

Evaluation of Gerbera (*Gerbera jamesonii*) Cultivars under Naturally Ventilated Polyhouse

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(Received: 12 November 2023; Revised: 01 December 2023; Accepted: 26 December 2023; Published: 15 January 2024)

(Published by Research Trend)

ABSTRACT: Among the flowers, gerbera (*Gerbera jamesonii* B.) is remarkable for the extra ordinary geometrical regularity of form. The demand for gerbera as both cut flower and an ornamental potted plant is steadily growing in the global market. This is primarily due to its elegant appearance, resilience, capacity to endure transportation and extended shelf life. An experiment was carried out to evaluate ten gerbera cultivars for growth, yield and quality parameters during the year 2022-2023 at Kittur Rani Channamma College of Horticulture, Arabhavi, University of Horticultural Sciences, Bagalkot. It was recorded that plant height was maximum in cv. Stanza (40.99 cm). Maximum values for leaf length (37.94 cm), leaf breadth (11.85 cm) and leaf area (7944.56 cm²) were recorded in cv. Balance. Higher number of leaves (33.16) and higher sucker production per plant (4.40) were recorded in cv. Intense. The same cv. Intense took less time for first flower bud initiation (41.68days) and flower opening (15.21 days). Maximum flower diameter was observed in cv. Balance (10.52 cm) and stalk length was found in cv. Forbes (57.10 cm). While stalk girth (6.52 mm), vase life (9.28 days), maximum number of flowers per plant (11.42) and meter square (102.81) were found more in cv. Intense. The overall study revealed that cultivar Intense exerted best performance on various growth and flower characters along with the cultivars Samara, Ankur and Balance.

Key words: Cultivars, gerbera, protected cultivation, quality parameters, vase life, yield.

INTRODUCTION

Gerbera (*Gerbera jamesonii* B.) belongs to Asteraceae family with popular names such as Transvaal daisy, African daisy and Barberton daisy. There are 40 species in the genus Gerbera but only *Gerbera jamesonii* is cultivated. It is indigenous to the African and Asian continents. With tall leafless stalks and daisy like blooms, this flower is particularly a beautiful flower crop. It is a widely used cut flower that may be cultivated in a variety of climates across the world. Its natural distribution spans from Africa to Madagascar, extending into tropical Asia and South America. The gerbera flower is often regarded as a symbol of beauty, purity and innocence, making it a cherished choice for various occasions and floral arrangements (Rangnamei *et al.*, 2019). For cultivation of gerbera in tropical and

subtropical conditions, the protected cultivation is suitable under open ventilated and forced ventilated polyhouses (Ahlawat *et al.*, 2012).

Currently, there are wide array of tissue cultured hybrid gerbera cultivars available for commercial production and new ones are continually being introduced each year. However, it is important to note that the performance of each cultivar can vary based on the region, season and other specific growing conditions. Given the rising demand for high quality cut flowers, there exists significant potential for expanding the cultivation of gerbera. The key to producing high quality flowers with a higher yield primarily hinges on the careful selection of appropriate cultivars. In light of this, studies and assessments of these cultivars under protected conditions would be valuable for growers

seeking to maximize the potential of this crop. Therefore, the present investigation was carried out with an objective to find out the most suitable cultivar of gerbera under naturally ventilated polyhouse with respect to growth, flower, yield and vase life for cut flower production.

MATERIAL AND METHODS

The present investigation was carried out in naturally ventilated polyhouse (NVPH) situated at the Department of Floriculture and Landscape Architecture, Kittur Rani Channamma College of Horticulture, Arabhavi, Gokak, Belagavi, Karnataka during the year 2022-23. The experiment consisted of ten cultivars of gerbera viz., Ankur, Atlanta, Balance, Forbes, Goliath, Intense, Samara, Shimmer, Stanza and Tommy were bought from KF Bio plants, Pune. The cultivars were evaluated in Completely Randomized Design (CRD) replicated three times. Raised beds of 45 cm height 70 cm width and 16 meter long were prepared inside a naturally ventilated poly house. Recommended dose of FYM and vermicompost were applied at the time of planting. Tissue cultured plants of above mentioned cultivars were planted on 19th November 2022 at a spacing of 30 × 30 cm in two rows in each bed. The recommended package of practices was followed for raising the crop. Five plants of each cultivar were selected randomly from the net plot and were tagged for recording the observations. The observations for vegetative characters, flowering parameters, flower quality and yield parameters were recorded. All the mean values of the recorded data for six months were subjected to statistical analysis as per the procedure given by Panse and Sukhatme (1985) and tabulated in tables.

