

## Evaluation of Gladiolus Cultivars for Cut Flower Production Under Open Field Conditions

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### ABSTRACT

Gladiolus, a widely cultivated ornamental crop is valued for its vibrant spikes and adaptability to diverse climatic conditions. This study evaluated eight gladiolus varieties: Punjab Hybrid, Joshka, Chandavar, Punjab Dawn, Punjab Home, Souvik Biscuits, Pusa Suhagin and Arka Naveen under open-field conditions in the Northern Dry Zone of Karnataka. The experiment, conducted in a Randomized Complete Block Design (RCBD) with three replications, assessed key growth parameters such as plant height, number of leaves, leaf length and leaf area, along with floral traits including spike number, spike length, rachis length, floret count and floret diameter. Significant variability was observed among the varieties for all parameters. Arka Naveen recorded the tallest plants (96.4 cm) and largest leaf area (131.84 cm<sup>2</sup>), while Souvik Biscuits exhibited the highest number of leaves (12) and longest leaves (53.6 cm). In floral traits, Punjab Hybrid achieved the highest spike production (2.28 spikes per plant) whereas Souvik Biscuits recorded the longest rachis (42 cm). The maximum floret diameter (7.3 cm) was observed in Pusa Suhagin, highlighting its potential for aesthetic and commercial applications. The findings revealed substantial genetic variability among the gladiolus varieties, with Arka Naveen, Souvik Biscuits and Chandavar demonstrating superior growth and floral attributes. These results provide valuable insights for breeders and cultivators, offering a foundation for selecting high-performing varieties suitable for ornamental and commercial purposes. The study underscores the potential for optimizing gladiolus production in agro-climatic zones like Karnataka.

**Keywords:** Cultivar, Floral traits, Floret diameter, Genetic Variability, Gladiolus, Growth, Leaf area, Spike production.

### INTRODUCTION

Gladiolus is a highly attractive bulbous cut-flower crop known for its large, well-textured and vividly colored spikes, which are in high demand in both international and domestic markets. In recent years, the demand for gladiolus has surged due to its ability to endure long-distance shipping and its wide range of colors, including blue, white, red, yellow, pink, mauve and various combinations. Gladiolus spikes are primarily used for garden displays, interior decoration and bouquet arrangements (Chadha and Sood, 2007). Globally, the total area under bulbous ornamentals is approximately 50,000 hectares, with gladiolus occupying around 9,500 ha. Major gladiolus-growing countries include the Netherlands, the UK, the USA, Japan, South Africa and Australia. The USA is a major producer of gladiolus, exporting 6.5 million gladiolus spikes annually while importing approximately 13 million cut stems per year (Kearney *et al*, 2004). In India, gladiolus is grown over an area of

25,000 ha, producing around 753 lakh spikes. It is commercially cultivated in several states, including West Bengal, Himachal Pradesh, Karnataka, Uttar Pradesh, Punjab and New Delhi (Rani *et al*, 2007). In Karnataka, gladiolus is grown throughout the year, particularly in the tropical regions of the state, where the favorable climate supports its cultivation. The state's climate, characterized by moderate temperatures and well-drained soils, provides optimal conditions for growing gladiolus. Major cultivation areas in Karnataka include regions with both open-field and controlled polyhouse conditions, where the crop is evaluated for its adaptability and flower quality. Gladiolus, with its rich varietal diversity, continues to see the introduction of new cultivars each year. As a result, evaluations of various gladiolus cultivars are regularly conducted to determine their suitability for growth in Karnataka's diverse agro-climatic zones (Krishnappa *et al*, 2015).

