*Original Research Article*

# Performance of gladiolus genotypes for growth and flowering under Gangetic region of Bihar, India


## Abstract

An evaluation experiment on performance of gladiolus genotypes was conducted at Botanical Garden, Bihar Agricultural University, Sabour during 2021-2022 for the identification of suitable genotype for the cultivation in Bihar. Twenty genotypes of gladiolus were evaluated for vegetative, floral and vase life parameters under Gangetic region of Bihar conditions. The best genotypes identified in present investigation based on mean performance were White Prosperity (79.73 cm), Red Majesty (79.27 cm), Nova Lux (73.47 cm) and Rose Supreme (73.40 cm) for spike length. Earliness in flowering was observed in Rose Supreme (83.53 days) which was at par with Punjab Dawn (83.60 days). Genotype Kum Kum responded well for number of spikes per plant (2.73), whereas Pusa Shubham for corms production (3.33). Genotype White Prosperity (30.27 days) and Rose Supreme (28.47 days) were recorded long flowering duration.



**Keywords:** Gladiolus, genotypes, spike length, florets, corm and cormels


## Introduction

Gladiolus is one of the most cultivated, economically important and common flowering plants. It is commonly known as Sword lily or queen of the bulbous flowers for its excellent aesthetic value and display life [1]. It is native to South Africa and presently has been cultivated throughout the world due to its attractive characteristics, dazzling colors, varying sizes and long vase life [2]. Its demand is very high among consumers and florist because of its fascinating spikes with variety of colours that make it attractive for use in as cut flower, making bouquets, indoor decoration and in landscaping as herbaceous borders, bedding plants, in rockeries and pots. It has the $8^{th}$ rank of cut flowers and first rank of bulbous flowers in the world trade [3]. The major gladiolus growing states are West Bengal, Maharashtra, Uttar Pradesh, Himachal Pradesh and Uttarakhand. It is one of the dominating cut flowers in the flower market of Bihar, but its cultivation is very negligible in Bihar and most of the cut flower procured in Bihar from West Bengal. However, many climatic conditions like abundant sunshine and favourable temperature for its growth are available in Bihar. Thus, there is much scope for increase in cultivation of gladiolus in Bihar.

The first important step in any crop improvement programme is evaluation. It is the basic tool for assessing the genetic variability present in any crop species, which could be exploited for its commercialization. The performance of any crop or genotype mainly depends on genotypic and environmental interaction. As a result, genotypes, which perform well in one region, may not perform same in other regions of changing climatic conditions. Hence, it becomes very much necessary to study the morphological variation to find out suitable genotype for a particular region. Since there is no information available on the performance of gladiolus genotypes in Gangetic region of Bihar. Thus, the present evaluation experiment was conducted to study the relative performance of twenty genotypes of gladiolus for growth, flowering, quality and yield traits.

**Materials and Methods**

The present experiment was carried out at Botanical Garden, Department of Horticulture (vegetable & floriculture), BAU, Sabour during 2021-2022.The experiment was laid out in a randomized block design with twenty genotypes with three replications. The corms were treated with carbendazim (0.2%) before planting in field. The corms were planted in beds at a spacing of 30 cm x 30 cm. The recommended package and practices i.e., irrigation, hoeing, weeding and fertilizer application was given in time during the entire crop period for obtaining better quality spikes along with high yield. Observations were recorded in five randomly selected plants in each genotype for various vegetative and floral parameters.

**Results and discussion**

The findings of the research work conducted during 2021-2022, on the evaluation of twenty gladiolus genotypes revealed that the vegetative, floral and corms production parameters of the plants were greatly influenced due to genotypes. Mean data (Table 1) indicated that among the genotypes, White Prosperity had shown maximum plant height (82.47 cm) and minimum plant height was observed in genotypes Kum Kum (50.00 cm). The variation in plant height in different genotypes may be due to influence of genetic and environmental factors. Similar observations for plant height also reported by Singh et al. [4], Singh et al. [5]and Mushtaq et al. [6] in gladiolus.

Number of leaves per plant was observed maximum in genotypes Pusa Subham (12.73) followed by genotypes Punjab Dawn (10.80) and Traderhorn (10.80), while minimum number of leaves per plant was observed in genotypes Green Spire (6.87). The variation in number of leaves per plant might be due to genetic variation and difference in adaptation to

the agro climatic conditions [7]. Similar variations in number of leaves had been reported by Swaroop et al. [8] and Susila [9] in gladiolus.

