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The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; 11(6): 647-650

www.thepharmajournal.com
Received: 08-03-2022
Accepted: 17-04-2022

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Evaluation of gerbera (*Gerbera jamesonii* L.) cultivars grown under fan and pad cooled Polyhouse conditions

RD Baghele and MG Pusdekar

Abstract
The present investigation was carried out to study the performance of seven cultivars of gerbera (*Gerbera jamesonii* L.) under fan and pad cooled Polyhouse condition at Department Floriculture and Landscape Architecture, ASPEE College of Horticulture and Forestry, Navsari Agricultural University, Navsari during 2011-12. Vegetative, flowering and flower characters varied significantly among the cultivars. Among the cv., Stanza was the tallest (47.90 cm), maximum plant spread (51.81cm), number of leaves per plant (30.81), Leaf area (285.61cm^2). With respect to flower characters, cv. Diego having maximum number of suckers per plant (26.8). cv. Fana was the minimum for days to flower bud initiation (68.71 days), days to flower bud development (80.49 days) and days to flower harvesting (90.27 days). cv. Stanza recorded the maximum number of flowers per plant (37.12). Largest flower diameter was found in cv. C. F. Orange (10.38 cm). Maximum stalk length (48.40 cm) was found in cv. Stanza, while stalk diameter (0.96 cm) in cv. Diego. The cv. Stanza possessed longest vase life (10.69 days). Wide variation in flower colour was also observed among the cultivars. Cultivar Stanza expressed best performance on various growth and flower characters followed by other cultivars *viz.* C. F. Orange and Diego.

Keywords: Gerbera, protected cultivation, growth, yield, flower quality

Introduction
Gerbera (*Gerbera jamesonii* L.) belongs to the family Asteraceae commonly known as Transvaal Daisy, Barberton or African daisy is considered as one of the nature's beautiful creations because of its excellent flowers with exquisite shape, size and bewitching colours. Gerbera is one of the important high-value cut flowers used as fresh and dry flower, aesthetic decoration, making of bouquet with high demand in the domestic as well as export market (Singh *et al.* 2017) [11].

Variety in colour has made this flowering plant attractive for use in decorations, such as cut flowers, herbaceous borders, bedding and potted plants for its long vase life. It is a leading flower and ranks among the top ten cut flowers of the world with wider applicability in the flower industry as cut flower and potted plant. It is a dwarf perennial herbaceous plant, growing in clumps with solitary flower heads on long slender stems which grow well above the foliage. The flowers come in wide range of colour including yellow, white, red, orange, pink, maroon, crimson and intermediate shades of these colours.

There is a great demand for gerbera particularly in European markets during winter months and almost throughout the year in India. Since India is situated comparatively closer to major flower consuming countries than its Asian counter parts, it has very good scope and potential in the flower trade, severe winter in major flower producing European countries is also an advantageous factor to India, specially cities like Bangalore, Pune, Hyderabad, Nasik etc. which enjoy moderate climate all through the year besides cheap availability of land and labour has got a great potential for producing gerbera on commercial scale for export as reported by Anop Kumari *et al.* (2010) [1]. Under high temperature conditions, physiological disorder may occur and hence, there is a need of partially controlled environment to grow the crop successfully. In tropical and sub-tropical environment, gerbera can be grown with desired quality under polyhouse conditions with different degrees of climatic control.

Thus in these circumstances several entrepreneurs and nursery men are utilizing this opportunity and are introducing latest and improved gerbera cultivars from abroad for cultivation in the state and elsewhere, locally several reputed companies have also started supplying improved plant materials multiplied through tissue culture techniques. Performance of each gerbera cultivars varies with the region, season and other growing conditions. There is always demand for novel types with high yielding genotypes.

Hence there is need to evaluate new cultivars for their quantitative and qualitative performances and recommending the suitable cultivars for the region. Therefore, the experiment was carried out to appraise the performance of gerbera cultivars under forced ventilated polyhouse with fan-pad cooling system.

Material and Methods

The experiment was carried out under fan and pad cooled Polyhouse at Experiential Learning Centre, Department Floriculture and Landscape Architecture, ASPEE College of Horticulture and Forestry, Navsari Agricultural University, Navsari during 2011-12. The mean maximum temperature during the period of experimentation ranged from 27.0 to 36.6 °C whereas the mean minimum temperature ranged from 15 to 16.1 °C. The mean relative humidity ranged from 45-84 per cent.

