



# Study for Morphological Characteristics on Different Cultivars of Gladiolus Flower

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## Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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## ABSTRACT

The experiment was conducted at Horticulture Research Farm, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi, Uttar Pradesh during the year 2023-2024 out to assess the performance of both indigenous and foreign gladiolus varieties under the climatic conditions of Eastern Uttar Pradesh. The experiment was laid out in a Randomized Block Design (RBD) with five replications in plot size of 1m x 1m. Healthy, disease-free corms from both Indian and exotic varieties were planted in November 2023. Results showed that cultivars Arka Lohit and Red Majesty showed 100% sprouting. Cultivar Arka Amar had maximum sprouts per hill than others. Cultivar White Prosperity topped in terms of plant height, scape width and internodal distance whereas, cultivar Gunjan (2.68) had maximum no. of corms while cultivar Suchitra has maximum corm weight. These findings show how different gladiolus varieties have unique physical traits, helping breeders and commercial growers choose the best ones for producing cut flowers.

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**Keywords:** *Gladiolus*; flowering; spike emergence; corm; exotic.

## 1. INTRODUCTION

*Gladiolus* (*Gladiolus grandiflorus*) is a widely cultivated ornamental plant known for its eye-catching floral spikes and impressive vase life, making it a significant player in the global floriculture industry. It is bulbous in nature and due to its popularity, it is often called queen of bulbous flowers (Bhusaraddi et al., 2025). Leaves are in sword like appearance that is why often regarded commonly as sword lily. With around 260 species, predominantly native to sub-Saharan Africa, gladiolus has become an essential cut flower in major flower-producing countries in domestic as well as international market (Singh & Sisodia, 2017). It has vibrant and fascinating florets which develops on long spikes that emerges from central growing portion of the corm, specifically from axil of leaves.

Due to the diverse range of climatic conditions around the world and most of the conditions prevail in India, it became an essential part in order to check the credibility and nature of available cultivars further, selecting varieties that thrive under specific environmental conditions while meeting commercial standards is crucial (Nasir et al., 2025). Evaluating these cultivars for their growth patterns, floral characteristics, and overall yield helps identify superior varieties that offer better performance and market appeal (Jadhav et al., 2025). This study aims to assess selected gladiolus varieties to determine their suitability for commercial production, providing insights that may benefit growers in improving productivity and quality also help in selection of cultivars suitable for specific reasons.

## 2. MATERIALS AND METHODS

The experiment is carried out at Horticulture Research Farm, Institute of Agriculture Sciences, Banaras Hindu University, Varanasi, Uttar Pradesh during the year 2023-2024 to investigate the certain performance-based observations of different gladiolus genotypes. The experiment is carried out on healthy 27 gladiolus cultivars (Arka Amar, Arka Ayush, Arka Lohit, Arka Nazrana, Arka Pratham, Arka Sapna, Arka Sobha, Big Time Supreme, Charishma, CPG, Flavo Souvenir, GS-2, Gunjan, Hunting Song, Nova Lux, Peter Pears, Pink City, Priscilla, Punjab Dawn, Pusa Shubham, Pusa Srijana, Red Majesty, Suchitra, Tiger Flame, True Love, White Prosperity, and Yellow Stone). The

experiment was laid out in a Randomized Complete Block Design having 5 replications. Manure (FYM) along with all other fertilizers were applied accordingly during the final land preparation. Corms were planted at a row spacing of 30 cm and plant to plant spacing at 20 cm. Necessary cultural operations were carried out timely for all the cultivars. The data were recorded on the selected parameters and were analyzed statistically.