Width of longest leaf was recorded maximum in genotypes Applouse (3.79 cm) followed by genotypes Pusa Subham (2.87 cm) and Algarve (2.87 cm) while width of longest leaf recorded minimum in genotypes Pink Lady (2.51 cm). The similar variation reported by Azimi [10].

Earliest spike emergence was exhibited by genotypes Rose Supreme (63.40 days) followed by Punjab Dawn (64.20 days) and genotype MPUAT Glad-1 took maximum days for first spike emergence (78.53 days). 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 Singh et al. [11].

Spike length at first floret open stage was recorded maximum in genotype White Prosperity (79.73 cm) followed by Red Majesty (79.27 cm) and genotype Kum Kum (60.39 cm) was observed to minimum spikes length at first floret open stage. This variation in spike length might be attributed to the inherent genetic characters associated with the genotypes. Spike length and rachis length are the important commercial traits in gladiolus which decide the rate in the market and their acceptability [12].

Earliest days to complete opening of first floret was exhibited by genotypes Rose Supreme (83.53 days) followed by Punjab Dawn (83.60 days) and genotype MPUAT Glad-1 (97.07 days) took maximum days to complete opening of first floret followed by White Prosperity (96.60 days). The results indicated that there is a particular set of flowering periods for each genotype. Results are similar to the findings of Singh et al. [11] and Solanki et al. [13]. This trait is important in gladiolus, which designates early or late flowering of genotypes and will be helpful in the availability of flowers.

Number of florets per spike was found maximum in genotype White Prosperity (13.73) followed by MPUAT Glad-1 (13.27) and genotype Green Star (8.47) was observed to minimum number of florets per spike. Number of florets differs from genotypes to genotypes, this might be due to hereditary traits of the cultivar of the gladiolus, which is governed by genetic makeup of the plants. Similar results on number of florets per spike have been reported by Rani and Singh [14] and Solanki et al. [13] in gladiolus.

Among the genotypes maximum number of spikes per plant was recorded in Kum Kum (2.73) whereas, minimum was recorded in Pink Lady (1.00) and Traderhorn (1.00). Variation in yield of spikes is mainly attributed due to the variation in sprouting percentage of corms and sprouts per plant which are the genetically controlled character Ainarkar et al. [15]. Similar findings were also observed by Geeta et al. [16] and Pattanaik et al. [17].

Number of corms was found maximum in genotype Pusa Subham (3.33) followed by genotype Kum Kum (2.93) and genotype Rose Supreme (1.07) had minimum number of corms. The variation observed in corm production amongst the genotypes studied might be due to differences in genetic as well as environmental factors. Similar result was also obtained by Singh et al. [11].

The results disclosed highly significant variations in weight of corms/plant among the genotypes. Maximum Weight of corms per hill was observed in genotype MPUAT Glad-1 (99.80 gm) followed by genotype Pusa Subham (98.73 gm), Punjab Dawn (96.74 gm) and minimum weight of corms per hill was observed in genotype Arka Poonam (24.45 gm). The variation observed in corm production amongst the genotypes studied might be due to differences in genetic as well as environmental factors. The weight of corm appeared to be associated with diameter of corm and number of cormels as evident from the results. It could be due to the fact the larger corms might have deposited more food resulting into their correspondingly heavier weight and vice versa. Similar findings were reported by Subhendu et al. [18] and Swetha et al. [19].

**Conclusion**

The research findings revealed that the different genotypes of gladiolus had the potential to influence the vegetative, flowering and yield traits of the plant. Among the twenty genotypes evaluated, Rose Supreme, White Prosperity, Pusa Shubham and Kum Kum were suitable for cultivation due to their flower quality as well as yield potential over other genotypes under Gangetic region of Bihar.



**Table-1 : Performance of gladiolus genotypes for growth and flowering under Gangetic region of Bihar**

| Genotypes | Plant height (cm) | Number of leaves per plant | Width of longest leaf (cm) | Days required for first spike emergence | Spike length (cm) at first floret open stage |
|---|---|---|---|---|---|
| Applouse | 66.50 | 10.13 | 3.79 | 73.27 | 68.40 |

