



Short communication

## Genetic variability in gladiolus for growth and flowering characters (*Gladiolus hybridus* Hort.)

P. Hemanth Kumar and B.S. Kulkarni

Department of Floriculture and Landscaping  
K.R.C. College of Horticulture, Arabhavi -591 310, India  
Gokak, Belgaum Dist, Karnataka  
E-mail: balajikrcch@gmail.com

### ABSTRACT

*Gladiolus* Sylvia x Melody exhibited early corm-sprouting (6.82 days). The hybrid Melody x Summer Sunshine (84.63 cm), followed by American Beauty x Pricella (84.12 cm) were tall. Maximum stem girth was observed in American Beauty x Summer Sunshine (35.31 mm), followed by Vedanapoli x Magic (33.71mm) and American Beauty x Melody (33.47 mm). Number of leaves per plant was higher in Melody x Magic (9.62), followed by Salvia x Magic (9.49) and Melody x Vedanapoli (9.42). The length was maximum (67.32 cm) in Melody x Summer Sunshine followed by Summer Sunshine x Pricella (67.57 cm), American Beauty x Vedanapoli (67.00 cm) and Vedanapoli x Pricella (66.06 cm). The hybrid Salvia x Melody was earliest to initiate flower bud (60.58 days) and first floret opening (69.04 days). The total duration of flowering was maximum in Vedanapoli x Magic.

**Key words:** Half-diallel, genetic variability, flowering, gladiolus

*Gladiolus* (*Gladiolus hybridus* Hort.) is an important bulbous cut-flower crop and is famous for keeping-quality and exhaustive range of spike colour. *Gladiolus* hybrids currently under cultivation seem to have developed genetically form 23 sps. (Arora *et al.* 2002). In the cut-flower industry, gladiolus occupies the fourth place in international cut-flower trade (Bhattacharyaji, 2003). The most common method of improving gladiolus is through hybridization. Since gladiolus is highly heterozygous (Misra and Saini, 1990), it is essential to evaluate the wide germplasm available before adopting hybridization programmes to exploit the diversity in growth and flowering traits.

An investigation was carried out on seven gladiolus varieties representing diverse morphological characters. These varieties were crossed by the half diallel method and were also selfed. The seeds were sown in seed beds and the material was carried to four cycles to obtain the required size of corms. Twenty one hybrids, along with their parents, were planted in a polyhouse in January, 2007 at Kittur Rani Chennamma College of Horticulture (University of Agricultural Sciences, Dharwad), Arabhavi in Randomized Block Design with two replications in raised beds with spacing of 30 x 20 cm

and the data were collected for five randomly selected plants from each parents and F<sub>1</sub>'s. Observations on different growth and flowering parameters were recorded in five randomly selected plants from each parent and F<sub>1</sub> and statistically analyzed to find out the significance of differences (Cochran and Cox, 1964).

Analysis of variance revealed that all the growth and flowering characters were highly significant except leaf width (Table 1). Among the parents cv. Sylvia exhibited and late sprouting (20.60 days) was observed in cv. Magic (Table 2). Among the hybrids, Sylvia x Melody exhibited early sprouting (6.82 days), Vedanapoli x Magic (22.92 days) and Summer Sunshine x Vedanapoli (20.67 days) were late to sprout. The cv. Priscilla produced tallest plants (79.40 cm) at 90 days after planting followed by Summer Sunshine (78.94 cm) while Sylvia (58.49 cm) was the shortest. Swaroop *et al.* (2005) reported that cv. Sylvia had shorter plants (74.33 cm) plant height, which closely confirms present investigation. Among the hybrids, highest plant height (84.63 cm) was observed in Melody x Summer Sunshine, followed by American Beauty x Priscilla (84.12 cm) and Summer Sunshine x Priscilla (82.54 cm), while, the lowest plant height (57.58 cm) was recorded in Sylvia x Melody.

