Performance of cut flower varieties of gladiolus under plain zone of Maharashtra

SD GAIKWAD, BV GONDALI*, MB SHETE and RD BANSOD

All India Coordinated Research Project on Floriculture
Zonal Agricultural Research, Station, Ganeshkhind, Pune 411067 Maharashtra, India
*Email for correspondence: gondhalibv187@gmail.com

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ABSTRACT

Performance of seven gladiolus varieties was evaluated on vegetative as well as floral parameters under plain zone of Maharashtra. The results revealed that Arka Manorama (112.71 cm) and Phule Neelrekha (103.93 cm) proved best performers for plant height; Phule Neelrekha (80.56 days), Punjab Glad-2 (80.44 days), Arka Manorama (79.44 days), G-11 (78.22 days) and G-12 (76.22 days) for days to spike emergence; Sancerre (91.44 days) and Pusa Sinduri (92.45 days) for time taken to 50 per cent flowering; Phule Neelrekha for spike length (96.19 cm), rachis length (58.73 cm) and number of florets per spike (18.67); Sancerre (10.19 cm) and Punjab Glad-2 (9.91 cm) for floret diameter; Phule Neelrekha (5.13), Sancerre (4.84), Pusa Sinduri (4.28) and G-12 (4.07) for number of florets remained open at a time; Sancerre and G-12 (2.42 each) for number of spikes per plant; Sancerre (1.69 cm) for cut spike diameter and Phule Neelrekha (8.00 days) and Sancerre (7.47 days) for vase life. Among the different tested genotypes, Phule Neelrekha proved best for spike length, rachis length and number of florets per spike. It also figured among the top genotypes for days to spike emergence, floret diameter, number of florets remained open at a time and vase life. However, Arka Manorama was best among the genotypes for plant height (112.7 cm) and Sancerre (1.69 cm) for cut spike diameter. These genotypes are suitable for cultivation under the agro-climatic situation of plain zone of Maharashtra.

Keywords: Gladiolus; florets; spike; rachis; genotype; vase life

INTRODUCTION

Gladiolus (*Gladiolus grandiflora* L) (Iridaceae) is one of the important flowering plants cultivated worldwide. It is a commercial flower and is very popular as cut flower both in domestic and international markets (Singh et al 2017a). It is known as the 'queen of bulbous flowering plants' (Singh et al 2017b). It is believed to be originated from South Africa from where it was introduced in India during seventieth century by British rulers. Gladiolus flowers not only offer aesthetical beauties, but also have become a commercial object. Its white fragrant floral spikes are used for making bouquets, flower arrangements and decoration for religious and auspicious purposes while double-typed floral spikes are mainly used as cut flowers for various purposes. It has gained popularity all over the world as one of the main decorative flowers. The market value of its cut flowers for bouquets and other floral arrangement is increasing day by day due to its long vase life and economic value (Sharma and Sharga 1998). Gladiolus is grown from corms which have one or more buds. Flowering buds emerge into leaves and flowering spikes and during the growth period its leaves and spikes form a new daughter corm form at the base of these leaves. It occupies eighth position in the world cut flower trade and has a global history. The major producing countries are United States (Florida and California), Holland, Italy, France, Bulgaria, India and Israel (Riaz et al 2007).

In India, cultivation of flower crops covered around 278 thousand hectares, with an average production of 2184 thousand MT and average productivity was 8 MT per ha (Anon 2023). The commercial cultivation of gladiolus is mainly concentrated in Maharashtra, West Bengal, Assam, Karnataka, Tamil Nadu, Kerala, Uttar Pradesh,

Uttaranchal, Punjab, Haryana, Sikkim, Jammu and Kashmir, Gujarat, Himachal Pradesh, Madhya Pradesh and Rajasthan (Singh et al 2020). Agro-climatic conditions of Pune district of Maharashtra state are suitable for cultivation of gladiolus and have great potential for its cultivation (Ghadage 2020).

