

## ORIGINAL ARTICLE

# Study on Growth, Floral and Corm Parameters of Gladiolus (*Gladiolus hybrida* L.) Hybrids

S. Naresh, A.V.D. Dorajee Rao, Ch. Satya Vani and L. Vanaja

Department of Floriculture and Landscape Architecture, Dr. Y.S.R. Horticultural University, HCRI, Venkataramannagudem - 534101, West Godavari District, Andhra Pradesh, India.

Email: nareshflori09@gmail.com

### ABSTRACT

An evaluation trial was laid out in randomized block design with three replications at HCRI, Venkataramannagudem, Andhra Pradesh and the material for the present study consisted eight hybrids namely (American Beauty, Arun, Darshan, Green Star, Limoncello, Meridiana, Pink Lady, White Prosperity and Dhiraj). The earliest sprouting (4.46 days) of corms was recorded by Meridiana which was on par with Limoncello (4.83 days). The minimum number of days taken for spike initiation was observed in Limoncello (50.06 days) followed by White Prosperity (57.03 days). The least number of days taken for basal floret to fully open was observed in hybrid Limoncello (63.03 days) which was statistically on par with White Prosperity (68.93 days). Among the hybrids evaluated spike length was highest in White Prosperity (103.07 cm) followed by Meridiana (88.08 cm). White Prosperity recorded the highest number of florets per spike (12.73) which was on par with Pink Lady (11.80) but significantly different from Darshan (10.90). The highest number of corms per plant was recorded by hybrid Darshan (2.73) which was on par with Dhiraj (2.46) and American Beauty (2.46) but significantly differed from White Prosperity (1.93).

Key words: Gladiolus, Hybrids, Growth, Floral, Corm and Yield Attributes

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### INTRODUCTION

Gladiolus is a member of family Iridaceae and subfamily Ixioideae, is one of the most popular ornamental bulbous plants grown commercially for its fascinating flowers in many parts of the world. Its cultivation in India dates back to 19<sup>th</sup> century as 'Firmingers Manual of Gardening in India' published in 1863, mentions that, Charles Gray of Coonoor grew some gladioli from corms and seeds in his garden. Gladioli have more than 10,000 cultivars of which about 20 are grown commercially for cut flower purpose.

Venkataramannagudem falling in coastal region of Andhra Pradesh, is a potential region with rich crop diversity. It is endowed with tropical climate and red loamy soils. Any attempt made to encourage cut flower production in the region not only helps the florists and consumers to get fresh and quality cut flowers regularly but also helps the small and marginal farmers in the region to improve their economic condition. Considering the increase in popularity of the gladiolus in the region the present study has been undertaken with the following parameters.

### MATERIAL AND METHODS

The present investigation entitled "Evaluation of gladiolus (*Gladiolus hybrida* L.) hybrids for growth, floral, corm parameters" was carried out during the period 2014-15 at Horticulture College and Research Institute, Dr. Y.S.R Horticultural University, Venkataramannagudem, Tadepalligudemmandal, West Godavari District. The experiment was laid out in randomized block design with three replications and the material for the present study consisted eight treatments namely (American Beauty, Arun, Darshan, Green Star, Limoncello, Meridiana, Pink Lady, White Prosperity and Dhiraj).

The land was brought to a fine tilth by ploughing and harrowing. Plots were made with a gross plot size of 1.8 m x 1.5 m. The corms of gladiolus were taken and cleaned by removing the dry scales present on

them. Later they were planted at a spacing of 30 cm x 20 cm in each row along the sides of ridges at a depth of 5-6 cm.

Five plants were selected at random (non-destructive sampling) and tagged in each treatment combination and replication for the purpose of recording observations on vegetative parameters, floral parameters and corm parameters.