**Table 1. Mean sum of squares for vegetative parameters in a 7 X 7 diallele cross of gladiolus (*Gladiolus hybridus* Hort.)**

Sl. No.	Trait	Sources		CD at 5%	CD at 1%
		Treatment	Error		
1	Days to sprouting	47.29**	2.67	4.90	5.90
2	Plant height	142.55**	13.84	10.50	13.77
3	Stem girth	31.86*	4.58	5.91	7.75
4	No. of leaves	0.5946**	0.21	1.26	1.66
5	Leaf length	105.62**	10.19	0.88	1.15
6	Leaf width	0.42	0.16	1.13	1.46
7	Days required for bud initiation	84.59**	5.17	6.27	8.22
8	Days required for first floret opening	87.44**	7.49	7.46	9.81
9	Days required for first to last floret opening	4.34**	1.13	2.92	3.84
10	Duration of flowering	10.89**	1.20	3.01	3.94
	d. f.	27	27		

\*Significant at 5% level, \*\*Significant at 1% level

Maximum stem girth (32.17 mm) was observed in the cv. American Beauty, followed by Vedanapoli (31.61 mm) and Summer Sunshine (30.95 mm), while, the hybrids American Beauty x Summer Sunshine exhibited maximum stem girth (35.31 mm), followed by Vedanapoli x Magic (33.71 mm), American Beauty x Melody (33.47 mm). The minimum stem girth (22.18 mm) was recorded in Sylvia x Magic (Table 2).

**Table 2. Mean performance of parents and hybrids (F<sub>1</sub>'s) with respect to vegetative parameters in gladiolus (*Gladiolus hybridus* Hort.)**

Sl.No.	Parent	Days to sprouting	Plant height (cm)	Stem girth (mm)	No. of leaves	Leaf length (cm)	Leaf width (cm)
1	A. Beauty	8.03	73.04	32.17	8.57	59.00	3.66
2	Sylvia	6.90	58.49	20.69	8.06	47.80	3.82
3	Melody	11.07	71.56	22.97	8.56	50.87	4.07
4	S. Sunshine	15.59	78.94	30.95	8.54	63.25	4.89
5	Vedanapoli	18.47	76.38	31.61	9.20	57.81	7.03
6	Magic	20.60	65.49	28.28	8.09	53.35	3.85
7	Priscilla	13.26	79.40	29.51	8.44	69.07	3.21
	Hybrid						
1	A. Beauty x Sylvia	20.20	66.96	26.56	8.14	54.11	3.45
2	A. Beauty x Melody	18.89	62.53	33.47	8.02	57.49	3.91
3	A. Beauty x S. Sunshine	15.26	73.49	35.31	7.99	60.83	4.28
4	A. Beauty x Vedanapoli	15.74	81.07	30.94	7.96	67.0	3.70
5	A. Beauty x Magic	19.69	68.75	26.61	8.62	52.26	4.11
6	A. Beauty x Priscilla	11.01	84.12	30.87	8.18	62.29	4.55
7	Sylvia x Melody	6.82	57.58	25.97	8.86	52.00	3.83
8	Sylvia x S. Sunshine	16.44	62.73	22.28	8.45	52.49	3.03
9	Sylvia x Vedanapoli	11.12	68.36	27.44	7.93	54.24	4.22
10	Sylvia x Magic	13.12	59.63	22.18	9.49	44.52	3.77
11	Sylvia x Priscilla	7.29	66.07	31.10	9.14	51.63	3.97
12	Melody x S. Sunshine	10.60	84.63	27.25	8.20	67.62	3.90
13	Melody x Vedanapoli	8.40	66.07	22.42	9.42	53.68	4.20
14	Melody x Magic	17.24	66.25	31.15	9.62	52.82	4.18
15	Melody x Priscilla	12.52	70.24	26.24	8.44	57.07	3.86
16	S. Sunshine x Vedanapoli	20.67	79.53	33.12	8.56	64.71	4.75
17	S. Sunshine x Magic	22.28	68.96	25.24	9.10	52.30	3.74
18	S. Sunshine x Priscilla	13.56	82.54	29.43	7.64	67.57	4.05
19	Vedanapoli x Magic	22.92	57.49	33.71	9.34	48.22	4.72
20	Vedanapoli x Priscilla	15.27	81.26	24.04	8.16	66.06	3.65
21	Magic x Priscilla	18.56	71.07	29.73	9.01	58.40	3.62
	S. Em±	1.63	3.69	2.14	0.45	3.19	0.40

Vedanapoli produced maximum number of leaves per plant (9.20), followed by American Beauty (8.5) and Melody (8.56). Among the hybrids, Melody x Magic recorded maximum number of leaves per plant (9.62), followed by Sylvia x Magic (9.49) and Melody x Vedanapoli (9.42). Minimum number of leaves (7.64) was observed in hybrid Summer Sunshine x Priscilla. Number of leaves may be related to stored food reserve in the corms (Sharma and Gupta, 2003).