RESULTS AND DISCUSSION

A. Vegetative parameters

The data on the plant height showed significant differences among cultivars (Table 1). Plant height was maximum in cultivar Stanza (40.99 cm) and it was on par with cv. Balance (39.73 cm) and cv. Forbes (38.34 cm) whereas, the minimum was noticed in cv. Samara (32.35 cm). Variations in gerbera plant height among cultivars arise from a mix of growth rates, genetic potential and interactions with environmental conditions. These conditions, including light, temperature and nutrients, can either amplify or limit the genetic expression of plant height, resulting in the observed differences. Similar results for vegetative characters in gerbera were observed by Sil *et al.* (2017); Maitra *et al.* (2020); Chavan *et al.* (2021).

Leaves are critical for plant growth and flower production. They are key for photosynthesis, nutrient and water uptake, hormone production and structural support for flowers. Higher number of leaves were produced by cv. Intense (33.16) and it was at par with

cv. Ankur (29.58). The least number of leaves was found in cv. Shimmer (25.06). The observed differences among the cultivars can likely be attributed to the unique genetic characteristics inherent to each individual cultivar. These results are in accordance with the findings of Lagamanna *et al.* (2015); Chavan *et al.* (2021); Vijayalaxmi *et al.* (2021).

The length of the leaf is an important factor in the interception of light, photosynthesis and flower yield. Cultivar Balance recorded significantly maximum leaf length (37.94 cm) which remained at par with cv. Stanza (37.12 cm) and cv. Atlanta (35.29 cm) whereas, cv. Shimmer recorded the minimum leaf length (28.34 cm). Leaf breadth was found maximum in cultivar Balance (11.85 cm) which was on par with cv. Stanza (11.03 cm) while, minimum was recorded in cv. Tommy (7.83 cm). The observed differences can be attributed to the genetic characteristics inherent in each cultivar and these results are in accordance with the findings of Baghele and Pusdekar (2022); Sairam *et al.* (2022).

Leaf area was found highest in the cultivars Balance (7944.56 cm²) and Stanza (7049.26 cm²) while, minimum was found in cultivar Shimmer (3694.72 cm²). Plant spread indicates the overall growth habit of plant. Maximum plant spread was observed in cv. Balance in both North-South and East-West direction (56.05 and 56.64 cm, respectively). However minimum plant spread was recorded in cv. Shimmer (45.77 and 43.70 cm, respectively). The differences among these cultivars may be attributed to the presence of larger sized leaves and a greater number of leaves produced by different cultivars. The production of leaves and the length of these leaves are critical factors that influence the overall plant spread. Leaves serve as the primary functional units for photosynthesis, playing a pivotal role in plant growth and ultimately affecting flower yield. Chavan *et al.* (2021); Vijayalaxmi *et al.* (2021); Baghele and Pusdekar (2022) also reported the same.

Number of suckers production per plant was observed highest in cv. Intense (4.40) followed by cv. Ankur (4.20) whereas, cv. Shimmer (2.60) recorded lowest number of suckers per plant. The presence of a greater number of leaves in cultivars like Intense and Ankur likely led to increased photosynthesis, resulting in the production and accumulation of a higher number of resources. This, in turn, contributed to the production of more suckers. Specifically, Intense produced the most leaves per plant and correspondingly, it had the highest number of suckers per plant. On the other hand, cv. Shimmer produced the fewest leaves per plant and it had the lowest number of suckers per plant. This suggests a positive correlation between the number of leaves and the production of suckers in these gerbera cultivars. These results are found in line with the findings of Deka and Talukdar (2015); Sairam *et al.* (2022).

Table 1: Vegetative characters of different gerbera cultivars.

