



ISSN (E): 2277-7695

ISSN (P): 2349-8242

NAAS Rating: 5.23

TPI 2023; 12(7): 909-912

© 2023 TPI

www.thepharmajournal.com

Received: 22-04-2023

Accepted: 25-05-2023

Maqem Nazir

Division of Floriculture and Landscaping, SKUAST-Jammu, Chatha, Jammu, Jammu and Kashmir, India

Sheetal Dogra

Division of Floriculture and Landscaping, SKUAST-Jammu, Chatha, Jammu, Jammu and Kashmir, India

RK Pandey

Division of Floriculture and Landscaping, SKUAST-Jammu, Chatha, Jammu, Jammu and Kashmir, India

Subash Kashyap

Division of Plant Breeding and Genetics, SKUAST-Jammu, Chatha, Jammu, Jammu and Kashmir, India

Nomita Laishram

Division of Floriculture and Landscaping, SKUAST-Jammu, Chatha, Jammu, Jammu and Kashmir, India

Arvinder Singh

Division of Floriculture and Landscaping, SKUAST-Jammu, Chatha, Jammu, Jammu and Kashmir, India

Ali Haider Shah

Division of Floriculture and Landscaping, Dr. Y.S Parmar University of Horticulture and Forestry, Nauni, Solan, Himachal Pradesh, India

Corresponding Author:

Sheetal Dogra

Division of Floriculture and Landscaping, SKUAST-Jammu, Chatha, Jammu, Jammu and Kashmir, India

Genetic variability in gladiolus with respect to vegetative and floral characters

Maqem Nazir, Sheetal Dogra, RK Pandey, Subash Kashyap, Nomita Laishram, Arvinder Singh and Ali Haider Shah

Abstract

The present investigation was carried out at Experimental Farm, Division of Vegetable Science & Floriculture, Sher-e-Kashmir University of Agricultural Sciences and Technology, Chatha during 2018-19 to study the variability studies in Gladiolus (*Gladiolus grandiflorus* L.). The experiment was laid out in a Randomized Block Design with three replications. Twenty-five genotypes of gladiolus were evaluated for 21 yield and flowering related traits to study their genetic parameters. Analysis of variance for all the traits showed significant differences among genotypes for all the flower and yield related traits. High range in mean performance has been observed for traits, viz. plant height (79.13 cm - 125.10 cm), no. of leaves (5.00 - 8.00), leaf area (61.00 cm² - 114.47 cm²), number of florets per spike (8.60 to 14.73), spike length (59.13 cm - 105.10 cm), Rachis length (33.63 cm - 71.90 cm), durability of first floret (4.60 - 8.63 days), flower duration (12.07-17.83 days), stem diameter (5.50 cm to 15.70 cm), floret size (4.36 cm to 7.26 cm), vase life (7.10 to 9.96 days), chlorophyll content (41.90 - 58.59), number of corms (1.66 - 3.66), weight of corm per plant (11.63 g - 36.63 g), diameter of corm (3.26 cm - 5.43 cm), numbers of cormels per plant (11.20 - 22.80).

Keywords: Gladiolus grandiflorus, genotypes, genetic variability, genetic advance

Introduction

Gladiolus (*Gladiolus grandiflorus* L.), the queen of the bulbous ornamentals, is the leading geophytes grown worldwide for cut flower trade and garden displays. It occupies 5th place in international cut flower trade among the geophytes in international florist trade and first in domestic bulbous flower trade (Butt *et al.*, 2015, Wani *et al.* 2016, 2018) [3, 13, 14] India has suitable agro-climatic conditions for gladiolus cultivation, it is being grown over an area of 11660 ha with a production of 106 Crore spikes (agricoop.nic.in).

There are about 260 species of the gladiolus, out of these 250 species are native to sub-Saharan Africa, mostly South Africa and about 10 species are native to Eurasia (Goldblatt *et al.*, 2001) [6]. The modern hybrids have been derived from at least 12 species which are now called as *Gladiolus grandiflorus* (Wilfret, 1980) [15]. The large diversity available among species has not been adequately exploited. Improvement of any crop is a continuous process and in gladiolus also there is scope to improve the existing cultivars or genotypes. Large number of gladiolus genotypes are grown, however their performance depends upon the climatic conditions of the region under which they are grown (Swaroop and Janakiram, 2010) [12].

