PERFORMANCE OF DIFFERENT VARIETIES OF GLADIOLUS UNDER PRAYAGRAJ AGRO-CLIMATIC CONDITIONS

ABSTRACT

An experiment was carried out in the Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, from November, 2023 to March, 2024. The experiment was conducted in Randomized Block Design (RBD) with fifteen varieties, replicated thrice. It is concluded that among the different varieties of gladiolus variety V_6 (Pusa Suhagin) performed significantly better in plant height (90.69 cm), number of leaves (10), leaf area index (0.22), spike length (113.6 cm), more number of spikes per plant (2.83), more number of florets per spike(16), however less number of days taken for first sprouting recorded in V_{15} (Snow Board, 7 days) and Vase life highest in variety V_9 (Arka Pratham, 11.66 days).

Keywords: Variety Gladiolus, Pusa Suhagin, Arka Pratham, Flowering, Growth

1. INTRODUCTION

"Flowers are one of the most beautiful gifts that nature has given to man. Their delightful smell makes people happy and joyful. Flowers are used for a number of additional purposes, including garlands, bouquets and interior decor in an old and religious culture. In India, where they are deeply associated with nearly all social occasions and celebrations"[47,48,49]. In addition, cultivating attractive plants and flowers is crucial for sustaining the ecological balance and reducing pollution in the environment.

"Gladiolus is a flower of glamour and perfection which is known as the queen of bulbous flowers due to its flower spikes with florets of massive form, brilliant colors, attractive shapes, varying size and excellent shelf life. The modern varieties are botanically known as Gladiolus grandiflorus belonging to the family Iridaceae. Gladiolus is grown as flower bed in gardens and used in floral arrangements for interior decoration as well as making high quality bouquets" **(Bose et al., 2003).**

"Gladiolus is rated fourth in worldwide trade, third in India's cut flower output and sixth in loose flower production" **(Nath et al., 2020)**. "Gladiolus flower cultivation generates six times the profit of rice production. Gladiolus cut flowers are produced by different countries such as USA, Holland, Italy, France, Poland, Bulgaria, Brazil, Australia and also Israel. Apart from this in Europe, for over 100 years Gladiolus has been popular, whereas it has been introduced recently in India. India has suitable agro-climatic conditions for gladiolus cultivation; it is commercially cultivated in Himachal Pradesh, Sikkim, Karnataka, Uttar Pradesh, West Bengal, Tamil Nadu, Punjab and Delhi. In the eastern states like Tripura, Assam, Manipur, Meghalaya and Nagaland, this flower has established itself as a commercial proposition. There is a sizeable area under gladiolus in Jammu-Kashmir, Andhra Pradesh and Gujarat also" **(Flower council of Holland, 2008).**

During the last two decades the commercial production of gladiolus spikes has become a very popular flowering plant in India. The cultivation of gladiolus has the potential to change the economic scenario of farmers especially under Northern Indian plains, Uttar Pradesh, Tamil Nadu and Pondicherry. It is also necessary to examine the efficiency of different varieties and varieties available in the market. So, all these cultivars need to be tested for their performance, colors and color combinations, floral characteristics like spike length, more number and better size of floret, increase vase life etc.

Considering the present status, it is necessary to improve both quantitative and qualitative features in order to capitalize on internal and exotic demand. Climate and soil conditions have a significant impact on plant nutrition, development and subsequent survival while growing the gladiolus crop. Different climatic conditions have a significant impact on the growth and yield performance of Gladiolus. Commercial cultivation of gladiolus is becoming more popular, with large-scale production practiced mostly during the winter season. This experiment was conducted to evaluate the performance of different varieties of gladiolus.

1. Materials and Methods

The field experiment entitled Performance of different varieties of gladiolus under Prayagraj agroclimatic conditions was carried out at the Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, Naini, Prayagraj, during November, 2023 to March, 2024. The experimental field is situated on the left side of Prayagraj - Rewa Road, near the river Yamuna, and approximately 7 km from Prayagraj city.