Cultivar	Plant height (cm)	Number of leaves	Leaf length (cm)	Leaf breadth (cm)	Leaf areaper plant (cm ²)	Plant spread (cm)		Number of suckers
						NS	EW	
Ankur	35.66	29.58	33.64	10.70	6631.37	54.10	53.55	4.20
Atlanta	36.81	27.84	35.29	8.93	5488.47	54.92	54.09	3.47
Balance	39.73	28.29	37.94	11.85	7944.56	56.05	56.64	3.53
Forbes	38.34	27.36	34.20	8.81	5160.25	53.83	52.95	2.87
Goliath	32.91	26.64	28.60	8.52	4061.34	50.60	51.84	3.00
Intense	35.45	33.16	31.31	9.43	6099.98	54.70	50.52	4.40
Samara	32.35	28.37	32.85	9.68	5638.57	52.08	51.14	3.53
Shimmer	33.71	25.06	28.34	8.30	3694.72	45.77	43.70	2.60
Stanza	40.99	27.55	37.12	11.03	7049.26	51.63	52.88	3.93
Tommy	34.67	27.19	29.51	7.83	3938.07	52.87	52.25	3.20
Mean	36.06	28.10	32.88	9.51	5570.66	52.62	51.96	3.47
S.Em±	1.33	0.84	1.20	0.34	299.90	1.68	1.83	0.09
CD (5%)	3.96	2.50	3.59	1.02	894.81	5.01	5.47	0.28

B. Flowering characters

The perusal of data (Table 2) revealed that flowering characters varied significantly among the cultivars. It was found that significantly earlier flower bud appearance (41.68 days) was observed in cultivar Intense followed by cv. Ankur (43.60 days) and cv. Samara (45.27 days) whereas, cv. Atlanta took the maximum number of days (54.30). The cultivar Intense took less time for flower opening (15.21 days) and which was statistically on par with cv. Samara (15.53 days) and cv. Ankur (16.27 days) whereas, the cv. Stanza took more number of days to flower opening (18.94 days). The differences observed among the

various gerbera cultivars regarding the duration from bud initiation to flower opening are likely a result of varietal distinctions. These differences may also interact with the prevailing environmental conditions under which the plants are cultivated. Both the unique genetic traits of each cultivar and the environmental factors in the growing conditions collectively influence the variations in the time it takes for the flowers to open from the initial bud initiation stage. These results are in conformity with the findings of Kankana and Madhumita (2014); Kumar *et al.* (2014); Chavan *et al.* (2021) in gerbera.

Table 2: Flowering parameters of different gerbera cultivars.

Cultivar	Days to first flower bud initiation	Days to flower opening from first bud initiation
Ankur	43.60	16.27
Atlanta	54.30	18.47
Balance	51.04	18.20
Forbes	50.18	18.00
Goliath	52.38	17.33
Intense	41.68	15.21
Samara	45.27	15.53
Shimmer	52.22	17.27
Stanza	53.25	18.94
Tommy	48.45	16.47
Mean	49.24	17.17
S.Em±	1.44	0.40
CD (5%)	4.28	1.21

C. Flower quality and yield characters

The widest flower was observed in cultivar Balance (10.52 cm) with maximum flower diameter. Next best cultivars in the order were cv. Forbes (10.28 cm), cv. Ankur (9.30 cm) and cv. Intense (9.19 cm). This can likely be attributed to the varietal characteristics of the particular cultivar, which may possess an increased number and longer disc and ray florets. These results are in conformity with the findings of Prajapati *et al.* (2017); Singh *et al.* (2017); Ganorkar *et al.* (2017) and Soni and Godara (2017). Longest stalk length was recorded in cv. Forbes (57.10 cm) which was at par

with cv. Tommy (56.28 cm), cv. Intense (55.52 cm) and cv. Ankur (55.41 cm). Maximum stalk thickness was recorded in cultivar Intense (6.52 mm) which was at par with cv. Ankur (6.38 mm), cv. Tommy (6.30 mm) and cv. Samara (6.02 mm) while, it was minimum in cv. Atlanta (5.23 mm). The stalk length and girth are genetic factor therefore it is expected to vary among the cultivars as earlier observed by Lagamanna *et al.* (2015); Prajapati *et al.* (2017). Significantly the maximum vase life was recorded in cultivar Intense (9.28 days) which was statistically at par with cv. Ankur (8.89 days) and cv. Tommy (8.77 days).