Variability in a population with respect to characters is a pre-requisite for a successful breeding programme. A huge amount of variability exists in this crop with respect to shape, growth habit, flowering behaviour, yield of spikes and quality. So, present study was undertaken to assess genetic variability for vegetative and floral characters.

Materials and Methods

Experimental material consisting of twenty five genotypes planted in Randomized Block Design (RBD) with three replications in a plot size of 1.20 m x 1.20 m at spacing of 20cm x 30cm on 22nd October, 2018 at the experimental farm of Division of Vegetable Science and Floriculture, Faculty of Agriculture, Sher-e-Kashmir University of Agricultural Sciences and Technology of Jammu, Chatha, Jammu during Rabi 2018-2019. Recommended package of practices and plant protection measures were followed for healthy crop growth during the season. Observations were recorded on twenty one parameters at appropriate stages of plant growth from five randomly selected plants in each plot from each replication.

Results and Discussion

The results obtained from the present investigation on various parameters exhibited significant differences among the genotypes.

Vegetative characters

A highly significant difference was observed for days taken to sprouting. Number of days taken to sprouting ranged between 4.00 days in Punjab Dawn to 11.00 days in Chinon. Earlier sprouting might be due to differential genetic capabilities, temperature requirements, dormancy and stored food reserve, which resulted in different sprouting times under prevailing agro-climatic conditions (Bhat *et al.*, 2017) [1]. Variation in days to sprouting in different genotypes has also been reported by Saifullah and Ahmed (2001) [10] and Nair and Shiva (2003) [8]. A significant difference in plant height at different stages of growth was also observed. Plant height is attributed to be an important vital character that depends upon the genetic constitution. Maximum plant height (134.10 cm) was observed in Jyotsana while the minimum was recorded in Punjab Lemon Delight (79.13 cm). The variation in the plant height among the various genotypes might be due to genotypic differences in phenotypic expression of plant height and variation in different genotype-environmental interaction effects. These findings are in accordance with Kumar and Yadav (2005) [7]. Significant difference was also observed for number of leaves per plant and leaf area. Highest numbers of leaves per plant (6.00) were recorded in sixty four per cent of genotypes studied. Maximum leaf area (114.47 cm²) was recorded in Eurovision while the minimum (61.00 cm²) was obtained in CPG. The findings are in agreement with those of Swaroop *et al.*, (2010) [12], Kumar and Yadav (2005) [7] and Chourasia *et al.*, (2015) [4]. Highest value for stem diameter was observed in Eurovision (7.33 mm) while the lowest was recorded in Chinon (5.50 mm). These results are in conformity with the earlier findings of Nazir and Dwivedi (2003) [9] in gladiolus. Many other works have reported variation among growing characters among different genotypes of gladiolus (Kumar *et al.*, 2005 and Sarkar and Chakrabarty 2014) [5, 11].

Floral Characters

All the genotypes responded differentially to various floral

traits. Earliest spike emergence was recorded in Chandani (85.80 days) whereas Mascagni took maximum number of days (123.28). Time required for spike emergence is an important varietal character in gladiolus that might be primarily governed by the genetic makeup of the genotypes. Spike emergence might have been primarily dependent on food reserves in plant that could be related to growth rate of plants regulating accumulation of the requisite level of carbohydrates for slipping. Similar results on differences for spike emergence among different genotypes have been reported by Bhat *et al.* (2009) [2] and Kumar and Yadav (2005) [7]. Days taken to bud showing colour and opening of first floret was observed earliest in Bindiya (103.02 and 106.94 days, respectively) and late in Mascagni (136.25 days and 142.70 days, respectively). Durability of first floret ranged between 4.60 to 8.63 days. It was observed maximum in Punjab Lemon Delight (8.63 days) and minimum in Pusa Kiran (4.60 days). Our results are similar to the findings of Chourasia *et al.*, (2015) [4]. Highest spike length (105.10 cm), rachis length (71.90 cm) and number of florets per spike was observed in Sunayana, Eurovision and Blue Tropic, respectively while Punjab Lemon Delight exhibited lowest spike and rachis length (59.13 cm and 33.63cm, resp.). The length of lowering period could be dependent upon carbohydrate reserve of the plants as blooming is an energy dependent process. The variation in spike length could be due to the differences among the genotypes for number of nodes and internodal length. The results indicated that rachis length was closely associated with other morphological characters like plant height, spike length, number of florets per spike. Similar results were revealed by Kumar and Yadav (2005) [7], Kumar and Yadav (2005) [7], and Chourasia *et al.*, (2015) [4]. Floret size ranged between (8.56 cm to 11.03 cm). Maximum floret size was observed in Eurovision (11.03 cm) while the minimum was recorded in Berlew (8.56 cm). The variation in floret size might be due to hereditary traits of different genotypes. Our results also find support from findings of Kumar and Yadav (2005) [7]. Vase life period ranged between 7.10 days in Peter Pears to 9.96 days in Pusa Kiran (13.96). Das *et al.*, (2014) [5] worked on the performance of gladiolus cultivars reported the same variation regarding vase life of gladiolus spikes.

