



ISSN (E): 2277- 7695

ISSN (P): 2349-8242

NAAS Rating: 5.03

TPI 2020; 9(5): 396-400

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www.thepharmajournal.com

Received: 04-04-2020

Accepted: 09-05-2020

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Evaluation of different gladiolus cultivars (*Gladiolus grandiflorus* L.) for flower and corm production under temperate conditions of Kashmir

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Abstract

(Gladiolus grandiflorus L.) is one of the important cut flower which occupies sixth rank in global trade among the cut flowers in the world and also commercially cultivated in Kashmir valley. A field experiment was laid out in Randomized Block Design with three replications to find out the performance of eleven gladiolus cultivars for their growth, flowering, spike yield and corm yield characters under temperate conditions of Kashmir Valley. The results revealed that there were significant difference among the cultivars with respect to vegetative growth parameters, flowering attributes and corm yield. Among all varieties, Deepest Red and White prosperity were found performing better with highest growth, flowering and corm yield parameters. The maximum dry matter production was recorded in White Prosperity (47.34 g plant⁻¹) followed by Deepest Red (47.12 g plant⁻¹) and Trader Horn (42.56 g plant⁻¹) and the minimum dry matter production was recorded in cultivar Her Majesty (34.72 g plant⁻¹) respectively. Significantly highest spike length (103.20 cm) and rachis length (88.25 cm) were recorded in cultivar 'White Prosperity' followed by Trader Horn. However, the maximum number of marketable spike yield per plant was recorded in the cultivars White friendship and Deepest Red. The maximum number of corms per plant (1.33) was recorded in 'Green Star' and Trader Horn while many cultivars viz., White prosperity, Prescilla, Nova Lux, Sonia, have produced only one corm. It could be concluded that the gladiolus varieties, White prosperity, Deepest Red and Trader Horn were found suitable for the temperate conditions of Kashmir valley.

Keywords: *Gladiolus*, *Gladiolus grandiflorus* L., cultivars, growth, flowering, corm yield, Kashmir valley

1. Introduction

In Indian floriculture, there has been a vibrant shift from sustenance production to commercial production of flowers with 334000ha of area under floriculture during 2018-19 that led to a production of 1962 Mt of loose flowers and 833 million (numbers) of cut flowers (NHB., 2019) [14]. India's total export of floriculture was approximately worth Rs. 702.31 crores during 2018-19. *Gladiolus* (*Gladiolus grandiflorus* L.) is one of the most popular cut flowers that belong to the family Iridaceae and sub family Ixoroideae. It is commercially grown in India, Turkey, Japan, China, USA, South America, South Africa, Italy, England, France, Germany, Spain, The Netherlands and Syria. It is available round the year in India due to wider adaptability under various agro-climatic zones of the country. It is mainly cultivated in Karnataka, Maharashtra, Punjab, West Bengal, Uttar Pradesh, Haryana, Tamil Nadu, Uttarakhand, Jammu and Kashmir, Himachal Pradesh and Odisha (Singh and Sisodia, 2018) [29]. Though there are about 260 species and over 30,000 varieties of gladiolus (Singh, 2014) [8] available and every year a great number of new varieties are being introduced, hence, it becomes difficult for the user to obtain enough information to judge the performance of these varieties and their suitability to grow successfully in different climatic conditions. A comparative varietal evaluation of new cultivars along with existing cultivar is necessary to determine the value of these cultivars is essential. Similarly to promote commercial cultivation of this crop in different districts of Kashmir valley, varietal evaluation is imperative to recommend promising cultivars based on their quality attributes. Generally, evaluation studies on varieties are aimed to contribute in identifying good varieties for commercial cultivation and to avoid cultivation of least prospective varieties for loss of capital by selecting these varieties. As for as *Gladiolus* is concerned, flowering characteristics of spike determines greatly for suitability of variety or genotype for production. The performance of any crop or cultivar largely depends on genotypic and environmental interaction.

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As a result, cultivars which perform well in one region may not perform the same in other regions of varying agro climatic conditions (A.K. Singh, 2017) [22]. Crop improvement in any flower crop is aimed at developing high yielding variety with desirable quality parameters of consumer preference. Hence, to introduce gladiolus as an alternative commercial flower crop in temperate regions of Kashmir valley suitable varieties which can produce saleable quality spikes and mother corms and cormels have to be identified. In light of the above facts, a research trial has been laid out in gladiolus to find out the suitable gladiolus cultivars for commercial cultivation in Kashmir valley.

