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Impact of Controlled Environment on Growth and Flowering of Gerbera (*Gerbera jamesonii* Bolus)

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ABSTRACT

Gerbera (*Gerbera jamesonii* Bolus) a popular cut flower from the Asteraceae family, whose cultivation in semi-arid regions diversifies income and offers profitable market opportunities, enabling scientists develop techniques suited to these conditions. Although, flower production in northern part is limited compared to southern parts of the state, it still contributes to the sector, especially as floriculture gaining traction. The present study was conducted to assess vegetative and flower characteristics of seven gerbera varieties (Intense, Chique, Camilla, Sam Dom, Ritmo, Beaker and Ankur) with three replications using Randomized block design (RBD) at the College of Horticulture, University of Horticultural Sciences, Bagalkot, Karnataka under polyhouse conditions. Results showed that vegetative characters like plant spread (63.89 cm), leaf length (30.03 cm) and leaf breadth (16.40 cm) was highest in the variety Intense. Plant height (54.20) was highest in Chique, maximum no of leaves per plant was produced by Beaker (28.17). Pertaining to flower characters, the maximum number of flowers per plant per month (3.93), stalk girth (6.30 mm) and flower diameter (11.3 cm) was highest in Intense. Stalk length (58.5 cm) was greater in Chique and maximum flower weight in Sam Dom (10.83 g). Hence, it was observed that the variety Intense performed best for most of the characters followed by Chique, Ankur, Ritmo, Camilla, Sam Dom and least by Beaker. In conclusion, the study identifies 'Intense' as the most promising gerbera variety for semi-arid polyhouse conditions in northern Karnataka, demonstrating superior vegetative and floral traits compared to the other varieties tested.

Keywords: Bagalkot, Environment, Flower, Gerbera,

INTRODUCTION

Gerbera (*Gerbera jamesonii* Bolus) is a bright and striking perennial belonging to the family Asteraceae, renowned for its daisy flowers, which convey happiness and positivity. The striking and colourful blooms come in numerous shades, rendering them a favourite in gardens as well as floral arrangements because of their optimistic vibe (Kankana and Talukdar, 2015). Gerbera plants are relatively drought-tolerant and thrive in regions with moderate rainfall and well-drained soil. Semi-arid environments, characterized by dry weather, are best suited for the cultivation of Gerbera, providing farmers with a lucrative venture, as it is one of the most sought-after cut flowers in the international floral market (Kumar *et al,* 2013). Floriculture is an important contributor to employment generation through job opportunities in different sectors of cultivation, packaging, transport and sale (Rahul *et al,* 2021; Kumar and Singh, 2022). To agricultural communities, floriculture provides a means to diversify their income sources and reduce reliance on traditional crops such as cotton and grains (Shivani and Tamrakar, 2022). The advent of high-tech farming practices, such as greenhouse farming, has enabled flower cultivation in Northern Karnataka to be carried out throughout the year, thus enhancing both quality and output. Flowers produced in this area, especially Gerberas, are slowly finding their way into markets all over the country. The increasing demand for these flowers is opening up new business prospects (Maitra *et al,* 2024). Moreover, studies on how these plants and varieties accommodate local climates can result in the creation of specialized cultivation methods suited to the area, supporting

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Table 1: Mean performance of gerbera cultivars for vegetative growth parameters.

Name of variety	Plant spread (cm)	Number of leaves	Plant height (cm)	Leaf length (cm)	Leaf breadth (cm)
Intense	63.89	21.97	53.09	30.03	16.40
Chique	57.30	20.97	54.20	23.87	11.03
Camilla	51.73	20.20	46.61	23.30	9.40
Sam Dom	44.50	16.73	37.37	21.00	8.60
Ritmo	55.63	13.73	44.30	23.27	12.47
Beaker	37.97	22.37	27.63	20.93	7.87
Ankur	50.85	28.17	39.3	26.30	11.07
CD at (5%)	4.89	4.27	4.84	1.54	1.52
SEm	1.59	1.39	1.57	0.50	0.49

healthier growth and improved yields for commercial and ornamental purposes. Hence, the present study was conducted to study the performance of different gerbera varieties under protected cultivation practices.

MATERIALS AND METHODS

The study was done at College of Horticulture, University of Horticultural Sciences, Bagalkot, Karnataka, during 2024-25 in a naturally ventilated polyhouse for assessment of different Gerbera cultivars for performance. Planting was initiated in October 2024. Meteorological observations made from the UHS Bagalkot MHREC station during the growing period of the crop revealed that the average maximum temperatures varied from 31.9°C to 28°C and the average minimum temperatures varied from 20°C to 17°C. The highest relative humidity varied from 84% to 62% and the lowest relative humidity varied from 69% to 33%. There were seven Gerbera cultivars, *viz.,* Intense, Chique, Camilla, Sam Dom, Ritmo, Beaker and Ankur, obtained from Kumar Florist (K.F. Bio Plants), Pune. A three replication Randomized Block Design (RBD) was used. Raised beds with dimensions 18 meters in length, 1 meter in width and 0.30 meters in height were prepared and amended with basal application of farmyard manure (FYM), biofertilizers and di-ammonium phosphate (DAP). Gerbera seedlings were tissue-cultured and transplanted at a distance of 30 cm × 20 cm and normal agronomic practices were maintained during the course of cultivation. Vegetative parameters such as plant height, plant spread, leaf number, leaf length and leaf breadth were collected through data. Floral characteristics like flower stalk length, stalk girth, number of flowers/plant/month, flower weight and flower diameter were measured 120 days after planting (DAP). The data collected were analyzed statistically using analysis of variance (ANOVA), standard error of the mean (S.Em ±) and critical difference (CD) at 5% level of significance to determine the performance of the cultivars under naturally ventilated polyhouse conditions.