There is heavy demand of flowers during marriage ceremonies, festivals and other social functions. There is a large gap between supply and demand of flowers and the local growers can take advantage of it. The location specific assessment of gladiolus genotypes provides opportunities for improvement of quality traits of flowers for breeding programmes to improve the yield and quality. In the context of agro-climatic situation of Pune region of Maharashtra, the available information is very scanty and not enough. The present investigations were undertaken to assess the seven genotypes of gladiolus and the variability present among them.

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MATERIAL and METHODS

The experiment was conducted at All India Co-ordinated Research Project on Floriculture, Zonal Agricultural Research Station, Ganeshkhind, Pune, Maharashtra during the year 2018-19, 2019-20 and 2020-21 in randomized block design with seven treatments comprising seven genotypes of gladiolus G-11, G-12, Arka Manorama, Pusa Sinduri, Punjab Glad-2, Phule Neelrekha and Sancerre replicated thrice.

The experimental site was located at 18.5204° N latitude and 73.8567° E longitude at an altitude of 560 m amsl on the western margin of the Deccan plateau. The climate of experimental site was sub-tropical characterized with moderate precipitation, hot and dry summer and cold winter with maximum yearly rainfall (about 90%) received due to southwest monsoon during June to October and the months of December to February receiving occasional and light winter showers.

The experimental plot was brought to fine tilth by ploughing, clod crushing and harrowing. At the time of land preparation, well rottened FYM @ 30 tonnes per ha was mixed uniformly in the soil before last harrowing. The field was then laid out with ridge beds of 1.80 m x 1.50 m dimension. As per the treatment, uniform and healthy bulbs of tuberose were planted in the prepared plots at a spacing of 30 cm x 30 cm. N:P:K 300:200:200 kg per ha was applied. Half dose of N ie 150 kg nitrogen was applied in the form of urea before planting of bulbs and the remaining half dose was top dressed 30, 60 and 90 days after planting. The full dose of 200 kg phosphorus and 300 kg potassium per ha was applied in the form of single super phosphate and muriate of potash respectively at the time of transplanting. All the cultural operations such as weeding, irrigation, plant protection etc were carried out as and when required.

The observations were taken from five randomly selected plants for recording various vegetative and floral characteristics viz plant height, days to flowering, spike length, rachis length, number of florets open at a time, number of florets per spike, number of spikes per plant and vase life. The data were statistically analyzed as per Panse and Sukhatme (1985).

RESULTS and DISCUSSION

The findings of the research work conducted on the basis of three year experimentation during 2018-19, 2019-20 and 2020-21 on the screening of seven gladiolus genotypes revealed that there existed differences in vegetative and floral characteristics of the genotypes (Table 1).

The genotype Arka Manorama recorded maximum plant height (112.71 cm) followed by Phule Neelrekha (107.62 cm). Minimum plant height was observed in G-12 (86.36 cm) and Punjab Glad-2 (90.24 cm), the two bein statistically at par.

Phule Neelrekha (80.56), Punjab Glad-2 (80.44), Arka Manorama (79.44), G-11 (78.22) and G-12 (76.22) took maximum days to spike emergence and were at par with one another. On the other hand, Pusa Sinduri, Sancerre and G-12 were at par with one another for minimum number of days taken for spike emergence (72.89, 74.89 and 76.22 respectively).

Minimum days to 50 per cent flowering were taken by Sancerre (91.44) and Pusa Sinduri (92.45), which were at par and maximum by Arka Manorama (99.22) and G-11 (97.11), the two being at par.

Spike length was observed maximum (96.19 cm) in Phule Neelrekha and minimum (66.34 cm) in G-12.

Rachis length was maximum in Phule Neelrekha (58.73 cm) followed by Arka Manorama (48.45 cm) and minimum in G-12 (30.17 cm). Sancerre (10.19 cm) and Punjab Glad-2 (9.91 cm) were at par for maximum floret diameter. On the other hand, minimum floret diameter was observed in G-11 (8.29 cm).