**Table 1: Growth Performance of Gladiolus Varieties Evaluated Under Open Field Conditions.**

Variety	Plant height (cm)	Number of leaf/plant (number)	Leaf length (cm)	Leaf area (cm <sup>2</sup> )
Punjab Hybrid	75.5	11	44	80.78
Joshka	84	11	42	99.96
Chandavar	86.4	8	46	118.86
Punjab Dawn	95	10	47	124.64
Punjab Home	78	10	39	95.47
Souvik Biscuits	94.6	12	53.6	109.34
Pusa Suhagin	76.5	10	35	69.02
Arka Naveen	96.4	9	52.4	131.84
S.Em ±	1.510	0.132	0.479	1.63
CD at 5%	4.581	0.400	1.453	4.929

## MATERIALS AND METHODS

The experiment was conducted at the Department of Floriculture and Landscape Architecture, College of Horticulture, Bagalkot, Karnataka, located in the Northern Dry Zone of Karnataka. The experimental site is positioned at a latitude of 16.18° N, a longitude of 75.7° E and an elevation of 533 meters above mean sea level. This region is characterized by semi-arid climatic conditions with moderate rainfall and distinct summer and winter seasons, making it highly suitable for gladiolus cultivation. The study was laid out in a Randomized Complete Block Design (RCBD), involving eight gladiolus varieties as treatments, each replicated thrice. The varieties selected for evaluation included Punjab Hybrid, Joshka, Chandavar, Punjab Dawn, Punjab Home, Souvik Biscuits, Pusa Suhagin and Arka Naveen. The plot layout was designed with a spacing of 30 cm between rows and 20 cm between plants, resulting in a population of 20 plants per plot. Uniform and healthy corms, free from pests and diseases, were carefully selected for planting to ensure consistent growth and accurate results.

All cultural practices were uniformly implemented across all treatments. The soil was thoroughly ploughed, leveled and raised beds were prepared to ensure proper drainage. Fertilization included a basal dose of NPK at 30:20:30 kg/ha, applied at planting, with nitrogen applied in two equal splits at 30 and 60 days after planting. Regular irrigation was provided at intervals of 7–10 days, depending on soil moisture levels. Manual weeding was carried out periodically to maintain weed-free plots. Plant protection measures were followed as per recommendations to control pests and diseases,

ensuring optimal crop growth and health. The observations were recorded from five randomly selected plants per treatment and the data were averaged to evaluate various growth and floral parameters. Growth parameters included plant height (cm), the number of leaves per plant, leaf length (cm) and leaf width (cm). Floral parameters assessed were the number of spikes per plant, spike length (cm), rachis length (cm), number of florets per spike and floret diameter (cm).

Instruments used for data collection included a measuring tape for assessing plant height, leaf length and width, a measuring scale for measuring spike and rachis lengths and a vernier caliper for recording floret diameter.

## RESULTS AND DISCUSSION

### Growth Parameters

The data on plant height, number of leaves per plant and leaf length (Table 1) revealed that the variety Arka Naveen exhibited the maximum plant height (96.4 cm) followed by Punjab Dawn (95 cm). The minimum plant height was recorded in Pusa Suhagin (75.5 cm). The variation in plant height could be attributed to genetic potential as reported by various studies on gladiolus growth patterns. Similar findings were observed by Meena *et al* (2016) in gladiolus varieties, where genetic variability significantly influenced plant height. The maximum number of leaves per plant (12) was recorded in Souvik Biscuits, whereas the minimum was observed in Chandavar (9). The variation in the number of leaves per plant could be due to the inherent genetic potential of the different cultivars, which influences leaf production and overall plant architecture. This is consistent with the findings

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**Table 2: Floral Characteristics of Gladiolus Varieties Evaluated Under Open Field Conditions.**

Variety	Number of spikes/plant (number)	Spike length (cm)	Rachis Length (cm)	Number of floret/spike (no.)	Floret diameter (cm)
Punjab Hybrid	2.28	49.6	25	10	5.2
Joshka	1.13	52	19	11	4.6
Chandavar	1.78	56	18	10	4.8
Punjab Dawn	1.13	48	20	12	5.1
Punjab Home	1.11	53	15.5	10	5.4
Souvik Biscuits	1.68	54.3	42	11	6.5
Pusa Suhagin	1.13	37	25.8	12	7.3
Arka Naveen	2.17	48.4	23	9	4.9
S.Em ±	0.026	0.91	0.34	0.171	0.10
CD at 5%	0.078	2.29	1.04	0.518	0.30

of Swaroop (2015), who also observed variability in leaf number among gladiolus cultivars.