## RESULT AND DISCUSSION

### Growth parameters

The data presented in table 1 indicated that earliest corm sprouting (4.46 days) was recorded by gladiolus hybrid Meridiana which was on par with Limoncello (4.83 days) whereas, the highest delay for sprouting of corms was observed in American Beauty (11.93 days). The difference in time taken for corm sprouting is felt to be a varietal character. Kamble (2001) stated that sprouting of corms was controlled by genetic composition of cultivars. At maturity the highest plant height (131.77 cm) was recorded by White Prosperity followed by Pink Lady (114.67 cm). The minimum was recorded by American Beauty (71.13 cm). At maturity the maximum number of leaves per plant was recorded by Green Star (8.66) which was on par with White Prosperity (8.03) and Meridiana (7.86) but significantly different from Arun (7.40) whereas, the minimum number of leaves per plant was observed in American Beauty (7.06). The difference in plant height of gladiolus can be attributed to the genotype makeup of characters. At maturity the highest leaf area per plant was recorded by White Prosperity (1148.40 cm<sup>2</sup>) which was on par with Green Star (1124.20 cm<sup>2</sup>) but significantly different from Limoncello (899.92 cm<sup>2</sup>) whereas, the least leaf area was observed in Darshan (658.83 cm<sup>2</sup>) followed by American Beauty (714.79 cm<sup>2</sup>). The difference in number of leaves and leaf area per plant can be attributed to the genetic makeup of hybrids.

Further it is worthy to mention that a comparative study of plant height, number of leaves and leaf area reveals a positive association between among this characters such association is stronger between plant height and leaf area at maturity suggesting that dwarf genotypes had less grass leaf area and taller genotypes had highest leaf area. Those genotypes having higher leaf area per plant found to record a relatively more plant height which might be because of increase in photosynthesis leading to the availability of more photosynthates. These results are in line with the findings of Archana [1], Rashmi [7] and Lepcha *et al.* [5] in gladiolus.

### Flower and Flower Quality Parameters

The data presented in table 2 indicated that there was significant difference among the hybrids with respected to number of days taken for spike initiation, fully emergence, the first basal floret to show colour and the basal floret to fully open. The minimum number of days taken for spike initiation was observed in Limoncello (50.06 days), highest number of days taken for Meridiana (68.80 days) which was on par with Green Star (66.46 days), Arun (63.66 days) and Darshan (63.53 days) but significantly different from Dhiraj (61.46 days). The hybrid Limoncello took less number of days for full emergence of spike (53.20), maximum number of days taken in Meridiana (72.73). The minimum number of days taken for basal floret to show colour was observed in Limoncello (56.24) followed by White Prosperity (64.60 days). The highest number of days taken Meridiana (77.26) hybrid which was on par with Green Star (72.86 days), Arun (71.46 days) and Darshan (71.20 days) but significantly different from Dhiraj (69.26 days). The least number of days taken for basal floret to fully open was observed in hybrid Limoncello (63.03) where as the maximum number of days taken in Meridiana (81.73 days) which was on par with Green Star (77.73 days) but which was significantly differed from Arun (75.10 days). Therefore it felt to show early spike initiation for early maturity for gladiolus spikes and the difference between spike initiation and occurrence of further stages are showing minimum variation. The variation observed in the days taken for spike initiation and further growth stages seem to be genetically control characters in gladiolus. These results are in confirmation with the findings of Lepcha *et al.* [5], Punam *et al.* [6], Tul *et al.* [11], Syed *et al.* [10], Archana and Patil [2] and Ganesh *et al.* [3] in gladiolus. Spike length was highest in White Prosperity (103.07 cm) followed by Meridiana (88.08 cm). The lowest was observed in Dhiraj (58.39 cm). White Prosperity was observed maximum rachis length 45.00 cm which was on par with Meridiana (43.62 cm), Pink Lady (43.07 cm), and American Beauty (41.51 cm). Least rachis length was recorded (32.01 cm) in Limoncello. The differences in spike length and rachis length can be attributed to the genetic constitution of the hybrids.