2.1 Geographical Location and Climate Condition

Geographically, Prayagraj is situated in the south-eastern part of Uttar Pradesh. It liesbetween 25º 47’ North latitudes and 82º 21’ East longitudes. The area of Prayagraj district comes under agro-climatic zone V (Upper Gangetic Plain region) and sub-zone of Central Plains. The climate ranges from dry sub-humid to semi- arid and the soil is alluvium calcareous sandy loam. The district experiences an average maximum temperature range between 43º - 47ºC which may go as high as 48ºC during peak summers (May-June). The minimum average temperature is 2-4ºC, which may fall as low as 1ºC during peak winter months (December-January). The average rainfall of the district is 960mm and the monsoon season is spread between July-September.

2.2 Experimental Details

The trail was laid out in a Randomized block design with fifteen varieties replicated thrice. Spacing 1 m x 1m. Fifteen different varieties used Priscilla, Joshika, Dhanvantari, Phule Neel Rekha, Souvik Biscuit, Pusa Suhagin, Chandni, Arka Amar, Arka Pratham, Smoky Lady, Arka Tilak, Panibica Beauty, Arka Naveen, Manhattan, Snow Board corms are procured from DFR, Pune College of Agriculture Campus, Narveer Tanaji Wadi, Shivajinagar, Pune, Maharashtra 411005.

2.2.1 Observation details

Number of days to sprouting, Plant height, Number of leaves per plant, Leaf area index, Number of branches per plant, Number of days for Spike emergence, Floret diameter(cm), Corm diameter (cm), Number of spikes per plant, Number of florets per spikes, Vase life.

2. RESULTS AND DISCUSSIONS

3.1 Vegetative Parameters

Days taken to first sprouting - Significantly, less number of days first sprouting (7 days) was recorded in the variety V15 (Snow Board), followed by variety V5 (Souvik Biscuit, 8.8 days) whereas, the variety that took more number of days for first sprouting V11 (Arka Tilak, 11days).

The differences in days to first sprouting in different cultivars of gladiolus due to genetic nature of cultivars. Similar report was also investigated in different varieties of tuberose by **Singh et. al., (2013), Kumar et. al., (2014).**

***Plant height*-** 90 days after planting, significantly taller plants (90.69 cm) were recorded in V_4 (Pusa Suhagin) followed by V_{12} (Arka Pratham, 87.8 cm) whereas shorter plants were recorded in V15 (Snow Board, 67.83 cm).

Plant height is a genetic character of every species and cultivar variation in plant height of different varieties may be attributed to the fact that this genetic character varied from variety to variety. Similar findings in variation in plant height were obtained by **Mohanty *et al.* (2011)** in rose and **Hussain and Khan (2004)** in variety of gladiolus.

***Number of leaves*-** 90 days after planting, significantly more number of leaves (10) were recorded in V_6 (Pusa Suhagin) at par by V_{11} (Arka Tilak, 9.8) and V_9 (Arka Pratham, 9.6) whereas less number of leaves were recorded in V15(Snow Board, 7.33).

Difference in number of leaves in different varieties might be due to the different genetic makeup of the varieties and their adaptability to the existing environmental conditions. The findings of the present investigation are in conformity with the reports of **Treder (2008)** in Oriental lily; **Lalmuanpui *et al.*(2021)** in gerbera**; Balan *et al.* (2020)** in tuberose; **Khan *et al.* (2020)** in Chrysanthemum.

***Leaf area index*-** Significantly, more leaf area index (0.22) was recorded in the variety V6 (Pusa Suhagin) at par by variety V5 (Souvik Biscuit, 0.20) and V2 (joshika,0.19) whereas, the less leaf area index recorded in V15 (Snow Board, 0.11).

Difference in leaf area index varieties might be due to the different genetic makeup of the varieties and their adaptability to the existing environmental conditions. The findings of the present investigation are in conformity with the reports of **Gupta *et al.* (2014)** in marigold; **Balan *et al.* (2020)** in gladiolus; **Singh *et al.* (2015)** in Chrysanthemum.