2. Material and Methods

The experiment was carried out in RBD (Randomized block design) during the year 2016-2017 at Krishi Vigyan Kendra, Bandipora (SKUAST-Kashmir). Corms of eleven number of gladiolus cultivars viz., White Prosperity, White Friendship, Trader Horn, Sonia, Snow White, Deepest Red, Green Star, Nova lux, Oscar, Her Majesty and Priscilla were collected from well reliable source of commercial floriculture units in, New Delhi, Punjab and Jammu and Kashmir. These corms were planted in ridges and furrow made at a spacing of 20 cm x 25 cm in a plot size of 1.25 m x 1.5 m dimension. The soil of the experiment site is sandy loam having the pH range of 6.5-7.5. Well decomposed FYM @ 25t/ha was applied 15 days prior to planting during land preparation operation. Standard package of practices were adopted throughout the experiment to grow a healthy crop. Observations on various vegetative parameters including plant height, number of leaves per plant, leaf length, leaf width, days to spike emergence, spike length, number of floret per spike, flower length, flower diameter, diameter of corm and number of cormels were recorded periodically during the whole crop cycle. The genotype Sonia was considered as standard check. The data were analysed as per the procedure given by the Panse and Sukhatme (1967) [30]. Mean and critical difference for each character was computed to derive meaningful conclusion.

3. Results and Discussion

3.1 Growth Parameters

Results revealed significant variation among the eleven cultivars with respect to all the growth parameters studied (Table 1). The days taken for sprouting varied between the cultivars from 21.59 days in Oscar to 30.11 days in Snow White. Significantly early sprouting observed in cultivar Oscar is significantly on par with White Friendship. Plant height varied from 100.00 cm to 117.34 cm, with cultivar Trader Horn (117.345 cm) recording the tallest plants followed by White Prosperity (115.31 cm) and the poorest plant height was recorded in Oscar (100.00 cm) respectively. Significantly highest leaves length (81.33 cm) recorded in Deepest Red was on par with the leaf length of Oscar (77.54 cm), whereas the least leaf length (69.09 cm) was recorded in Snow White. The maximum leaf area was found in White Prosperity (115.48 cm²) followed by White Friendship (106.67 cm²) and the minimum leaf area was recorded in Oscar (72.44 cm²). The maximum dry matter production was recorded in White Prosperity (47.34g plant⁻¹) followed by Deepest Red (47.12 plant⁻¹) and the minimum dry matter production was recorded in Her Majesty (34.72 g plant⁻¹). The data clearly indicate that the wide variation observed in different growth characters are probably due to genetic nature

of the varieties which phenotypically appear when grown under temperate condition of Kashmir. Morphological variations on number of days to sprouts and size of leaf were observed between different gladiolus varieties by Kadam *et al.* (2014) [7], Sisodia and Singh (2015) [25], Swaroop *et al.* (2017) [27] and Mushtaq *et al.* (2018) [10]. Similar finding have been reported by earlier workers Ranjan *et al.* (2014) [18], Shaikat *et al.* (2012) [20], Negi *et al.* (2014) [12] and Chourasia *et al.* (2015) [2]. The better performance of growth characters observed in gladiolus cultivars White prosperity, White Friendship and Deepest Red might be because of early sprouting and higher leaf area which might have increased photosynthesis leading to the availability of more photosynthates. Hence, the growth performance has reflected in number of days taken for spike emergence. The number of days to spike emergence amongst the varieties ranged from a maximum of days 78.30 in 'Priscilla' to the minimum 64.40 days in 'White Prosperity'.

3.2 Flowering Parameters

Flowering parameters of different gladiolus varieties differed significantly when grown under climatic conditions of Kashmir (Table 2). Significantly highest spike length (103.20 cm) and rachis length (88.37 cm) were recorded in cultivar 'White Prosperity' followed by Trader Horn with a spike length of (100.29 cm) and rachis length of 87.25 cm. The least spike length (77.86 cm) and rachis length (65.29 cm) was recorded in Green Star. The maximum spike weight was observed in White Prosperity (89.32 g) followed by Trader Horn (84.01 g) and Deepest Red (81.33 g). The minimum was recorded in Snow White (69.09 g). The number of florets per spike was ranged from 12.33 in cultivar Green Star to 16.89 in cultivar White Prosperity. The number of florets per spike recorded in cultivars White friendship (16.89) and Deepest Red (15.66) were on par with the cultivar Priscilla (15.66). The floret size ranged between 6.09 cm in Green Star to 8.17 cm in White prosperity. It could be noticed that the when the number of florets increased more than 10 in a variety the rachis length was showing improving trend of more than 40 cm. The days taken for first flower opening was found the earliest of 77.48 days in White Prosperity which was on par with Deepest Red, and Sonia. Spike length, rachis length and number of florets per spike were found to be governed by genetic architecture of the genotype. These results were found in consonance with the earlier findings of Lepcha *et al.* (2007) [9], Punam *et al.* (2009) [17], Ganesh *et al.* (2014) [3] and Naresh *et al.* (2015) [11] with respect to flowering parameters of different gladiolus cultivars. The minimum days taken for first flower opening was recorded in Karma (98.70 days) followed by Adagio (87.80 days). Similar variation in days taken for opening of florets was noticed by Aswath and Parthasarathy (1996) [1], Swain *et al.* (2008) [26], Kumar *et al.* (2014) [8] and Singh *et al.* (2017) [22] in gladiolus.