Table 1: Mean performance of twenty five gladiolus genotypes for different characters

Sl. No.	Genotypes	Days taken to sprouting	Plant Height (cm)	Number of leaves	Leaf area (cm ²)	Days taken to spike emergence	Days taken to bud showing color	Days taken to opening of first floret
1	Chandani	5.00	106.50	5.33	84.14	85.80	105.80	113.20
2	Punjab Dawn	4.00	95.13	5.00	99.27	99.10	115.70	122.40
3	Punjab Glance	5.66	88.30	6.00	82.73	88.90	120.03	127.46
4	Pune Hybrid	6.00	118.00	7.66	82.00	103.53	127.03	133.70
5	CPG	5.33	104.13	6.00	61.00	115.20	131.46	137.06
6	Punjab Lemon Delight	4.33	79.13	5.00	99.93	96.60	117.50	124.50
7	Yellow Stone	7.33	116.30	5.33	99.26	94.30	115.89	125.52
8	Novalux	4.00	102.30	5.66	100.00	100.60	118.20	125.10
9	Blue Tropic	8.00	124.00	5.33	82.20	109.73	125.73	130.76
10	Oscar	6.00	115.80	5.66	90.75	111.73	120.04	129.63
11	Chinon	11.00	116.63	5.66	99.07	111.53	130.03	135.13
12	White Prosperity	6.00	119.13	5.33	94.93	116.66	131.00	136.00
13	Pusa Srijana	6.00	120.00	5.66	104.20	101.43	121.16	125.26
14	Berlew	5.00	119.13	5.33	103.17	100.73	109.36	110.20
15	Jyotsana	5.00	120.00	8.00	86.53	95.60	114.50	121.20
16	Bindiya	7.00	103.30	6.00	81.93	85.90	102.02	106.94
17	Urmi	7.66	115.63	6.33	89.43	85.93	109.03	116.23

18	Sunanya	5.00	125.10	6.33	111.53	90.50	110.00	117.60
19	Pusa Kiran	5.00	119.13	5.33	84.00	97.53	116.70	124.20
20	Shabnam	5.00	123.00	7.66	83.60	88.10	111.60	119.50
21	Surya Kiran	7.66	111.63	5.66	83.80	98.40	115.20	124.30
22	Eurovision	8.33	115.60	6.66	114.47	106.30	125.80	132.10
23	Dhanvantri	5.66	103.30	5.33	93.43	91.63	109.86	117.70
24	Peter Pears	7.66	105.63	5.66	82.63	120.16	135.60	140.70
25	Mascagni	5.00	107.31	5.33	92.91	123.28	136.25	142.70
	Mean	6.10	110.96	5.89	91.47	100.76	119.02	125.56
	C.V.	15.35	2.89	8.65	2.72	4.11	4.67	4.62
	S.E.	0.54	1.85	0.29	1.44	2.39	3.20	3.35
	C.D. 5%	1.54	5.27	0.83	4.09	6.79	9.12	9.53

Table 2: Mean performance of twenty five gladiolus genotypes for different characters