Table 1. Vegetative Parameters

Notation	Varieties	Days to germination	Plant height (cm)	Number of leaves	Leaf area index
V_1	Priscilla	7.83	81.3	9.33	0.20
V_2	Joshika	8	78.12	9	0.19
V_3	Dhanvantari	8.33	78.43	9	0.14
V_4	Phule Neel Rekha	7.16	80.93	9	0.16
V_5	Souvik Biscuits	8.66	83.88	9	0.20
V_6	Pusa Suhagin	8.33	90.69	10	0.22
V_7	Chandani	8.5	83.43	8.33	0.13
V_8	Arka Amar	8.26	84.63	8.34	0.12
V_9	Arka Pratham	8.66	87.8	9.6	0.14
V_{10}	Smoky Lady	8.23	84.29	8.66	0.15
V_{11}	Arka Tilak	11	81.63	9.8	0.13
V_{12}	Panibica Beauty	7.66	84.33	8	0.16
V_{13}	Arka Naveen	7.76	81.99	9	0.17
V_{14}	Manhattan	8.33	73.68	8.7	0.11
V_{15}	Snow Board	7	67.83	7.33	0.11
	F-TEST	S	S	S	S
	SE(d)±	0.59	1.75	0.38	0.23
	$C D_{0.05}$	1.22	3.60	1.12	0.02
	C.V.	8.95	2.6	0.54	1.62

3.2 Floral Parameters

Number of days for Spike emergence - Significantly, less number of days for spike emergence (70.83 days) was recorded in the variety V6 (Pusa Suhagin), followed by variety V13 (Arka Naveen, 72.2 days) whereas, the variety that took more number of days for spike emergence V15 (snow Board, 90 days).

This variation among cultivars might be due to genetic traits and prevailing climatic condition. These findings are accordance with **Singh and Singh (2013), Patil et al (2009)** and **Rachana et al (2013).**

Number. of florets per spike-

Significantly, more number of floret per spike (16.6) was recorded in the variety V6 (Pusa Suhagin), followed by variety V9 (Arka Pratham, 15.6) whereas, the less number of spike recorded in V15 (snow Board, 10.66).

This variation in florets per spike may be due to genetic variability among the different cultivars of gladiolus and prevailing environmental conditions. Variation in number of florets among the varieties was also reported **Ramachandrudu and Thangam (2004)** and **Singh and Singh (2013).**

Quality parameters

Spike length - Significantly, longer spike length (113.6 cm) was recorded in the variety V6 (Pusa Suhagin), followed by variety V13 (Arka Naveen, 111.3 cm) whereas, the shorter spike length recorded in V15 (snow Board, 74.66 cm).

The number of days taken from flower bud initiation to tight bud stage is an important character of rose cut flower, which indicates the early or late flowering habit of any of the cultivars. Both characters like bud stage and tight bud stage are helpful in the availability of flowers for a long among different cultivars. Variation for late or early flowering seems to be the genetically inherent character of different variety. Similar results have also been reported by **Harshvardhan (2009), Nagaraja (1996), Manjula (2005)** in gladiolus.

Floret diameter- Significantly, bigger floret diameter (12.33) was recorded in the variety V5 (Souvik Biscuit), at par by variety V9 (Arka Pratham, 12) and V13(Arka Naveen 11.9) whereas, the less number of spikes recorded in V15 (Snow Board, 10.66).

The differences in floret diameter varieties may be attributed to the fact that this genetic character varied from variety to variety. The variation in floret diameter might be due to the retarded growth of the plants, low temperature and low light intensity in winter as reported earlier by **Gill and Atwal (1976), Gill *et al* (1988)** and **Terfa *et al* (2014).**

Corm Diameter- Significantly, higher corm diameter (6.49 cm) was recorded in the variety V9 (Arka Pratham), followed by variety V3 (Dhanvantri, 5.33) whereas, the lesser corm diameter recorded in V15 (Snow Board, 2.63).

The differences in corm diameter varieties may be attributed to the fact that this genetic character varied from variety to variety. Similar findings of **Murugesan *et al* (1991), Bhattacharjee (1993) *et al*** and **Sundram *et al* (1996).**