The data presented in table 3 indicated that the hybrid White Prosperity was recorded the highest number of florets per spike (12.73) which was on par with Pink Lady (11.80). The least was recorded in Green Star (8.36). The differences in number of florets spike might be due to the variation in genetic makeup of different cultivars and efficient utilization of natural resources and inputs besides the size of planting material. The variation observed in these parameters can be attributed to the variations in their

genetic constitution [7]. Darshan (2.26) was recorded the maximum number of spikes per plant followed by White Prosperity (1.86). The minimum was observed in Limoncello (1.00). The variation in spike yield is attributable to the number of shoots per corm which is a genetically controller character [8, 4]. The maximum floret length (10.78 cm) was recorded by White prosperity followed by Limoncello (9.62 cm). The minimum was recorded by Darshan (8.34 cm). White Prosperity (10.06 cm) was recorded maximum floret diameter which was on par with Green Star (9.58 cm), Arun (9.28 cm), Meridiana (9.24 cm) and American Beauty (9.18 cm). The minimum was recorded by Darshan (8.06 cm). Maximum vase life was recorded by White Prosperity (10.96 days) followed by Pink Lady (9.53 days). The minimum was recorded by Darshan (7.43 days). Floret length and diameter are size parameters observed in the present study a comparative study of the data on floret size with that of spike size and vegetative parameters gives an idea that a higher leaf area was helpful in certain hybrids to put forth more growth by virtue of their inherent capacity to synthesize a higher quantity of food material that could be utilized for elongation of spike as well as florets. This fact is also evident from the relatively superior performance of the hybrids bearing bold sized florets in vase life. These findings are in consonance with those reported by Archana [1] and Lepcha *et al.* [5]. Variations in vase life can also be attributed to the differential accumulation of carbohydrates due to varied leaf production and sensitivity of cultivars to ethylene. Spike yield per ha (000's) height was recorded in Darshan (377.76) followed by White Prosperity (311.09). The minimum (166.66) was observed in Limoncello and Meridiana (166.66). These hybrids were also good in terms of spike length and rachis length besides putting forth elongated bold sized florets which were more in number gaining a superior stand and leading position as compared to other hybrid varieties in terms yield of spikes. Similar opinion was also expressed by Lepcha *et al.* [5] and Punam *et al.* [6].

**Table 1. Growth parameters as observed in different gladiolus hybrids**

| Name of the hybrid | Days to sprouting | Plant height (cm) at maturity | Number of leaves per plant at maturity | Leaf area per plant (cm <sup>2</sup> ) at maturity |
|--------------------|-------------------|-------------------------------|--|--|
| American Beauty    | 11.93             | 71.13                         | 7.06                                   | 714.79   |
| Arun               | 9.13              | 99.73                         | 7.40                                   | 787.99   |
| Darshan            | 9.16              | 87.60                         | 7.20                                   | 658.83   |
| Green Star         | 5.56              | 104.23                        | 8.66                                   | 1124.20  |
| Limoncello         | 4.83              | 94.26                         | 7.40                                   | 899.92   |
| Meridiana          | 4.46              | 87.36                         | 7.86                                   | 748.26   |
| Pink Lady          | 6.36              | 114.67                        | 7.40                                   | 766.79   |
| White Prosperity   | 7.86              | 131.77                        | 8.03                                   | 1148.40  |
| Dhiraj (Check)     | 9.26              | 78.93                         | 7.36                                   | 783.39   |
| Mean               | <b>7.62</b>       | <b>96.63</b>                  | <b>7.60</b>                            | <b>848.07</b>                                      |
| SE m±              | 0.31              | 2.79                          | 0.22                                   | 45.08  |
| CD at 5%           | 0.94              | 8.44                          | 0.67                                   | 145.40   |