RESULTS AND DISCUSSION

Vegetative parameters

The findings of the current research, as presented in the table 1, demonstrated noteworthy differences between the different Gerbera cultivars for several vegetative characteristics. Statistical analysis reported that the cultivar 'Chique' achieved the highest plant height at 54.20 cm, followed very closely by 'Intense' with 53.09 cm, while 'Beaker' had the lowest height at 27.63 cm. These plant height differences concur with the findings documented by Reddy *et al* (2003). Leaf number varied between 13.73 and 28.17, with 'Ankur' having the largest number and 'Ritmo' having the least, supported by Kumar *et al* (2013). Leaf length was maximum in 'Intense' (30.03 cm) followed by 'Ankur' (26.30 cm) and 'Chique' (23.87 cm). Leaf breadth was dominated by 'Intense' at 16.40 cm followed by 'Ritmo' (12.47 cm) and 'Ankur' (11.07 cm). In plant spread, 'Intense' recorded the widest spread of 63.89 cm, followed by 'Chique', while that of 'Beaker' was the narrowest at 37.97 cm. These differences are based on the natural genetic composition of the cultivars, in addition to their corresponding leaf sizes, supporting Deka *et al* (2015). Moreover, the plant height of 'Intense' (53.09 cm) and 'Ankur' (39.3 cm) recorded during this research were different from that reported in Odisha (44.7 cm and 46.3 cm respectively), according to Maitra *et al* (2024), reflecting the influence of local climatic conditions on the growth of the cultivars.

Flower characters

Data analysis from the table 2 shows that flower characteristics were quite different for the various Gerbera varieties. In the single-type flowers, the maximum diameters were for the flowers of

Table 2: Mean performance of gerbera cultivars for floral growth parameters.

Name of variety	Number of flowers/plant/ month	Flower weight (g)	Flower diameter (cm)	Stalk length (cm)	Stalk girth (mm)	Flower colour	Flower type
Intense	3.93	9.52	11.33	57.63	6.30	Dark Pink	Single
Chique	3.23	7.23	6.73	58.50	4.91	Purple	Double
Camilla	2.73	10.62	6.75	50.20	4.23	Light Pink	Double
Sam Dom	2.00	10.83	7.80	40.83	4.61	White	Double
Ritmo	2.20	7.72	9.30	46.17	5.80	Yellow	Single
Beaker	3.90	8.32	5.94	32.50	4.97	Orange-Yellow	Double
Ankur	2.00	10.18	10.29	50.50	4.35	Bright Red	Single
CD at (5%)	0.60	0.21	0.65	4.96	0.46	-	-
SEm	0.19	0.07	0.21	1.61	0.15	-	-

'Intense' (11.3 cm), followed by 'Ankur' (10.29 cm) and 'Ritmo' (9.30 cm). For double-type flowers, the largest flower diameter was recorded in 'Sam Dom' (7.80 cm), followed by 'Camilla' (6.75 cm), whereas the smallest diameters were recorded in 'Chique' (6.73 cm) and 'Beaker' (5.94 cm). The greater flower diameters in single-type flowers can be due to their longer ray florets compared to double-type flowers. The larger flower size of 'Intense' is attributed to the genetic makeup of the cultivar. These findings are consistent with the reports of Gotz (1983) and Mahmood *et al* (2013) who also reported extreme variation in flower diameter among Gerbera cultivars under greenhouse conditions. As for flower yields, the largest number of flowers per plant in 'Intense' (3.93), followed closely by 'Beaker' (3.90), then 'Camilla' (2.73) and 'Chique' (2.33), but the lowest flower yield was 'Sam Dom' (2.00). This augmented flower production in some cultivars can be attributed to characteristics like an increased leaf area, leaf number and plant spread, all of which improve the storage and production of photosynthates, hence leading to flower growth, as justified by Deka *et al* (2015). The longest

stalks of flowers were observed in 'Chique' (58.5 cm), then 'Intense' (57.63 cm) and 'Ankur' (50.5 cm), while 'Beaker' had the shortest (32.5 cm). Since stalk length is primarily controlled by genes, its difference between cultivars is not unexpected, according to Sarkar and Ghimaray (2004). In Gerbera, stalk length is an important quality factor of cut flowers, as longer stalks contain greater reserves that are responsible for flower longevity, something also highlighted by Mahmood *et al* (2013). In stalk girth, the maximum was in 'Intense' (6.30 mm), then 'Ritmo' (5.80 mm), while minimum was recorded in 'Camilla' (4.23 mm). Rajiv Kumar et al. (2012) had reported previously variations in stalk thickness among ten Gerbera genotypes in polyhouse conditions. For flower weight, 'Sam Dom' yielded the most massive flowers (10.83 g), while 'Chique' yielded the lightest (7.23 g). This difference in flower weight correlates with flower size, as confirmed by Vijayalaxmi *et al* (2021), with bigger flowers naturally having more mass.

CONCLUSION

Vegetative growth and floral traits of Gerbera were significantly impacted by the selection of cultivar. The differences noticed among the seven cultivars can be credited primarily to their unique genetic attributes, as they were all grown under identical and favourable polyhouse conditions. Out of them, the cultivar 'Intense' performed the best in both vegetative and floral traits. Cultivars like 'Chique', 'Ankur' and 'Ritmo' also exhibited satisfactory results. On the basis of the findings of this study, the cultivation of 'Intense', 'Chique', 'Ankur' and 'Ritmo' is suggested in naturally ventilated polyhouses in semi-arid areas to attain maximum growth and flower production.

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