Table 2. Floral and quality parameters of different varieties of gladiolus

Notation	Varieties	Number of days for Spike emergence	Spike length(cm)	Number of florets per spike	Floret diameter(mm)	Corm Diameter(cm)	Vase life(days)
V_1	Priscilla	81.83	111	14.33	23.5	5.33	9.66
V_2	Joshika	86.82	106	14.66	25.1	4.74	8.66
V_3	Dhanvantari	78.16	101.66	13.33	21.2	5.55	7.66
V_4	Phule Neel Rekha	74.83	109.66	14	35.1	5.21	8.33
V_5	Souvik Biscuits	83.16	91.66	14.33	29.4	3.73	7.33
V_6	Pusa Suhagin	70.83	113.6	13	22.7	6.55	7.5
V_7	Chandani	69.16	81.33	16	32.1	4.55	9.66
V_8	Arka Amar	73.16	99.66	16.16	23.9	3.52	10.66
V_9	Arka Pratham	76	112	12.66	27.2	6.49	11.66
V_{10}	Smoky Lady	82.16	97	13.66	27.3	4.55	9.83
V_{11}	Arka Tilak	71.83	104	15.66	28.3	5.52	11.5
V_{12}	Panibica Beauty	78.5	88	15.66	28.9	3.74	9.33
V_{13}	Arka Naveen	81.16	111.3	13.33	26.3	4	8.83
V_{14}	Manhattan	76.16	79	12.66	28	4.48	8.5
V_{15}	Snow Board	90	74.66	10.66	25.1	2.63	7.16
	F-TEST	S	S	S	S	S	0.8
	SE(d)±	0.46	0.97	0.58	0.41	0.41	0.8
	$C D_{0.05}$	1.36	2.01	1.20	0.84	0.20	0.38
	C.V.	0.66	1.22	5.08	1.87	5.29	5.25

Table 3. Yield parameters of different varieties of gladiolus

Notation	Varieties	Number of Spikes per plant	Corm yield per plant	Corm weight per plant(g)
V_1	Priscilla	1.66	6.2	42.68
V_2	Joshika	1.33	2.66	45.52
V_3	Dhanvantari	2.16	3.33	49.6
V_4	Phule Neel Rekha	2	3.33	55.5
V_5	Souvik Biscuits	1.5	3.66	51.4
V_6	Pusa Suhagin	2.83	6.8	62.8
V_7	Chandani	1.83	3.2	54.8
V_8	Arka Amar	2.66	6.66	57.8
V_9	Arka Pratham	2.16	4	55
V_{10}	Smoky Lady	2.33	2.66	50.7
V_{11}	Arka Tilak	2.66	6.66	40.8
V_{12}	Panibica Beauty	1.33	4	44.6
V_{13}	Arka Naveen	1.66	3	52.7
V_{14}	Manhattan	1.83	2	44.8
V_{15}	Snow Board	1	1.33	38.6
	F-TEST	S	S	S
	SE(d)±	0.46	0.39	6.39
	$C D_{0.05}$	0.95	0.91	2.25
	C.V.	29.27	13.81	0.89

Yield parameters

Number of spikes per plant

Significantly, more number of spikes per plant (2.83) was recorded in the variety V6 (Pusa Suhagin), followed by variety V8 (Arka Amar, 2.66) whereas, the less number of spikes per plant recorded in V15 (Snow Board, 1).

The result indicated that highly significant difference among different cultivars with respect to spikes produced per plant being genetically controlled factor, variation occurred due to the hereditary traits of different cultivars under prevailing environment. The results are in spikes per plant is in accordance with **Patil et al. (2009), Ramchandrudu and Thangam (2009)** in gladiolus.

Number of corms yield per plant

Significantly, more number of corm yield per plant (6.8) was recorded in the variety V6 (Pusa Suhagin), followed by variety V8 (Arka Amar, 6.6) whereas, the less number of corm yield recorded in V15 (snow Board, 1.33).

Corm weight - Significantly, higher corm weight (62.8) was recorded in the variety V6 (Pusa Suhagin), followed by variety V8 (Arka Amar, 57.8) whereas, the lesser corm weight recorded in V15 (Snow Board, 1.33).

The higher yield might be due to increased morphological characters viz. plant height, a greater number of leaves which help in the production of more photosynthesis resulting in greater accumulation of dry matter which related to the production of a higher weight and higher number of bulb per hectare. Similar results were also found by **Nagaraja (1996).**

4. CONCLUSION

From the present investigation, it is concluded that among the different variety of gladiolus, V6 (Pusa Suhagin) performed significantly better in plant height, number of leaves, spike length, more number of spike per plant, more number floret per spike, however less number of days taken for first sprouting recorded in V15 (Snow Board) and Vase life higher in variety V9 (Arka Pratham).

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