**Table 2. Floral parameters as observed in different gladiolus hybrids**

| Name of the hybrid | Number of days taken for |                 |                             |                            | Spike length | Rachis length |
|--------------------|--------------------------|-----------------|-----------------------------|----------------------------|--------------|---------------|
|                    | Spike initiation         | Spike emergence | Basal floret to show colour | Basal floret to fully open |              |               |
| American Beauty    | 60.36                    | 64.90           | 69.56                       | 73.43                      | 66.63        | 41.51         |
| Arun               | 63.66                    | 66.93           | 71.46                       | 75.10                      | 77.74        | 37.38         |
| Darshan            | 63.53                    | 67.60           | 71.20                       | 74.96                      | 63.14        | 36.61         |
| Green Star         | 66.46                    | 69.20           | 72.86                       | 77.73                      | 66.42        | 36.41         |
| Limoncello         | 50.06                    | 53.20           | 56.24                       | 63.03                      | 61.82        | 32.01         |
| Meridiana          | 68.80                    | 72.73           | 77.26                       | 81.73                      | 88.08        | 43.62         |
| Pink Lady          | 61.06                    | 64.93           | 69.03                       | 73.53                      | 81.91        | 43.07         |
| White Prosperity   | 57.03                    | 61.26           | 64.60                       | 68.93                      | 103.07       | 45.00         |
| Dhiraj (Check)     | 61.46                    | 65.93           | 69.26                       | 74.26                      | 58.39        | 33.15         |
| Mean               | <b>61.38</b>             | <b>65.18</b>    | <b>69.05</b>                | <b>73.63</b>               | <b>74.13</b> | <b>38.75</b>  |
| SE m±              | 1.81                     | 1.89            | 2.04                        | 2.14                       | 2.93         | 1.26          |
| CD at 5%           | 5.49                     | 5.74            | 6.17                        | 6.48                       | 8.86         | 3.83          |

**Table 3. Floral quality parameters and spike yield as observed in different gladiolus hybrids**

| Name of the hybrid | Number of         |                  | Floret      |               | Vase life (Days) | Spike yield per ha |
|--------------------|-------------------|------------------|-------------|---------------|------------------|--------------------|
|                    | Florets per spike | Spikes per plant | Length (cm) | Diameter (cm) |                  |                    |
| American Beauty    | 9.70              | 1.40             | 8.88        | 9.18          | 7.66             | 233.32             |
| Arun               | 10.80             | 1.40             | 9.18        | 9.28          | 7.76             | 233.32             |
| Darshan            | 10.90             | 2.26             | 8.34        | 8.06          | 7.43             | 377.76             |
| Green Star         | 8.36              | 1.13             | 8.59        | 9.58          | 8.36             | 188.88             |
| Limoncello         | 8.76              | 1.00             | 9.62        | 9.15          | 8.46             | 166.66             |
| Meridiana          | 10.03             | 1.00             | 8.94        | 9.24          | 7.73             | 166.66             |
| Pink Lady          | 11.80             | 1.33             | 9.18        | 9.07          | 9.53             | 222.21             |
| White Prosperity   | 12.73             | 1.86             | 10.78       | 10.06         | 10.96            | 311.09             |
| Dhiraj (Check)     | 10.60             | 1.53             | 8.67        | 8.14          | 7.63             | 255.54             |
| Mean               | <b>10.41</b>      | <b>1.43</b>      | <b>9.13</b> | <b>9.08</b>   | <b>8.39</b>      | <b>239.49</b>      |
| SE m±              | 0.48              | 0.09             | 0.36        | 0.36          | 0.32             | 16.14              |
| CD at 5%           | 1.48              | 0.29             | 1.10        | 1.10          | 0.96             | 48.81              |