3.3 Spike and corm yield Parameters

There is no significant difference in number of spikes produced per plant among the cultivars as most of them produced one spike and very few plants failed to produce productive spike. However, significant differences were recorded in number of marketable spikes produced per plant. The maximum of one marketable spike per plant was produced by the cultivars White Prosperity, Deepest Red and White friendship. The least number of 0.8 marketable spikes were produced by the cultivars Green Star. As the numbers of

florets per spike and rachis length decide the marketability of the spikes, the cultivars *viz.* Deepest Red (1.00) White Prosperity (1.00), Priscilla (1.00), White friendship (1.00) and Her Majesty have performed well in producing marketable flower spikes. Variation in spike yield between different gladiolus cultivar was earlier reported by Aswath and Parthasarathy (1996) [1], Swain *et al.* (2008) [26], Kumar *et al.* (2014) [8] and Singh *et al.* (2017) [22].

The maximum number of (1.33) corms per plant was recorded in 'Green Star and Trader Horn while many cultivars *viz.*, Oscar, Snow White, Nova Lux, and Trader Horn have produced at least one flowering size corm for next year sowing. The maximum corm diameter of 3.34 cm recorded in cultivar White Prosperity was at par with White Friendship (2.56 cm) and the minimum corm diameter was observed in

Sonia and Green Star (2.33 cm). Significantly highest numbers of corms were produced in Trader Horn (19.01) followed by White Prosperity (18.48) and Her Majesty (18.33). However, no cultivar failed to produce corms during the study. Variation in corm and cormels production observed in present study is in consonance with the reports of Singh *et al.* (2013) [21], Kadam *et al.* (2014) [7], Sisodia and Singh (2015) [25] in gladiolus. Similar findings were recorded by Poon *et al.* (2010) [16], Shaukat *et al.* (2012) [20], Jana *et al.* (2013) [6], Singh *et al.* (2013a) [21] and Rao *et al.* (2015) [19]. Among the eleven gladiolus cultivars studied Deepest Red, White Prosperity and Trader Horn were found superior in terms of growth parameters, floral characters, spike yield and corm yield.

Table 1: Vegetative growth performance of gladiolus varieties

Varieties	Sprouting (Days)	Plant height (cm)	Leaf length (cm)	Leaf area (cm ²)	Dry matter production (g plant-1)	Days taken for spike emergence
Oscar	21.59	100.01	77.54	72.44	35.37	77.34
Her Majesty	23.60	119.81	75.12	84.27	34.72	75.10
Priscilla	26.30	113.53	70.32	77.52	41.75	78.30
Nova Lux	25.20	107.81	71.41	78.31	36.00	77.30
Green Star	24.66	101.12	73.00	85.22	35.09	74.01
Deepest Red	26.57	111.02	81.33	89.88	47.12	68.56
Snow White	30.11	103.03	69.09	87.00	40.01	69.01
Sonia	29.34	114.6	72.48	91.33	39.24	67.21
Trader Horn	27.87	117.34	74.01	104.00	42.56	68.23
White Friendship	23.20	105.52	69.42	106.67	36.48	70.10
White Prosperity	21.80	115.19	69.32	115.48	47.34	64.40
Mean	25.48	109.91	73.00	90.19	39.61	71.78
SEd±	0.85	2.84	1.80	1.75	0.92	1.55
CD (0.5%)	2.10	7.02	4.52	4.38	2.32	3.81