Maximum number of florets remained open at a time (5.13, 4.84, 4.28 and 4.07) was observed in

Table 1. Vegetative and floral characteristics of different genotypes of gladiolus (2018-19 to 2020-21)

Variety	Plant height (cm)				Days to spike emergence			
	2018-19	2019-20	2020-21	Pooled mean	2018-19	2019-20	2020-21	Pooled mean
G-11	90.00	95.18	92.85	92.68	81.00	80.00	73.67	78.22
G-12	88.33	86.54	84.21	86.36	79.00	75.67	74.00	76.22
Arka Manorama	115.33	112.56	110.23	112.71	79.33	78.33	80.67	79.44
Pusa Sinduri	103.00	102.24	99.90	101.71	74.00	72.33	72.33	72.89
Punjab Glad-2	90.33	91.36	89.03	90.24	80.00	80.00	81.33	80.44
Phule Neelrekha	112.67	106.27	103.93	107.62	77.67	80.67	83.33	80.56
Sancerre	107.78	101.95	99.62	103.12	73.00	74.67	77.00	74.89
SE(m)±	2.75	1.74	1.74	1.33	0.79	1.30	1.79	1.43
$CD_{0.05}$	8.41	5.32	5.32	4.15	2.41	3.99	5.49	4.47

Table 1. Contd …..

Variety	Days to 50% flowering				Spike length (cm)			
	2018-19	2019-20	2020-21	Pooled mean	2018-19	2019-20	2020-21	Pooled mean
G-11	98.33	98.67	94.33	97.11	68.67	68.75	66.78	68.07
G-12	96.67	95.33	95.33	95.78	66.33	67.33	65.37	66.34
Arka Manorama	97.33	99.67	100.67	99.22	83.67	84.80	84.38	84.28
Pusa Sinduri	92.67	92.00	92.67	92.45	83.50	83.69	81.72	82.97
Punjab Glad-2	93.67	94.67	96.00	94.78	71.33	71.45	68.69	70.49
Phule Neelrekha	93.00	95.00	95.00	94.33	98.27	96.14	94.17	96.19
Sancerre	90.33	92.00	92.00	91.44	92.64	91.54	89.58	91.25
SE(m)±	1.04	1.23	1.24	0.82	3.33	1.33	1.36	0.49
$CD_{0.05}$	3.17	3.77	3.79	2.55	10.21	4.08	4.18	1.51

Table 1. Contd …..

Variety	Rachis length (cm)				Floret diameter (cm)			
	2018-19	2019-20	2020-21	Pooled mean	2018-19	2019-20	2020-21	Pooled mean
G-11	34.00	34.68	33.89	34.19	8.43	8.50	7.93	8.29
G-12	28.00	31.76	30.76	30.17	9.30	9.30	9.43	9.34
Arka Manorama	49.00	48.80	47.54	48.45	8.90	8.97	9.10	8.99
Pusa Sinduri	41.50	42.02	41.35	41.62	9.07	9.17	9.33	9.19
Punjab Glad-2	39.67	38.65	37.32	38.55	9.83	9.87	10.03	9.91
Phule Neelrekha	60.23	58.10	57.87	58.73	9.67	9.70	9.83	9.73
Sancerre	45.91	45.54	45.88	45.78	10.24	10.17	10.17	10.19
SE(m)±	34.00	0.90	1.41	0.62	0.19	0.11	0.21	0.09
$CD_{0.05}$	5.56	2.75	4.32	1.93	0.58	0.34	0.64	0.28

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Variety	Number of florets remained open at a time				Number of spikes/plant			
	2018-19	2019-20	2020-21	Pooled mean	2018-19	2019-20	2020-21	Pooled mean
G-11	5.00	2.33	2.73	3.35	2.33	2.00	2.00	2.11
G-12	4.33	4.00	3.87	4.07	2.67	2.30	2.30	2.42
Arka Manorama	4.00	3.00	2.60	3.20	1.00	1.07	1.07	1.05
Pusa Sinduri	4.83	4.00	4.00	4.28	1.50	1.43	1.43	1.45
Punjab Glad-2	4.67	3.00	2.97	3.55	1.67	1.63	1.63	1.64
Phule Neelrekha	5.33	5.33	4.73	5.13	1.67	1.50	1.50	1.56
Sancerre	6.84	4.00	3.67	4.84	2.51	2.37	2.37	2.42
SE(m)±	0.61	0.54	0.23	0.36	0.34	0.08	0.08	0.05
$CD_{0.05}$	1.87	1.64	0.70	1.11	1.05	0.23	0.23	0.16

Table 1. Contd …..