## 3. RESULTS AND DISCUSSION

### 3.1 Growth Parameters

The sprouting percentage varied greatly from 100% to 66.47 % (Table 1) among the gladiolus varieties studied. Cultivars Arka Lohit (100%) and Red Majesty (100%) recorded maximum sprouting percentage whereas Charishma (66.47%) was least performing cultivar. Early cultivars have shorter dormancy period and vice versa. It can be regulated by environmental conditions as well as soil temperature of experimental area. The experimental findings revealed significant variation in number of sprouts and plant height. Cultivar Arka Amar (2.49) recorded maximum sprouts/hill, exhibiting a statistically significant advantage over the variety Arka Lohit (1.37). More sprouts per hill means more spike from single corm and more multiplication. Bolagam, (2018) found similar findings in gladiolus. The attribute plant height has varied enormously in the genotypes due to difference in genetically constituent as well their adaptability in environmental conditions (Kumar & Yadav, 2005). White Prosperity (65.31 cm) exhibit tallest plant whereas shortest plant height was observed in Arka Ayush (43.19 cm). The variation in plant height in different genotypes may be due to influence of genetic and environmental factors. Baruah & Bora, (2022) in gladiolus found similar findings (Anil et al., 2017).

### 3.2 Flowering Parameters

Table 1 showed the data for the spike emergence that varied from 72.30 days to 91.96 days. Earliest spike emergence was recorded in cultivar Arka Pratham (72.30 days) and Arka Sapna (74.95 days), while cultivar White Prosperity (91.96 days) exhibit longest duration for spike emergence. The time taken for spike emergence is an important trait in gladiolus

**Table 1. Performance of cultivars of gladiolus on growth and flowering parameters**

| <b>Treatments</b> | <b>Sprouting percentage (%)</b> | <b>No. of sprouts per hill</b> | <b>Plant height (cm)</b> | <b>Spike emergence (days)</b> | <b>Scape width (cm)</b> | <b>Internodal distance (cm)</b> |
|-------------------|---------------------------------|--------------------------------|--------------------------|-------------------------------|-------------------------|---------------------------------|
| Arka Amar         | 94.68                           | 2.49                           | 64.70                    | 89.41                         | 2.30                    | 4.27                            |
| Arka Ayush        | 87.21                           | 1.57                           | 43.19                    | 85.30                         | 2.41                    | 3.75                            |
| Arka Lohit        | 100                             | 1.37                           | 57.78                    | 81.44                         | 2.32                    | 4.08                            |
| Arka Nazrana      | 98.5                            | 1.41                           | 57.33                    | 79.97                         | 2.23                    | 4.23                            |
| Arka Pratham      | 88.28                           | 1.83                           | 65.61                    | 72.30                         | 2.43                    | 4.99                            |
| Arka Sapna        | 94.38                           | 1.62                           | 58.08                    | 74.96                         | 2.03                    | 4.51                            |
| Arka Sobha        | 82.42                           | 1.68                           | 59.00                    | 75.74                         | 1.95                    | 5.10                            |
| Big Time Supreme  | 84.06                           | 1.91                           | 58.73                    | 80.26                         | 2.11                    | 4.25                            |
| Charishma         | 66.47                           | 1.49                           | 49.90                    | 78.20                         | 1.66                    | 4.01                            |
| CPG               | 93.58                           | 1.98                           | 59.44                    | 79.97                         | 1.79                    | 4.42                            |
| Flavo Souvenir    | 73.81                           | 2.37                           | 54.82                    | 87.88                         | 2.16                    | 4.91                            |
| GS-2              | 97.41                           | 1.65                           | 57.78                    | 87.31                         | 2.21                    | 2.93                            |
| Gunjan            | 79.32                           | 2.00                           | 59.46                    | 82.65                         | 2.18                    | 3.73                            |
| Hunting Song      | 92.11                           | 1.89                           | 60.77                    | 82.96                         | 2.32                    | 5.12                            |
| Nova Lux          | 88.33                           | 2.02                           | 64.06                    | 82.22                         | 2.07                    | 4.27                            |
| Peter Pears       | 86.14                           | 1.64                           | 56.55                    | 74.08                         | 2.22                    | 5.23                            |
| Pink City         | 76.28                           | 1.56                           | 52.09                    | 79.15                         | 1.94                    | 4.23                            |
| Priscilla         | 83.69                           | 1.75                           | 57.90                    | 82.92                         | 2.13                    | 4.30                            |
| Punjab Dawn       | 94.23                           | 2.05                           | 58.87                    | 81.62                         | 2.18                    | 4.80                            |
| Pusa Shubham      | 86.18                           | 1.47                           | 59.44                    | 86.14                         | 2.08                    | 6.03                            |
| Pusa Srijana      | 83.57                           | 2.00                           | 57.73                    | 78.92                         | 2.04                    | 3.37                            |
| Red Majesty       | 100                             | 1.81                           | 60.70                    | 84.44                         | 2.10                    | 4.47                            |
| Suchitra          | 78.36                           | 1.70                           | 62.12                    | 77.74                         | 2.42                    | 6.70                            |
| Tiger Flame       | 68.39                           | 1.69                           | 60.53                    | 79.22                         | 2.21                    | 5.25                            |
| True Love         | 88.34                           | 1.99                           | 58.96                    | 85.38                         | 2.08                    | 4.18                            |
| White Prosperity  | 87.26                           | 1.57                           | 65.31                    | 91.96                         | 2.56                    | 7.07                            |
| Yellow Stone      | 79.29                           | 1.47                           | 56.94                    | 83.10                         | 2.13                    | 4.52                            |
| <b>CD at 5%</b>   | 10.83                           | 0.35                           | 5.87                     | 5.91                          | 0.46                    | 2.18                            |