Table 2: Flowering performance of gladiolus varieties

Varieties	Spike length (cm)	Rachis length (cm)	Spike weight (g)	No. of florets per spike	Floret Size (cm)	Days taken for first floret opening
Oscar	81.73	71.21	76.67	14.44	6.37	89.34
Her Majesty	90.42	75.81	77.12	14.27	7.72	85.33
Priscilla	89.30	76.57	76.52	15.52	6.75	87.33
Nova Lux	90.20	78.26	78.41	13.39	7.00	88.87
Green Star	77.86	65.29	73.0	12.33	6.09	86.67
Deepest Red	90.57	74.13	81.33	15.66	7.89	78.91
Snow White	78.83	66.23	69.09	14.00	7.01	80.09
Sonia	92.34	77.71	73.48	13.33	7.24	78.27
Trader Horn	100.29	87.25	84.01	14.21	7.56	79.29
White Friendship	87.20	78.02	71.42	13.87	6.48	79.19
White Prosperity	103.20	88.37	89.32	16.89	8.17	77.48
Mean	89.27	76.26	77.31	14.35	7.12	82.80
SEd±	2.72	1.58	1.55	0.92	0.23	1.76
CD (0.5%)	6.87	4.10	3.97	2.32	0.64	4.42

Table 3: Spike and corm yield performance of gladiolus Cultivars

Varieties	Number of corms per plant	No. of marketable Spikes per plant	No. of corms per plant	Corm diameter (cm)	Average Corm weight (g)	No. of cormels per plant
Oscar	1.20	1.0	1.27	2.54	46.37	17.34
Her Majesty	1.00	1.00	1.20	2.44	47.72	18.33
Priscilla	1.12	1.00	1.52	2.52	46.75	16.78
Nova Lux	1.09	1.00	1.41	2.39	47.00	17.37
Green Star	1.33	0.88	1.11	2.33	40.09	16.11
Deepest Red	1.26	1.12	1.42	2.46	57.89	16.01
Snow White	1.00	1.00	1.09	2.40	47.01	18.09
Sonia	1.00	1.00	1.18	2.33	47.24	16.27
Trader Horn	1.29	1.00	1.21	2.44	47.56	19.01

White Friendship	1.20	1.12	1.42	2.56	46.48	17.19
White Prosperity	1.20	1.00	1.67	3.34	48.17	18.48
Mean	1.15	1.01	1.32	2.52	47.48	17.36
SEd±	0.03	0.04	0.03	0.08	1.03	0.58
CD (0.5%)	0.08	0.09	0.08	0.19	2.76	1.52

4. Conclusion

It is concluded from the research findings that, among all the varieties, Deepest Red and White Prosperity were found performing better with highest growth, flowering and corm yield parameters and were found suitable for cultivation on commercial scale in the temperate conditions of Kashmir valley.

Acknowledgements

Authors are thankful to the Authorities of Sher-e-Kashmir University of Agricultural Sciences & Technology, Kashmir, Srinagar, Jammu and Kashmir, India for providing necessary facilities for conducting present research work.

Competing interests

Authors have declared that no competing interests exist.

Authors' Contributions

'AHW' designed the study. 'AHW' and 'MA' wrote the protocol. 'AHW, KAS' and 'MA' managed literature searches, 'AHW' and 'KAS' wrote the first draft of the manuscript. 'AHW, 'KAS' and 'MA' managed the field trial and data recording. 'MA' performed the statistical analysis. All authors read and approved the final manuscript".

Consent

Not applicable.

Ethical approval

Not applicable.