Variety	Number of florets/spike				Cut spike diameter (cm)				Vase life (days)			
	2018-19	2019-20	2020-21	Pooled mean	2018-19	2019-20	2020-21	Pooled mean	2018-19	2019-20	2020-21	Pooled mean
G-11	13.67	14.00	13.00	13.56	1.40	1.40	1.33	1.38	6.00	5.00	5.43	5.48
G-12	11.67	13.00	12.00	12.22	1.30	1.30	1.20	1.27	6.33	6.33	6.73	6.46
Arka Manorama	15.33	15.33	14.00	14.89	1.33	1.37	1.30	1.33	5.33	5.33	6.00	5.55
Pusa Sinduri	15.67	15.67	14.67	15.34	1.43	1.40	1.40	1.41	4.33	4.67	4.63	4.54
Punjab Glad-2	15.67	15.00	13.67	14.78	1.40	1.43	1.40	1.41	6.00	5.67	5.20	5.62
Phule Neelrekha	19.33	18.67	18.00	18.67	1.40	1.43	1.43	1.42	9.67	7.33	7.00	8.00
Sancerre	16.72	17.00	17.33	17.02	1.73	1.70	1.63	1.69	8.67	6.67	7.07	7.47
SE(m)±	0.98	0.51	0.62	0.31	0.09	0.04	0.07	0.02	0.28	0.56	0.34	0.39
$CD_{0.05}$	3.00	1.56	1.89	0.95	N/A	0.13	0.22	0.05	0.85	1.70	1.05	1.22

Phule Neelrekha, Sancerre, Pusa Sinduri and G-12 respectively, which were at par and minimum number was observed in Arka Manorama (3.20), G-11 (3.35), Punjab Glad-2 (3.55), G-12 (4.07) and Pusa Sinduri (4.28) respectively, the four being at par.

Maximum number of spikes per plant (2.42 each) was observed in Sancerre and G-12 and minimum in Arka Manorama (1.05).

Phule Neelrekha resulted in maximum number of florets per spike (18.67) followed by Sancerre (17.02), whereas, minimum number was observed in G-12 (12.22).

Sancerre gave maximum cut spike diameter (1.69 cm) and G-12 (1.27 cm) the minimum.

Phule Neelrekha and Sancerre showed maximum vase life of 8.00 and 7.47 days respectively and were at par. Minimum vase life was observed in Pusa Sinduri (4.54 days), G-11 (5.48 days), Arka Manorama (5.55 days) and Punjab Glad-2 (5.62 days) and were at par with one another.

From the above results, it is inferred that Arka Manorama (112.71 cm) and Phule Neelrekha (103.93 cm) proved best performers for plant height; Phule Neelrekha (80.56 days), Punjab Glad-2 (80.44 days), Arka Manorama (79.44 days), G-11 (78.22 days) and G-12 (76.22 days) for days to spike emergence; Sancerre (91.44 days) and Pusa Sinduri (92.45 days) for time taken to 50 per cent flowering; Phule Neelrekha for spike length (96.19 cm), rachis length (58.73 cm) and number of florets per spike (18.67);

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Sancerre (10.19 cm) and Punjab Glad-2 (9.91 cm) for floret diameter; Phule Neelrekha (5.13), Sancerre (4.84), Pusa Sinduri (4.28) and G-12 (4.07) for number of florets remained open at a time; Sancerre and G-12 (2.42 each) for number of spikes per plant; Sancerre (1.69 cm) for cut spike diameter and Phule Neelrekha (8.00 days) and Sancerre (7.47 days) for vase life.