The length of leaves was maximum (69.07 cm) in cv. Priscilla, followed by Summer Sunshine (63.25 cm). Among the hybrids Melody x Summer Sunshine (67.62 cm) recorded maximum leaf length, followed by Summer Sunshine x Priscilla (67.0 cm) and Vedanapoli x Priscilla (66.06 cm), while, minimum length (44.52 cm) was observed in Sylvia x Magic. Maximum width of leaves at mid-point was recorded in Summer Sunshine x Vedanapoli (4.75 cm),

followed by Vedanapoli x Magic (4.72 cm) and American Beauty x Priscilla (4.55 cm), and, minimum (3.03 cm) was recorded in Sylvia x Summer Sunshine.

Data (Table 3) on number of days for flower bud initiation revealed that cv. American Beauty was the earliest to exhibit flower bud initiation (62.81 days), followed by Melody (63.25 days) while the hybrid Sylvia x Melody was the earliest (60.58 days) followed by American Beauty x Priscilla (61.24 days) and American Beauty x Melody (61.76 days). The hybrid Vedanapoli x Magic (82.21 days) was the last to initiate flower bud. Arora and Khanna (1985) reported that time taken for spike emergence varied significantly among various cultivars. These findings are closely confirmed with the present results. Further, Neeraj *et al.* (2000) suggested that gladiolus can be grouped as early, mid, late and may be cultivated for longer duration of flowering and garden display. The cv. American Beauty took

**Table 3. Mean performance of parents and F<sub>1</sub> hybrids with respect to flowering in gladiolus (*Gladiolus hybridus* Hort.)**

Sl.No.	Parent	Days for bud initiation	Days for first floret opening	Days for first to last floret opening	Duration of flowering
1	A. Beauty	62.81	70.67	14.38	15.11
2	Sylvia	66.14	72.97	12.12	10.66
3	Melody	63.25	72.80	13.68	15.77
4	S. Sunshine	66.86	75.12	14.57	12.40
5	Vedanapoli	77.71	85.18	14.57	15.86
6	Magic	80.93	88.72	13.34	17.92
7	Priscilla	71.88	80.40	13.69	17.28
	Hybrid				
1	A. Beauty x Sylvia	68.93	77.34	13.23	14.69
2	A. Beauty x Melody	61.76	69.71	10.57	12.69
3	A. Beauty x S. Sunshine	68.10	76.90	15.30	15.69
4	A. Beauty x Vedanapoli	70.16	77.57	15.22	15.33
5	A. Beauty x Magic	82.11	89.11	13.42	14.06
6	A. Beauty x Priscilla	61.24	71.68	13.07	16.28
7	Sylvia x Melody	60.58	69.04	11.51	12.95
8	Sylvia x S. Sunshine	68.07	76.46	15.24	9.33
9	Sylvia x Vedanapoli	63.94	71.87	13.72	16.69
10	Sylvia x Magic	65.74	71.43	10.15	15.68
11	Sylvia x Priscilla	69.19	79.29	11.16	14.24
12	Melody x S. Sunshine	68.73	76.40	14.16	16.33
13	Melody x Vedanapoli	62.18	70.43	15.16	13.75
14	Melody x Magic	69.93	78.47	11.89	15.88
15	Melody x Priscilla	67.34	75.24	12.40	15.89
16	S. Sunshine x Vedanapoli	74.69	82.37	15.25	16.75
17	S. Sunshine x Magic	78.62	89.93	13.78	16.56
18	S. Sunshine x Priscilla	66.23	73.86	13.34	11.57
19	Vedanapoli x Magic	82.21	90.52	15.40	19.35
20	Vedanapoli x Priscilla	73.90	84.62	13.18	13.91
21	Magic x Priscilla	77.22	84.62	14.40	18.92
	S. Em±	2.27	2.73	1.06	1.09