References

- Aswath C, Parthasarathy VA. Evaluation of gladiolus cultivars. *J Hill Res.* 1996;9:147-149.
- 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.
- Ganesh BK, Gunjeet K, Saha TN, Tiwari AK, Ramesh K. Varietal evaluation and genetic variability studies on gladiolus. *Indian J Hort.* 2014;71(3):379-384.
- Hossain MD, Talukder KH, Asaduzzaman M, Mahmud F, Amin N, Sayed MA, *et al.* Study on morphological characteristics of different genotypes of gladiolus flower. *J Sci. Found.* 2011;9(1&2):01-08.
- Islam MK, Anwar M, Alam AU, Khatun UK, Ara KA. Performance of different Gladiolus varieties under the climatic condition of Tista Meander Flood. *Prog Agric.* 2017;28(3):198-203.
- Jana BR, Das B. Evaluation of tropical gladiolus under eastern plateau and hill region of India. *Int. J Sci. Res.* 2013;4(7):1301-1302.
- Kadam GB, Kumar G, Saha TN, Tiwari AK, Kumar R. Varietal evaluation and genetic variability studies on gladiolus. *Indian J Hort.* 2014;71(3):379-384.
- Kumar A, Sisodia A, Singh AK. Evaluation of tuberose cultivars for growth, flowering and postharvest life. *Indian Perfumer.* 2014;58(1):29-32.
- Lepcha B, Nautiyal MC, Rao VK. Variability studies in gladiolus under mid hill conditions of Uttarakhand. *J Ornamental Hort.* 2007;10(3):169-172.
- Mushtaq S, Hafiz IA, Arif M, Anwar A. Performance evaluation of elite gladiolus cultivars under agro climatic conditions of Rawalpindi. *Asian J Adv. Agric. Res.* 2018;5(3):1-6.
- Naresh S, Dorajeerao AVD, Bhaskar VV, Krishna KU, Rao MP. Evaluation of gladiolus (*Gladiolus hybrid L.*) hybrids under coastal Andhra Pradesh conditions. *Plant Archives.* 2015;15(1):451-454.
- Negi R, Kumar S, Dhiman SR. Evaluation of different cultivars of gladiolus (*Gladiolus grandiflorus L.*) suitable for low hills of Himachal Pradesh. *Indian J of Scientific Res and Tech.* 2014;2(6):6-11.
- Neha, Chopde RP, Gawali S, Seema T. Evaluation of gladiolus varieties for flower and corm production under Vidarbha conditions. *Plant Arch.* 2012;12:911-913.
- NHB. Overview of Horticulture Sector, Horticultural Statistics at a Glance, National Horticulture Board, Gurugram, India; c2018. p. 9.
- Dogra S, Singh A, Laishram N, Jamwal S. Evaluation of gladiolus cultivars under subtropical conditions of Jammu. *International Journal of Agricultural Sciences.* 2012;8(2):518-522.
- Poon TB, Rao TM, Kumar DP, Dhananjaya MV. Evaluation of different genotypes of gladiolus for corm and cormel production. *Nepal Agric. Res J.* 2010;10:50-54.
- Punam H, Sanyat M, Lily MK. Evaluation of gladiolus cultivars for cut flower production in Jharkhand. *J Ornamental. Hort.* 2009;12(3):206-207.
- Ranjan JK, Attri BL, Das B, Hare K, Ahmed N. Performance of gladiolus genotypes for cut flower and corm production under high altitude of Uttarakhand. *Indian J Hort.* 2010;67:386-390.
- Rao KD, Sushma K. Performance of different new genotypes of gladiolus. *Agric. Sci. Digest-A Res J.* 2015;35(2):134-137.
- Shaukat SA, Shah SZA, Shaukat SK, Shaukat SW. Evaluation of different gladiolus cultivars under Union Council Bangoon Poonch J&K Conditions. *J Agric. Sci. App.* 2012;14(2):138-141.
- Singh AK, Anuj K, Ghimire NR. Studies of gladiolus cultivars for post-harvest characters. *Environment and Ecology.* 2013;31(2):418-421.
- Singh AK, Sah R, Sisodia A, Pal AK. Effect of gamma irradiation on growth, flowering and postharvest characters in tuberose varieties. *International Journal of Current Microbiology and Applied Sciences.* 2017;6(8):1985-1991.
- Singh AK, Sisodia A. *Textbook of Floriculture and Landscaping.* New India Publishing Agency, New Delhi; c2017.
- Singh AK. *Breeding and Biotechnology of Flowers: Commercial Flowers.* New India Publishing Agency,

New Delhi; c2014.

25. Sisodia A, Singh AK. Plant morphology, growth and corm parameters as influenced by gamma doses in gladiolus cultivars. *Environment and Ecology*. 2015;33(2A):888-892.
26. Swain S, Rath CS, Seithi BK. Evaluation of gladiolus cultivars for quality flowers and corm yield under Eastern Ghat in high land zone of Orissa. *Orissa J Hort*. 2008;36:122-123.
27. Swaroop K. Morphological variation and evaluation of gladiolus germplasm. *Indian Journal of Agricultural Sciences*. 2010;80(8):742-745.
28. Hilly M, Adams ML, Nelson SC. A study of digit fusion in the mouse embryo. *Clin. Exp. Allergy*. 2002;32(4):489-498.
29. Sisodia D, Sisodia DS. Prediction of diabetes using classification algorithms. *Procedia computer science*. 2018 Jan 1;132:1578-1585.
30. Panse VG, Sukhatme PV. *Statistical Methods for Agricultural Workers*, 4th Edn. ICAR, New Delhi; c1967. p. 228-232.