Sl. No.	Genotypes	Number of floret per spike	Spike length (cm)	Rachis length (cm)	Durability of first floret (days)	Flower Duration (days)	Stem Diameter (mm)	Floret Size (cm)
1	Chandani	12.00	86.50	46.63	5.10	14.63	10.53	4.36
2	Punjab Dawn	11.53	75.13	45.30	5.50	15.50	11.23	5.73
3	Punjab Glance	11.43	68.30	38.50	5.30	15.00	11.50	6.43
4	Pune Hybrid	12.40	98.97	62.97	5.75	14.40	12.87	7.16
5	CPG	11.73	84.13	56.63	5.63	13.97	12.03	5.66
6	Punjab Lemon Delight	11.00	59.13	33.63	8.63	12.07	13.90	6.86
7	Yellow Stone	11.00	96.30	56.26	6.17	14.18	12.90	6.33
8	Novalux	9.73	82.47	43.00	5.50	12.73	9.850	5.83
9	Blue Tropic	14.73	104.00	70.81	5.90	17.03	15.63	6.03
10	Oscar	10.60	95.80	50.14	5.67	13.94	8.90	6.40
11	Chinon	9.90	96.63	49.97	6.00	14.97	5.50	6.63
12	White Prosperity	11.00	99.13	70.47	5.03	15.83	13.40	5.70
13	Pusa Srijana	10.23	100.00	60.30	5.50	16.20	12.40	5.80
14	Berlew	11.60	99.13	69.60	5.83	14.89	10.13	6.10
15	Jyotsana	13.90	100.10	63.60	5.40	15.13	14.15	6.80
16	Bindiya	12.95	83.30	60.80	4.97	15.90	12.21	6.60
17	Urmi	13.00	95.63	71.47	4.63	15.87	13.50	6.16
18	Sunanya	11.23	105.10	59.97	5.50	16.83	10.30	7.00
19	Pusa Kiran	12.60	99.13	65.30	4.60	17.20	13.33	6.50
20	Shabnam	13.20	103.30	71.13	5.10	17.83	12.86	7.00
21	Surya Kiran	12.50	91.63	67.97	6.13	15.30	14.80	5.50
22	Eurovision	12.00	92.60	71.90	5.15	14.10	15.70	5.63
23	Dhanvantri	8.60	83.30	57.80	4.83	16.63	13.67	7.26
24	Peter Pears	11.43	85.63	64.13	4.80	14.40	14.30	6.70
25	Mascagni	12.16	87.31	64.78	6.13	16.31	13.70	7.00
	Mean	11.69	90.90	58.92	5.55	15.23	12.37	6.28
	C.V.	2.75	2.33	2.46	2.62	2.63	2.84	10.19
	S.E.	0.18	1.22	0.83	0.08	0.23	0.20	3.24
	C.D. 5%	0.53	3.48	2.38	0.23	0.65	0.57	1.05

Table 3: Mean performance of twenty five gladiolus genotypes for different characters

Sl. No.	Genotypes	Vase life (days)	Chlorophyll Content (%)	Number of corms per plant	Weight of corm per plant (g)	Diameter of corm (cm)	Number of corbels per plant
1	Chandani	8.63	47.80	2.66	27.80	4.83	17.30
2	Punjab Dawn	9.50	54.50	2.52	19.13	4.06	12.09
3	Punjab Glance	9.00	58.30	2.33	23.00	4.16	13.20
4	Pune Hybrid	8.33	46.20	2.32	19.40	4.11	11.40
5	CPG	7.58	43.70	2.87	15.50	3.65	11.200
6	Punjab Lemon Delight	6.80	50.00	2.54	20.00	4.01	12.90
7	Yellow Stone	7.99	46.86	2.35	27.39	3.97	13.80
8	Novalux	9.28	56.43	3.66	30.93	4.51	20.10
9	Blue Tropic	9.62	51.43	3.33	24.43	4.21	15.96
10	Oscar	9.18	44.76	2.68	20.50	3.77	15.20
11	Chinon	8.66	56.70	2.76	22.93	4.31	14.79
12	White Prosperity	9.10	50.60	2.33	26.10	4.32	16.20
13	Pusa Srijana	9.16	50.60	1.66	30.00	4.63	18.60
14	Berlew	7.82	47.63	2.66	30.37	4.83	12.40
15	Jyotsana	8.20	55.13	3.47	36.63	5.43	22.80
16	Bindiya	9.60	48.40	3.00	33.30	5.21	20.30