less days (70.67 days) for first floret opening followed by Melody (72.80 days) and Sylvia (72.97 days) while the hybrid Sylvia x Melody took less (69.04 days) days for first floret opening followed by American Beauty x Melody (69.71 days) and Sylvia x Magic (71.43 days). Where as the hybrid Vedanapoli x Magic took maximum (90.52 days) number of days for first floret opening. The range for days for first floret opening was between 69.71 to 90.52 days. Similar range for first flowering was observed by Swaroop *et al.* (2005). The variety Summer Sunshine and Vedanapoli (14.5 days) took more number of days for first to last floret opening followed by American Beauty (14.38 days) while the hybrids Vedanapoli x Magic took more number of days (15.40 days) followed by Summer Sunshine x Vedanapoli (15.25 days) and Sylvia x Summer Sunshine (15.24 days). The parents Sylvia exhibited shorter flowering duration (10.66 days) followed by Summer Sunshine (12.40 days) and American Beauty (15.11 days). While the hybrid Sylvia x Summer Sunshine reported shorter flowering duration (9.33 days) followed by Summer Sunshine x Priscilla (11.57 days) and American Beauty x Melody (12.69 days). Where as the hybrid Vedanapoli x Magic exhibited wider flowering duration (19.35 days). The range for flowering duration was observed between 11.33 to 19.35 days, while Saini *et al.* (1991) reported a range of 17 to 25.9 days in the field experiment.

Considerable morphological variation was observed for all the characters except for the leaf width among the various parents and F<sub>1</sub>'s. Hence these characters could be considered as useful selection criteria for further improvement in gladiolus. Among 21 hybrids, American Beauty x Vedanapoli, American Beauty x Priscilla, Melody x Summer Sunshine, Summer Sunshine x Vedanapoli, Summer Sunshine x Priscilla, Vedanapoli x Magic, and

Vedanapoli x Priscilla were found to be promising for various growth characters and American Beauty x Melody, Sylvia x Melody, Melody x Vedanapoli, Summer Sunshine x Priscilla and American Beauty x Priscilla were found to be promising for various flowering characters.

## REFERENCES

- Arora., J. S. and Khanna, K. 1985, Evaluation of gladiolus cultivars. *J. of Res. Punjab Agril. Univ.*, **22**:635-662
- Arora J.S., Misra R.L., Singh K., Singh, P. and Bhattacharjee S.K., 2002. *Gladiolus*. Technical Bulletin No.14. Published by All India Coordinated Research Project on Floriculture, Division of Floriculture and Landscaping, Indian Agriculture Research Institute, New Delhi- 110 012, India, pp 110
- Bose, T. K. and Yadav, L. P., 1989. *Commercial Flowers*. Naya Prokash Publications, Calcutta, pp 267-350
- Cochran, W.G. and Cox, J.M, 1964. *Experimental Designs*. John Wiley & Sons, London
- Misra, R.L. and Saini, H.C. 1990. Correlation and path-coefficient studies in gladiolus. *Ind. J. Hort.*, **47**:127-132
- Neeraj, Mishra, H.P. and Jha, P.B. 2000. Evaluation of gladiolus germplasm under North Bihar conditions. *Ind. J. Hort.*, **57**:178-181
- Saini, R.S., Gupta, A.K. and Yamdagni, R. 1991. Performance of different cultivars of gladiolus (*Gladiolus floribundus* L.) under Hissar conditions. *South Ind. Hort.* **39**:99-101
- Sharma, T.R. and Gupta, R.B. 2003. Effect of corm size and spacing on growth, flowering and corm production in gladiolus. *J. Orn. Hort.*, **6**:352-356
- Swaroop, K., Singh, K.P and Singh, K.P. 2005. Performance of gladiolus under Delhi conditions. *J. Orn. Hort.*, **8**:31-35

(MS Received 7 August 2007, Revised 24 August 2009)