| | | | | | |
|---|---|---|---|---|---|
| Pink Lady | 62.40 | 7.13 | 2.51 | 72.73 | 68.07 |
| Summer Sunshine | 62.93 | 7.33 | 2.85 | 71.00 | 69.13 |
| White Prosperity | 82.47 | 7.80 | 2.81 | 77.93 | 79.73 |
| Rose Supreme | 68.90 | 7.53 | 2.85 | 63.40 | 73.40 |
| Red Majesty | 66.00 | 7.67 | 2.80 | 71.20 | 79.27 |
| American Beauty | 66.10 | 7.80 | 2.66 | 69.27 | 68.73 |
| Nova Lux | 62.00 | 8.20 | 2.67 | 70.87 | 73.47 |
| Green Spire | 65.17 | 6.87 | 2.71 | 68.00 | 68.13 |
| Pusa Subham | 58.00 | 12.73 | 2.87 | 73.40 | 67.93 |
| Darshan | 52.80 | 8.33 | 2.54 | 68.40 | 61.20 |
| Gunjan | 69.97 | 7.47 | 2.75 | 75.87 | 68.53 |
| Algarve | 58.32 | 7.53 | 2.87 | 70.47 | 67.73 |
| Arka Poonam | 65.83 | 8.00 | 2.60 | 71.20 | 68.37 |
| Green Star | 65.38 | 7.73 | 2.59 | 74.40 | 63.27 |
| Punjab Dawn | 64.77 | 10.80 | 2.55 | 64.20 | 66.53 |
| Traderhorn | 57.27 | 10.80 | 2.68 | 68.73 | 70.53 |
| Arka Gold | 59.73 | 7.20 | 2.55 | 74.47 | 67.29 |
| Kum Kum | 50,00 | 10.60 | 2.74 | 77.00 | 60.39 |
| MPUAT Glad-1 | 62.77 | 8.93 | 2.85 | 78.53 | 68.07 |
| S. Em . ± | 1.929 | 0.293 | 0.116 | 2.420 | 2.513 |
| CD. at 5% | 5.524 | 0.839 | 0.334 | 6.928 | 7.197 |
| CV. % | 6.830 | 7.087 | 8.115 | 5.845 | 6.318 |



**Table-2 : Performance of gladiolus genotypes for growth and flowering under Gangetic region of Bihar**

| Genotypes | Days to complete opening of first floret | Number of florets per spike | Number of spikes per plant | Number of corms | Weight of corms per hill (gm) |
|---|---|---|---|---|---|
| Applouse | 93.87 | 9.07 | 1.13 | 2.20 | 69.93 |
| Pink Lady | 92.53 | 11.33 | 1.00 | 1.40 | 48.10 |
| Summer Sunshine | 91.67 | 12.20 | 1.20 | 1.20 | 57.60 |
| White Prosperity | 96.60 | 13.73 | 1.40 | 1.60 | 66.50 |
| Rose Supreme | 83.53 | 11.53 | 1.40 | 1.07 | 54.70 |
| Red Majesty | 92.00 | 12.13 | 1.47 | 1.80 | 76.30 |
| American Beauty | 90.73 | 11.73 | 1.47 | 1.87 | 60.63 |
| Nova Lux | 92.80 | 9.80 | 1.67 | 2.80 | 59.43 |
| Green Spire | 95.20 | 10.53 | 1.53 | 2.20 | 48.17 |
| Pusa Subham | 95.93 | 10.80 | 1.87 | 3.33 | 98.73 |
| Darshan | 96.00 | 9.47 | 1.53 | 2.00 | 32.18 |
| Gunjan | 92.67 | 10.20 | 1.40 | 1.67 | 41.70 |
| Algarve | 90.07 | 9.40 | 1.07 | 1.20 | 62.03 |
| Arka Poonam | 91.40 | 10.13 | 1.40 | 2.67 | 24.45 |
| Green Star | 92.87 | 8.47 | 1.40 | 1.60 | 46.70 |
| Punjab Dawn | 83.60 | 10.47 | 2.07 | 2.93 | 96.74 |
| Traderhorn | 87.20 | 12.00 | 1.00 | 1.87 | 42.83 |
| Arka Gold | 94.40 | 9.73 | 1.27 | 1.20 | 39.80 |
| Kum Kum | 94.80 | 8.73 | 2.73 | 2.93 | 45.20 |
| MPUAT Glad-1 | 97.07 | 13.27 | 1.47 | 2.47 | 99.80 |
| S. Em . ± | 1.175 | 0.523 | 0.072 | 0.079 | 1.19 |
| CD. at 5% | 3.365 | 1.497 | 0.207 | 0.226 | 5.49 |
| CV. % | 2.200 | 8.440 | 8.519 | 6.863 | 5.67 |



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