Variation in vase life among the gerbera cultivars might be attributed to variations in their genetical make up as reported by Mahmood *et al.* (2013) in gerbera. Stalk diameter also plays an important role in maintenance of postharvest vase life of cut flower by an increase in carbohydrate content of the stalk which stabilizes the vase life, there by prolong the shelf life of cut flowers. The similar kind of findings were recorded by Prajapati *et al.* (2017); Singh *et al.* (2017); Chavan *et al.* (2021). Significantly maximum number of flowers per plant and per meter square was recorded in cv. Intense (11.42 and 102.81/m², respectively) followed by Samara (10.24 and 92.19 cm², respectively), Ankur (9.38 and 84.42/m², respectively) and Balance (9.35 and 84.15/m², respectively) whereas, cv. Shimmer (5.64 and 50.79/m², respectively) produced a minimum number of flowers per plant and per meter square. The increased yield per plant and per square meter in the mentioned

cultivars can be attributed to the robust growth of the plants, including taller plant heights, a greater number of leaves and higher sucker production. These factors contribute to the accumulation of more photosynthates, which, in turn, enhances the overall flower yield. Furthermore, the number of cut flowers per plant increased due to the favourable atmospheric conditions present in the polyhouse, such as temperature and relative humidity control. These conditions facilitate optimal growth and flowering. Ultimately, the flower yield and its associated quality parameters play a crucial role in determining the commercial suitability of a particular cultivar for cultivation. These factors collectively determine the significance of a cultivar in the context of commercial flower production. The results are in accordance with the findings of Chavan *et al.* (2021); Vijayalaxmi *et al.* (2021); Baghele and Pusdekar (2022); Sairam *et al.* (2022).

Table 3: Flower quality and yield characters of different gerbera cultivars.

Cultivar	Flower diameter (cm)	Stalk length (cm)	Stalk girth (mm)	Vase life (days)	Number of flowers per plant per half year	Number of flowers per m ² per half year
Ankur	9.30	55.41	6.38	8.89	9.38	84.42
Atlanta	8.91	54.15	5.23	7.26	8.61	77.52
Balance	10.52	54.37	5.64	7.97	9.35	84.15
Forbes	10.28	57.10	5.65	8.55	6.22	55.98
Goliath	9.10	55.09	5.55	8.16	6.70	60.27
Intense	9.19	55.52	6.52	9.28	11.42	102.81
Samara	9.04	53.62	6.02	7.27	10.24	92.19
Shimmer	8.77	53.61	6.15	8.51	5.64	50.79
Stanza	9.16	52.14	5.86	7.75	8.02	72.21
Tommy	8.95	56.28	6.30	8.77	7.51	67.56
Mean	9.32	54.73	5.93	8.24	8.31	74.79
S.Em±	0.36	0.65	0.22	0.24	0.44	3.96
CD (5%)	1.06	1.95	0.66	0.73	1.31	11.82

CONCLUSIONS

Based on the current findings, it is evident that among the ten gerbera cultivars evaluated under protected cultivation, the cultivar Intense emerged as superior to all others. Cultivar Intense exhibited several notable attributes, including the maximum number of leaves, the highest number of suckers produced per plant, the shortest duration to first flower bud emergence, the quickest flower opening, the maximum stalk girth, an extended vase life, the highest number of flowers produced per plant and per square meter. Meanwhile, the cultivar Balance excelled in terms of leaf length, leaf breadth, leaf area and plant spread, as well as producing a significant number of flowers per plant. These findings highlight the varying strengths and qualities of these gerbera cultivars contributing to the overall understanding of their performance under protected cultivation. Based on the findings of the present study, it can be concluded that the gerbera cultivars Intense, Ankur, Balance and Samara exhibit favourable performance under naturally ventilated polyhouse conditions. Furthermore, these four cultivars are recommended for adoption in commercial cultivation. Growers often opt for four to five cultivars and these cultivars are well suited for such practices as

they offer a range of different colours that consumers prefer for floral arrangements.

Acknowledgement. The Corresponding Author is highly thankful to major advisor, members of advisory committee, all the teaching and non-teaching staff, batch mates and juniors of KRCCCH, Arabhavi for their constant and consistent support during his research work.

Conflict of Interest. None.

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How to cite this article: Shreekanth, R.T. Patil, B. C. Patil, Naveen M. Puttaswamy⁴, A.M. Nadaf and Sachinkumar T. Nandhimath (2024). Evaluation of Gerbera (*Gerbera jamesonii*) Cultivars under Naturally Ventilated Polyhouse. *Biological Forum – An International Journal*, 16(1): 141-145.