**Table 2. Performance of cultivars of gladiolus for flowering and corm attributes**

| <b>Treatments</b> | <b>Days for colour show of 1<sup>st</sup> floret</b> | <b>Days for colour show of 3<sup>rd</sup> floret</b> | <b>Days for colour show of 5<sup>th</sup> floret</b> | <b>Number of corms / hill</b> | <b>Weight of corms (g)</b> | <b>Diameter of corms (g)</b> |
|-------------------|--|--|--|-------------------------------|----------------------------|------------------------------|
| Arka Amar         | 90.91  | 92.46  | 93.59  | 2.49                          | 45.41                      | 37.18                        |
| Arka Ayush        | 92.03  | 93.31  | 94.07  | 1.53                          | 16.98                      | 36.93                        |
| Arka Lohit        | 89.35  | 90.84  | 91.77  | 1.80                          | 35.24                      | 41.34                        |
| Arka Nazrana      | 93.40  | 94.46  | 95.39  | 1.64                          | 19.53                      | 38.84                        |
| Arka Pratham      | 80.71  | 82.06  | 84.60  | 1.50                          | 37.10                      | 41.40                        |
| Arka Sapna        | 86.87  | 87.73  | 88.94  | 1.17                          | 35.50                      | 37.52                        |
| Arka Sobha        | 85.69  | 86.82  | 87.78  | 1.13                          | 32.99                      | 46.90                        |
| Big Time Supreme  | 91.60  | 92.87  | 93.58  | 1.12                          | 38.81                      | 33.80                        |
| Charishma         | 95.83  | 96.79  | 97.74  | 1.73                          | 30.63                      | 31.12                        |
| CPG               | 82.63  | 83.84  | 85.15  | 1.27                          | 11.76                      | 29.32                        |
| Flavo Souvenir    | 96.31  | 97.71  | 98.52  | 1.74                          | 22.78                      | 42.07                        |
| GS-2              | 72.92  | 74.10  | 75.17  | 2.41                          | 37.02                      | 43.49                        |
| Gunjan            | 80.03  | 81.32  | 81.95  | 2.69                          | 25.89                      | 30.95                        |
| Hunting Song      | 86.23  | 87.45  | 88.34  | 2.42                          | 35.54                      | 30.95                        |
| Nova Lux          | 77.15  | 79.46  | 80.54  | 2.14                          | 34.09                      | 43.31                        |
| Peter Pears       | 79.53  | 80.75  | 82.05  | 2.59                          | 30.58                      | 42.30                        |
| Pink City         | 94.02  | 95.22  | 96.52  | 1.72                          | 27.47                      | 40.98                        |
| Priscilla         | 80.67  | 82.31  | 83.59  | 1.75                          | 71.73                      | 47.14                        |
| Punjab Dawn       | 87.09  | 88.32  | 89.38  | 2.33                          | 60.31                      | 44.96                        |
| Pusa Shubham      | 92.25  | 93.55  | 94.72  | 2.57                          | 31.86                      | 39.15                        |
| Pusa Srijana      | 87.06  | 88.36  | 89.88  | 1.49                          | 30.48                      | 34.08                        |
| Red Majesty       | 96.46  | 97.76  | 98.84  | 1.48                          | 20.53                      | 29.93                        |
| Suchitra          | 99.42  | 100.40   | 101.91   | 2.01                          | 68.50                      | 54.36                        |
| Tiger Flame       | 86.13  | 87.36  | 88.54  | 1.23                          | 20.29                      | 40.42                        |
| True Love         | 89.27  | 90.63  | 91.73  | 1.72                          | 22.63                      | 38.19                        |
| White Prosperity  | 80.73  | 82.20  | 83.61  | 2.48                          | 44.20                      | 45.88                        |
| Yellow Stone      | 91.86  | 93.10  | 94.52  | 1.98                          | 26.49                      | 35.07                        |
| <b>CD at 5%</b>   | <b>15.98</b>   | <b>15.75</b>   | <b>15.60</b>   | <b>1.19</b>                   | <b>34.64</b>               | <b>14.64</b>                 |