**Table 4. Corm characters as observed in different gladiolus hybrids**

| Name of the hybrid | Number of       |                   | Corn                 | Cormel        | Corm         |        |
|--------------------|-----------------|-------------------|----------------------|---------------|--------------|--------|
|                    | Corms per plant | Cormels per plant | Weight per plant (g) | Diameter (cm) | Yield per ha |        |
| American Beauty    | 2.46            | 18.63             | 77.60                | 5.50          | 4.04         | 411.09 |
| Arun               | 1.26            | 25.10             | 86.84                | 30.56         | 4.69         | 211.10 |
| Darshan            | 2.73            | 16.67             | 69.02                | 22.47         | 3.93         | 455.53 |
| Green Star         | 1.06            | 34.93             | 62.68                | 26.45         | 4.81         | 177.77 |
| Limoncello         | 1.13            | 15.70             | 49.28                | 3.55          | 5.31         | 188.88 |
| Meridiana          | 1.00            | 35.82             | 57.38                | 6.33          | 4.91         | 166.66 |
| Pink Lady          | 1.06            | 16.43             | 70.70                | 7.72          | 5.07         | 177.77 |
| White Prosperity   | 1.93            | 47.33             | 100.13               | 21.67         | 5.73         | 322.20 |
| Dhiraj (Check)     | 2.46            | 17.93             | 58.19                | 11.16         | 4.25         | 411.09 |
| Mean               | 1.67            | 25.39             | 70.20                | 14.91         | 4.74         | 280.23 |
| SE m±              | 0.11            | 2.29              | 3.09                 | 0.98          | 0.20         | 19.06  |
| CD at 5%           | 0.34            | 6.92              | 9.34                 | 2.97          | 0.60         | 57.64  |

### Corm Parameters

The data presented in table 4 indicated that the highest number of corms per plant was recorded by hybrid Darshan (2.73) which was on par with Dhiraj (2.46) and American Beauty (2.46) but significantly differ from White Prosperity (1.93). The minimum was observed in Meridiana (1.00). Number of corms produced per corm negatively influenced the diameter of corms. In other words, higher the number of corms produced per plant lower was the corm size observed. The maximum corm diameter was observed in White Prosperity (5.73 cm) which was on par with Limoncello (5.31 cm) but significantly differed from Pink Lady (5.07 cm). The minimum corm diameter was observed in Darshan (3.93 cm). Among the various hybrids White Prosperity was recorded highest (100.13 g) corm weight per plant followed by Arun (86.84 g). The minimum corm weight per plant was observed in Limoncello (49.28 g). Corm diameter and corm weight are important parameters to be considered while selecting plant material for the purpose of producing quality spikes with more number of larger florets. Swain *et al*, [9] reported that availability of more food material stored in bigger sized mother corms helps in better plant growth which might also give higher cormel production. The highest number of cormels per plant was registered in White Prosperity (47.33) followed by Meridiana (35.82). Limoncello was recorded minimum (15.70) number of cormels per plant. The hybrid Arun was recorded the maximum (30.56 g) cormel yield per plant followed by Green Star (26.45 g). The minimum (3.55 g) cormel weight per plant was observed in Limoncello. It was found to be at par with American Beauty (5.50 g) and Meridiana (6.33 g), but significantly differ from Pink Lady (7.72 g). The highest weight of corm and cormel per plant 121.80 g was recorded in White Prosperity which was on par with Arun (117.41 g), but significantly different from Darshan (91.50 g). Limoncello (52.84 g) was recorded minimum weight of corm and cormels per plant. Kamble (2001) reported that variation in weight of cormels might be attributed to the number of cormels produced per plant, which in turn are genetically controlled factors. The ability to produce corms and cormels per plant determines its rate of multiplication. The highest corm yield (000's) per ha (455.53) was recorded by the hybrid Darshan. It was found to be at par with American Beauty (411.09) and Dhiraj (411.09) but differed significantly from White Prosperity (322.20). The hybrid Meridiana was recorded

the minimum corm yield per ha (166.66). These differences can be ultimately attributed to genitival makeup of the cultivars as reported by Kamble [4]. Superiority of the cultivars Darshan and Dhirajwith respect to number of corms per plant might be stocked by its outstanding performance with regard to spike yield per plant and per hectare over others.

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