The experiment was laid out in Randomized Block Design and replicated for three times. The treatments consist of seven gerbera varieties *viz*., Stanza (Red), Fana (Red), C. F. Gold (Yellow), Diego (Orange), Cherany (Pink), C. F. Orange (Orange), and Lion (Yellow).

The healthy uniform tissue cultured plants were procured from Kumar Florist Bio Plants, Pune were planted on the raised beds by following 30 cm spacing both in between rows and plants. Standard recommended package of practices were followed during the crop growth period with regular nutrient application through fertigation.

Results and Discussion

Growth characteristics

The results obtained from the present investigation on various characters of growth and flowering of gerbera cultivars revealed significant differences among the cultivars with respect to growth characteristics (Table 1). Among the cultivar, Stanza recorded maximum plant height (47.90 cm), followed by C. F. Gold (45.79 cm), whereas the lowest was recorded by cultivar C. F. Orange (40.57 cm). Number of leaves per plant ranges f from 18.54 (cv. C. F. Orange to 30.81 (cv. Stanza). Plant spread was recorded highest in cv. Stanza (51.81 cm) followed by cv. Diego (48.79 cm) while the lowest was recorded under cv. Lion (42.20 cm). Variation in plant spread was due to the inherent genetic character of the individual cultivar and also it depends upon the leaf length and leaf breadth of the cultivars as reported by Anop Kumari *et al.* (2010) [1] and Bhosale *et al.* (2012) [6] in gerbera. Stanza recorded maximum leaf area (285.61 cm), followed by C. F. Gold (245.02 cm), whereas the lowest was recorded by cultivar C. F. Orange (118.29 cm).

Table 1: Plant growth characters of gerbera cultivars grown under fan and pad cooled Polyhouse

Treatment	Plant height (cm)	Plant spread (cm)	Number Leaves per plant	Leaf area (cm^2)
C. F. Gold	45.79	45.38	29.45	245.02
Diego	41.86	48.79	27.51	238.14
Stanza	47.90	51.81	30.81	285.61
Cherany	42.56	47.13	26.84	175.94
C.F. Orange	40.57	42.52	18.54	118.29
Fana	42.68	44.75	22.87	226.65
Lion	43.20	42.20	20.94	212.12
S.Em±	1.37	1.30	1.80	16.07
CD at 5%	4.23	4.01	5.55	49.53

The data presented in Table 2 the maximum number of suckers per plant were produced by cv. C. F. Gold (26.25) followed by cv. Stanza (24.94) while the minimum were produced by cv. C. F. Orange (14.48). The cultivars which produced higher number of leaves per plant exhibited greater plant spread and produced higher number of suckers per plant compared to other cultivars which is in accordance with the results of Chobe *et al.* (2010) [7] in gerbera.

The data regarding flowering characters varied significantly among the cultivars. Significantly, the cv. Fana was taken minimum days to flower bud initiation, days to flower bud development and days to flower harvesting (68.71, 80.49 and 90.27 days) respectively, which is at par with cv. Lion (69.36,83.31 and 92.18 days) respectively, while cv. Diego was delay (80.73, 94.56 and 105.84 days) from planting to full bloom.

Since early and late flowering characters are genetically controlled and this variation might be attributed to the inherent varietal character of the cultivars as have been reported by Dalal *et al.* (2005) [8], Vasudevan and Rao (2010). Due to this, the cultivars *viz*., Fana, Lion, Stanza, Cherany and C. F. Orange were grouped as early flowering due to their minimum duration requirement for harvesting 90.27 to 97.51 days. The cultivars C. F. Gold and Diego were came in the group of late flowering as they took more than 100 days.