The maximum leaf length (53.6 cm) was recorded in Souvik Biscuits, followed by Arka Naveen (52.4 cm). The minimum leaf length was observed in Pusa Suhagin (35 cm). This significant variation could be attributed to the differences in the genetic makeup of the varieties, affecting the leaf development process. These findings were consistent with Mushtaq *et al.* (2018), who reported significant differences in leaf length across gladiolus cultivars. The maximum leaf area (131.84 cm<sup>2</sup>) was recorded in Arka Naveen, followed by Punjab Dawn (124.64 cm<sup>2</sup>). The minimum leaf area was observed in Pusa Suhagin (69.02 cm<sup>2</sup>).

### Floral Parameters

The number of spikes per plant showed significant variation among the gladiolus cultivars. The highest number of spikes per plant was observed in Punjab Hybrid (2.28), Arka Naveen (2.17), while the lowest number of spikes per plant was recorded in Punjab Home (1.11). This variation in spike numbers can be attributed to the genetic differences among the cultivars, as noted by Rani *et al.* (2007), who highlighted the genetic potential's role in determining spike production.

Spike length also varied significantly among the gladiolus cultivars. The highest spike length was recorded in Chandavar (56 cm), followed by Souvik Biscuits (54.3 cm) and the lowest spike length was recorded in Pusa Suhagin (37 cm). This variation in spike length can be attributed to the genetic differences between cultivars, as supported by Islam *et al.* (2017) and Chourasia *et al.* (2015), who observed similar results, emphasizing the role of genetic potential in determining spike length in gladiolus.

The rachis length of gladiolus cultivars exhibited significant variation, with the maximum rachis length recorded in Souvik Biscuits (42 cm), followed by Pusa Suhagin (25.8 cm) and Punjab Hybrid (25 cm). The shortest rachis length was observed in Punjab Home (15.5 cm). This variation in rachis length can be attributed to the genetic traits of the cultivars and their interaction with environmental conditions. Swaroop (2015) also reported significant differences in rachis length among gladiolus cultivars due to both genetic and environmental factors. Regarding the number of florets per spike, significant differences were observed among gladiolus cultivars. The maximum number of florets per spike was recorded in Pusa Suhagin (12), Punjab Dawn (12) and followed by Joshka (11) and Souvik Biscuits (11), while the minimum number of florets per spike was recorded in Arka Naveen (10). The variation in the number of florets per spike can be attributed to the genetic potential of the cultivars. Similar findings were reported by Meena *et al.* (2016), who noted the significant role of genetic variability in determining the number of florets per spike in gladiolus.

The floret diameter also showed significant variation among gladiolus cultivars. The maximum floret diameter (7.3 cm) was observed in Pusa Suhagin, while the minimum floret diameter (4.6 cm) was recorded in Joshka. Other cultivars had floret diameters ranging from 4.8 cm (Chandavar) to 6.5 cm (Souvik Biscuits). The variation in floret diameter can be attributed to the inherent genetic differences of the cultivars, which influence their flower morphology. These findings are consistent with earlier reports indicating that genetic factors play a crucial role in determining the flower size in gladiolus (Chopade, 2011; Singh *et al.*, 2017).

## CONCLUSION

The study demonstrated substantial variability in growth and flowering traits among gladiolus varieties, providing essential insights for selecting high-performing cultivars. Varieties like Arka Naveen, Souvik Biscuits and Chandavar exhibited superior growth and floral attributes, making them suitable for ornamental and commercial purposes. These findings serve as a valuable resource for growers and breeders to enhance gladiolus cultivation practices.

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