Chopde et al (2012) evaluated eight varieties of gladiolus for flower and corm production under Vidarbha, Maharashtra and observed significantly minimum period for the first spike emergence, opening of first pair of florets and 50 per cent flowering in Phule Tejas, while, spike yield per plant of gladiolus was found to be the highest in variety Psittacinus hybrid. Spike quality parameters such as length of spike, length of rachis and florets per spike were found to be the maximum in Phule Ganesh and the maximum diameter of spike was noticed in variety Nova Lux. Significantly the maximum longevity of flowers on plant was noticed in Phule Neelrekha. The corm yield of gladiolus in respect of numbers was the maximum in Psittacinus hybrid and maximum diameter of corm and weight of corm per plant were found superior in Nova Lux and cormels produced per plant and their weight were noted maximum in Phule Ganesh.

Gawali et al (2012) studied the performance of eight gladiolus varieties under Nagpur, Maharashtra conditions and revealed that earlier sprouting and 50 per cent sprouting of corms were seen in Phule Neelrekha, while, the maximum sprouting of corms and sprouts per corm were noticed in Phule Ganesh and Pisttacinus hybrid respectively. Maximum height of plants and leaves per plant were noticed in Nova Lux and Phule Neelrekha respectively. Spike yield per plant and per hectare were found to be maximum in Pisttacinus hybrid. Significantly more length of spikes and florets per spike were recorded in Phule Ganesh. Maximum vase life was noticed in Monte Alto which was at par with Phule Ganesh.

Ghadage (2020) evaluated ten different varieties of gladiolus at Talegaon, Maharashtra and reported that early sprouting of corms (4.00 days), maximum diameter of corms (23.39 cm), maximum length of spike (88.61 cm), maximum number of florets per spike (13.47) and maximum vase life (11.47 days) were recorded in variety Phule Ganesh, while maximum number of sprouted corms (19.78) and sprouting percentage (98.89%) were noticed in variety Phule Tejas. The maximum number of leaves per plant (12.97), maximum number of spikes per plant (2.33) and maximum yield in terms of number of spikes per ha (3.45 lakhs) were noticed in variety G-11. The variety Rose Supreme recorded minimum days to first spike emergence (45.40 days) while variety Phule Prerana produced maximum number of cormels (138.87). Thus Phule Ganesh recorded early sprouting, bigger size corms, longer spike, more florets per spike and longer vase life.

Kadam et al (2020) evaluated 34 gladiolus varieties/cultivars at Pune, Maharashtra and found that cultivars Suchitra (113.37 cm), Arka Amar (110.73 cm), Melody Open (105.50 cm), Phule Ganesh (102.84 cm) and Phule Neelrekha (102.54 cm) were found superior for spike length. Maximum rachis length was recorded in cultivars Melody Open (71.06 cm), Sweta (68.32 cm), Phule Ganesh (67.60 cm), Suchitra (65.92 cm), Phule Neelrekha (64.39 cm) and Pusa Kiran (62.22 cm). The maximum number of florets was recorded in cultivars Pusa Urmi (19.56), Pusa Suhagin (19.55), Subhangani (19.00), Suryakiran (18.56), Ps Hybrid 40 (18.22) and Phule Neelrekha (18.11).

Ainarkar et al (2023) evaluated qualitative and quantitative characters of ten gladiolus varities at Dapoli, Maharashtra and found that early spike emergence (54.91 days), maximum spike length (96.12 cm), maximum Inter-floret length (5.49 cm), maximum number of florets per spike (14.43), minimum days required for flowering (65.54 days), maximum number of florets opened at a time (7.78), maximum number of spikes per hectare (3.23 lacs) and maximum number of corms per hectare (2.41 lacs) were recorded in variety Phule Neelrekha, while maximum floret diameter (8.93 cm) and maximum floral duration (24.67 days) were recorded in IIHR-G-12. The variety Phule Neelrekha was suitable in respect of quality parameters of gladiolus spikes under Konkan conditions.

CONCLUSION

The study revealed that among the different tested genotypes, Phule Neelrekha proved best for spike length (96.19 cm), rachis length (58.73 cm) and number of florets per spike (18.67). It also figured among the top genotypes for days to spike emergence, floret diameter, number of florets remained open at a time and vase life. However, Arka Manorama was best among the genotypes for plant height (112.7 cm)

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and Sancerre (1.69 cm) for cut spike diameter. These genotypes are suitable for cultivation under the agro-climatic situation of plain zone of Maharashtra.

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