varieties and is likely influenced mainly by the plant's genetic makeup. It may also depend on the food reserves within the plant, which are linked to the plant's growth rate and its ability to accumulate enough carbohydrates needed for spike development. Mushtaq *et al.*, (2018) and Nalage *et al.*, (2019) on gladiolus observed similar finding in gladiolus. Maximum scape width (Table 1) was recorded in White Prosperity (2.55 cm) and Charishma had exhibit the narrowest scape (1.66 cm). Greater scape width enhances plant's ability to support multiple florets without breaking. Cultivar White Prosperity (7.06 cm) noticed longest internodal distance significantly differing from Suchitra (6.70 cm) while cultivar GS-2 has the shortest internodal length. The variation in internodal length could be attributed to the plant's genetic composition, which is influenced by its genotypic traits. Shravan Kumar *et al.* (2017) and in gladiolus observed similar finding. For earliest opening of 1<sup>st</sup>, 3<sup>rd</sup> and 5<sup>th</sup> floret (Table 2), cultivar GS-2 takes minimal duration while cultivar Suchitra had taken maximum days. The earliest cultivars open their flowers early which is of important use in the market. The variation in opening of days to floret opening among different cultivars may be attributed to differences in their genetic makeup, that leading to diverse phenotypic expressions. Comparable findings on flowering traits in gladiolus have also been reported by Kumar *et al.*, (2018) on various varieties of gladiolus.

### 3.3 Corm Parameters

The experimental findings revealed significant variation in the number of corms per hill (Table 2) among the gladiolus varieties. Gunjan produced maximum number of corms (2.68) which was statistically par with Peter Pears (2.59) whereas cultivar Arka Shobha (1.12) observed to have least number of corms. The significant variation is observed among all the cultivars which varies according to their different genotype as well as environmental factors largely due to their genetic makeup. Each variety's genetic makeup affects how it responds to different soil types and weather conditions. More corm production led to more multiplication and can be used for further breeding programs. Kumawat *et al.*, (2018) in gladiolus and Singh *et al.*, (2020) in gladiolus observed variability in number of corms in their study. The data of cultivars for weight of corms were varied vastly (Table 2). Suchitra (68.50 g) shows maximum weight and CPG (11.76 g) shows least in terms of weight. The variation observed attributable to greatest corm

weight and corm size at the time of planting. Number of corms produced per plant may also impacted the weight of corms. Kumar *et al.*, (2018) in gladiolus observed same findings.

## 4. CONCLUSION

The study demonstrated that different gladiolus genotypes significantly influenced the plant's growth, flowering, and yield characteristics. Out of the twenty-seven genotypes tested Arka Amar, Arka Pratham, Hunting Song, GS-2 and White Prosperity emerged as the most promising, showing superior flower quality and yield performance, making them well-suited for cultivation. The observed variations in key traits underline the importance of varietal selection for optimizing gladiolus production and quality.

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## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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