Floral characters

Table 2: Sucker per plant and days to flowering of gerbera cultivars grown under fan and pad cooled Polyhouse

Treatment	Numbers of suckers per plant	Days to flower bud initiation (days)	Days to flower bud development (days)	Days to flower harvesting (days)
C. F. Gold	15.61	78.51	92.47	103.63
Diego	26.25	80.73	94.56	105.84
Stanza	24.94	70.52	83.19	92.73
Cherany	21.45	71.35	85.48	95.68
C.F. Orange	18.36	75.12	87.60	97.51
Fana	19.21	68.71	80.49	90.27
Lion	14.48	69.36	83.31	92.18

S.Em±	1.45	0.70	0.89	1.23
CD at 5%	4.47	2.16	2.75	3.78

Flower quality plays an important role in both international and domestic flower market which decides the price and flower longevity it have been reported by Sridhar and Biradar (2016) [12]. Cut flower parameters such as flower diameter, stalk length and stalk diameter revealed significant variation among the cultivars as shown in Table 3.

Table 3: Flower per plant and quality characters of gerbera cultivars grown under fan and pad cooled Polyhouse

Treatment	No. of flower per plant	Flower diameter (cm)	Stalk length (cm)	Stalk diameter (cm)	Vase life (days)
C. F. Gold	29.64	10.19	45.57	0.84	10.40
Diego	32.84	9.34	40.62	0.96	9.72
Stanza	37.12	10.33	48.40	0.75	10.69
Cherany	28.67	7.42	38.36	0.84	9.45
C.F. Orange	35.45	10.38	46.51	0.90	8.67
Fana	26.48	8.15	40.47	0.78	9.32
Lion	28.67	9.54	41.48	0.69	8.64
S.Em±	2.09	0.62	1.29	0.05	0.53
CD at 5%	6.43	1.93	3.96	0.15	1.63

Stanza produced maximum number of flowers per plant (37.12) and it was followed by cv. C.F. Gold (35.45) and Diego (32.84) while the minimum was in cv. Fana (26.48). The increase in flower yield may be attributed to the greater leaf area and more number of suckers and leaves per plant as well as plant spread which might have resulted in production and accumulation of maximum photosynthates, ultimately resulting in more number of flowers with bigger size. This was in accordance to the findings of Habibah *et al.* (2008) [9], Barooah and Talukdar (2009) [5]. The flower diameter showed significant variation among the gerbera cultivars and maximum flower diameter was recorded from C. F. Orange (10.38 cm) and Stanza (10.33 cm) which was followed by cv. Lion (9.54cm) and Diego (9.34cm) while minimum was recorded with Cherany (7.42 cm).

Stalk length is a very important quality character for gerbera cut flower and it indicates more reserved food in the stalk which will later be available to the flower for longer period. Further, being a genetic factor stalk length varied among the cultivars tested in the study and the similar was noted in earlier works (Ahlawat *et al*., 2012; Sarmah *et al*., 2014) [2, 10]. The longest stalk length of gerbera was found in Stanza (48.40 cm) and it was followed by cv. C. F. Orange (46.51cm) while the shortest was found with the cv. Cherany (38.36 cm). The maximum stalk diameter of gerbera was found in Diego (0.96 cm) and it was followed by cvs. C. F. Orange (0.90 cm) while the minimum was found with the cv. Lion (0.69 cm).

Shelf life of cut flower is an important trait which decides its longevity in vase as well as in decorations. Maximum vase life was recorded in cv. Stanza (10.69 days) followed by C. F. Gold (10.40 days) and minimum vase life was recorded in cv. Lion (8.64 days) and C. F. Orange (8.67 days). The variation in vase life of different cultivars of gerbera might be attributed to genetic variability and also the stalk length and stalk diameter which will have stored food material. The cultivar Primrose due to its long vase life could be a very popular choice in the wholesale market. The results are in accordance to the findings of Amiri *et al.* (2009) [3] Anil Kumar *et al.* (2010) [4]. In general, vase life of flower greatly depends on the general condition of the mother plant. The varieties which exhibit longer vase life might possess better water uptake capacity and higher accumulation of metabolic sugars (reducing and non-reducing) in the plant as well as in the flower stalk.

Conclusion

The experiment clearly indicated that Stanza resulted in the maximum flower with satisfactory flower quality which was closely followed by the cultivars C. F. Orange and Diego. From the present study, it may be concluded that the gerbera cultivar Stanza, C. F. Orange and Diego may be chosen under fan and pad cooled Polyhouse condition. Also these three varieties are recommended for adoption as grower usually takes four to five verities for commercial cultivation due to the reason that consumer prefers different colour varieties for arrangements.

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