10}	CHY-10

Five plants were randomly selected from each replication for carrying out performance studies. All the recommended practices were followed. The data on flwering weight and vase life characters were recorded and statistically analysed (Panse and Sukhatme, 1985) [6].

Results and Discussion

The data recorded on average flower weight and vase life presented in Table 1 and Table 2 revealed significant variations among the cut chrysanthemum genotypes.

Average weight of flowers

Among the ten chrysanthemum genotypes average weight of flower was recorded in treatment CHY-1 (7.28 g) which followed by CHY-8 (7.14 g) while, the minimum average weight of flower observed in CHY-3 (3.54 g) which was followed by CHY- 7(5.15 g). Also similar result reported by Katwate *et al*. (1992) [5] in cultivars *viz.* "Sharad Mala" and "IIHR Sel.4". Also studied on different varieties of chrysanthemum on flower yield under North Gujarat conditions and observed that highest flower weight of flowers per plant was recorded in "Nilima". Joshi *et al*. (2009) [4]. Genetic variability in chrysanthemum and observed average flower weight differed significantly with different genotypes. Maximum of 6.46 g in genotype "Pink" with a mean value of 3.0 g and this result reported by Sahu (2012) [7].

Table 1: Performance of chrysanthemum genotypes under polyhouse condition on the basis of average weight of flower

Treatments	Average weight of flower (g)
T_1 (CHY-1)	7.28
T_2 (CHY-2)	6.13
T_3 (CHY-3)	3.54
T_4 (CHY-4)	6.95
T_5 (CHY-5)	6.35
T_6 (CHY-6)	6.07
T_7 (CHY-7)	5.15
T_8 (CHY-8)	7.14
T_9 (CHY-9)	6.73
T_{10} (CHY-10)	6.10
Range	6.13-7.28
Mean	6.14
Result	Sig.
S.Em ±	0.22
C.D. at 5%	0.64

Vase Life

Use of Aluminium Sulphate 300 ppm + Sucrose 2% was done for prolonging vase life of cut chrysanthemum genotypes.

Among all ten genotypes maximum vase life was recorded in CHY-1 (20.13 days) whereas, the minimum vase life was found in CHY-3 (10.65 days). Also similar result found in standard chrysanthemum cv. "Snow Ball" produced in polyhouse exhibited maximum vase life (20 days) as compared to open conditions (16 days) those result reported by Talukdar *et al*. (2006) [10]. Chrysanthemum (*Chrysanthemum morifolium* R.) varieties for recorded longest vase life period in cv. "Calmiro Sunny" (13.11 days) by Vetrivel and Jawaharlal (2014). The effect of pulsing solutions on vase life and quality of cut flowers of (*Chrysanthemum morifolium* R.) cv. "White Zambla". Best treatment of STS at 0.4 mM for 30 minutes followed by pulsing in BA (10 ppm) + GA3 at (20 ppm) + AOA (4 mM) for 24 hours had the most favourable effect on vase life of flower. This result reported by Abou *et al*. (2012) [1].

Table 2: Performance of chrysanthemum genotypes under polyhouse condition on the basis of vase life. (300 ppm + 2% Sucrose)

Treatments	Vase life (Days)
T_1 (CHY-1)	20.13
T_2 (CHY-2)	18.53
T_3 (CHY-3)	10.65
T_4 (CHY-4)	13.59
T_5 (CHY-5)	15.33
T_6 (CHY-6)	16.22
T_7 (CHY-7)	12.14
T_8 (CHY-8)	17.81
T_9 (CHY-9)	16.46
T_{10} (CHY-10)	18.47
Range	10.65-20.13
Mean	15.94
Result	Sig.
S.Em ±	0.48
C.D. at 5%	1.41

Conclusion

Thus from the present investigation it can revealed that genotype

CHY-1 showed significant effect on the average flower weight (7.28 g) and prolonged vase life (20.13 days) by using of Aluminium Sulphate 300 ppm + Sucrose 2%.

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