17	Urmi	7.91	46.80	2.66	20.93	4.31	11.60
18	Sunanya	9.08	55.73	2.33	29.03	4.85	18.13
19	Pusa Kiran	9.96	41.90	3.33	30.96	4.73	21.38
20	Shabnam	8.90	52.10	3.00	30.63	4.78	19.80
21	Surya Kiran	7.11	49.30	1.99	11.63	3.26	9.67
22	Eurovision	8.22	49.03	3.00	26.30	4.92	16.86
23	Dhanvantri	9.20	51.00	2.60	24.43	4.48	15.89
24	Peter Pears	7.10	57.51	2.00	18.80	3.97	11.60
25	Mascagni	8.14	58.59	2.00	19.31	4.09	12.10
	Mean	8.56	50.84	2.64	24.77	4.37	15.41
	C.V.	2.73	10.54	2.86	11.76	6.39	2.77
	S.E.	0.13	3.09	0.04	1.68	0.16	0.24
	C.D. 5%	0.38	8.80	0.12	4.78	0.46	0.70

Conclusion

Significant variation was observed by way of analysis of variance for all the twenty-one characters studied, indicating the existence of variability among the selected genotypes.

References

- Bhat ZA, Nazki IT, Burhan Hamid. Evaluation of gladiolus cultivars for growth, flowering, spike yield and corm yield under temperate regions of Kashmir. *Indian Horticulture Journal*. 2017;7(3/4):203-207.
- Bhat ZA, Paul TM, Mir MM. Effect of corm size and planting geometry on growth, flowering and corm production in gladiolus cv. white prosperity *Journal of Ornamental Horticulture*. 2009;12(1):35-38.
- Butt SJ, Varis S, Nasir IA, Sheraz S, Shahid A, Ali Q. Micro Propagation in Advanced Vegetable Production: A Review. *Advancements in Life Sciences*. 2015;2(2):48-55.
- Chourasia A, Viradia RR, Ansar H, Madle SN. Evaluation of different gladiolus cultivars for growth, flowering, spike yield and corm yield under Saurashtra region of Gujarat. *The Bioscan*. 2015;10(1):131-134.
- Das R, Boro A, Medhi T, Medhi B. Performance studies of some gladiolus cultivars under rain-fed condition of Assam (India). *Horticultural Science*. 2014;89:789-797.
- Goldblatt P, Manning JC, Peter B. Radiation of Pollination Systems in Gladiolus (Iridaceae: Crocoideae) in Southern Africa. *Annals of Missouri Botanical Garden*. 2001;88(4):713-734.
- Kumar R, Yadav DS. Evaluation of gladiolus cultivars under subtropical hills of Meghalaya. *Journal of Ornamental Horticulture*. 2005;8(2):86-90.
- Nair SA, Shiva KN. Performance of selected Gladiolus (*Gladiolus floribundus*) varieties under Bay island conditions. *Indian Journal of Agricultural Science*. 2003;73(7):397-398.
- Nazir M, Dwivedi VK, Bhat KL. Correlation studies in gladiolus over different environments. *National Symposium on Recent Advances in Indian Floriculture*. 2003 November; 12(14):280.
- Safiullah, Ahmed MJ. Evaluation of exotic cultivar of gladiolus (*Gladiolus grandiflorus*) under Rawalkot conditions. *Sarhad Journal of Agriculture*. 2001;7(2):171-174.
- Sarkar I, Chakraborty S. Varietal performances on important floral attributes of 15 indigenous and exotic varieties of gladiolus in North Eastern Himalayan region *Journal of Agricultural Technology*. 2014;1(1):80-85.
- Sharma P, Nath AK, Dhiman SR, Dogra S, Sharma V. Characterization of carnation (*Dianthus caryophyllus* L.) genotypes and gamma irradiated mutants using RAPD, ISSR and SSR markers. *South African Journal of Botany*. 2022;148:67-77.
- Wani MA, Nazki IT, Din A, Malik SA, Rather ZA. Photosynthate partitioning in Asiatic lilies under ammonia cal and nitrate sources of nitrogen. *Agricultural Research*. 2016;5:230-235. <https://doi.org/10.1007/s40003-016-0222-x>
- Wani MA, Nazki IT, Din A, Iqbal S, Wani SA, Khan FU, et al. Floriculture Sustainability Initiative: The Dawn of New Era. In: Lichtfouse, E. (Eds.) *Sustainable Agriculture Reviews 27. Sustainable Agriculture Reviews*, 2018, 27. Springer, Cham. https://doi.org/10.1007/978-3-319-75190-0_4
- Wilfret GJ. Gladiolus In: *Introduction to Floriculture* Larson RA (Ed.) Academic Press; c1986. p. 166-171.