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EVALUATION OF GLADIOLUS (*GLADIOLUS HYBRIDA* L.) HYBRIDS UNDER COASTAL ANDHRA PRADESH CONDITIONS

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Abstract

Performance of eight gladiolus hybrids was tested as against an adopted variety Dhiraj as a check under coastal Andhra Pradesh conditions. Plant height and leaf area at maturity was recorded at maximum in the hybrid White Prosperity as compared to other hybrids and check variety. White Prosperity produced the longest spikes, however per plot spike yield was highest (63.46) in the hybrid Darshan followed by White Prosperity (52.26) as against the check variety Dhiraj (42.93).

Key words : Gladiolus, hybrids, growth, floral, corm and yield attributes.

Introduction

Gladiolus is a member of family *Iridaceae* and sub-family *Ixioideae*, is one of the most popular ornamental bulbous plants grown commercially for its fascinating flowers in many parts of the world. The current number of species in the genus is 255 (Pragya *et al*., 2010). Its cultivation in India dates back to 19th 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. Gladiolus grown hardly over an area of 9.37 thousand ha with a production of 707 million spikes (NHB, 2013) in India. 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.

Materials and Methods

The present investigation entitled "Evaluation of gladiolus *(Gladiolus hybrida* L.) hybrids under coastal Andhra Pradesh conditions" 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 (Andhra Pradesh), India. The experiment was laid out in RBD with three replications. The experiment consisted of nine treatments namely (American Beauty, Arun, Darshan, Green Star, Limoncello, Meridiana, Pink Lady, White Prosperity and Dhiraj as a check). Plot size was 1.8 m × 1.5 m. Corms were dipped in Carbendazim (0.2%) solution for 30 minutes before planting. They were planted at a spacing of 30 cm × 20 cm in each row along the sides of ridges at a depth of 5-6 cm. Recommended dose of 30:20:20 g/m^2 of NPK was applied. Nitrogen, phosphorus and potassium were applied in the form of urea, SSP and MOP, respectively. Uniform cultural practices were followed to all the treatment, to grow successful crop. Five plants per treatment per replication were tagged and used for recording various parameters on vegetative growth, flowering characters. Mean values of three replications after exposing them to statistical calculations was recorded as pooled mean for the parameter in particular treatment.

Results and Discussion

The data presented in table 1 revealed that earliest sprouting of corms (4.46 days) was recorded by 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). Ram *et al.* (2001) stated that sprouting of corms was controlled by genetic composition of cultivars. Therefore, the differences in time taken for sprouting can also be attributed to the genotype characters of hybrids under

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present study. Plant height varied significantly among different hybrids. 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). Plant height was found to exhibit a study increase from 30 DAP to maturity in all the varieties showing the linear growth of the hybrids. At maturity the maximum number of leaves per plant (8.66) was recorded by Green Star, which was on par with White Prosperity (8.03) and Meridiana (7.86). The minimum number was observed in American Beauty (7.06). Leaf area per plant showed significant differences among the various gladiolus hybrids. The highest leaf area per plant at maturity was recorded by White Prosperity (1148.40 cm^2), which was on par with Green Star (1124.20 cm^2). The least was observed in Darshan (658.83 cm^2). Further, it is worthy to mention that a comparative study of plant height, number of leaves and leaf area revealed a positive association among these characters. Such association was stronger between plant height and leaf area at maturity suggesting that dwarf genotypes had less gross leaf area and taller genotypes had highest leaf area. However, the differences in gross leaf area were found to be more in magnitude at maturity indicating that the existing leaves at 60 DAP and maturity might have expanded in addition to the production of new leaves. The difference in number of leaves and leaf area per plant can be attributed to the genetic makeup of hybrids. 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 findings are in confirmation with the results of Kishan (2010), Bhujal *et al*. (2013), Susila (2013) and Ganesh *et al*. (2014) in gladiolus.

The minimum number of days taken for (table 2) spike initiation, full emergence of spike, basal floret to show colour and basal floret to fully open was observed in Limoncello (50.06, 53.20, 56.24 and 63.03 days, respectively) followed by White Prosperity (57.03, 61.26, 64.60 and 68.93 days, respectively). The highest number of days taken for spike initiation full emergence of spike, basal floret to show colour and basal floret to fully open was observed in Meridiana (68.80, 72.23, 77.26 and 81.73 days, respectively). 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, with fully emergence, the first basal floret to show colour and to basal floret to fully open indicating that the total duration of flowering also vary significantly. 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. Thus, it can be pointed out that the planning for supply of gladiolus spike can be charted out daily taking into account the time taken for spike initiation the various hybrids. These results are in confirmation with the findings of Lepcha*et al*. (2007), Punam *et al*. (2009), Tul *et al*. (2009), Syed *et al*. (2013), Patil (2013) and Ganesh *et al*. (2014) in gladiolus. Spike length and rachis length are significantly varied among the hybrids (table 2). Among the hybrids evaluated spike length and rachis length was highest in White Prosperity (103.07 cm and 45.00 cm). The lowest spike length was observed in Dhiraj (58.39 cm) and least rachis length was recorded (32.01 cm) in Limoncello. The spike length is important characters for commercial value of gladiolus. It is interesting to note that taller plants were found to record higher values in respect of both rachis and spike lengths in the present study. The differences in spike length and rachis length can be attributed to the genetic constitution of the hybrids.

The data presented in table 3 revealed that White Prosperity was 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 least number of florets per spike was recorded in Green Star (8.36). From the data revealed that the hybrids that recorded higher values in respect of spike length are also recording higher values or at par values with highest entry in respect of number of florets per spike. Similarly hybrids bearing shorter spikes were found to bear lesser number of florets per spike. The spikes with more number of florets will last longer in the vases. Increased photosynthetic surface because of higher number of leaves could have helped the plants for better growth and therefore such plants grow taller and bear longer spikes with more number of florets on them. White Prosperity (10.78 cm and 10.06 cm) was recorded maximum floret length and diameter and minimum was recorded by Darshan (8.34 cm and 8.06 cm). Among the hybrids under study, white florets were born by White Prosperity, yellow coloured florets by Limoncello, green florets by Green Star, purple florets by Meridiana; the rest of the hybrids *viz*., American Beauty, Arun, Darshan, Pink Lady and Dhiraj were found to bear florets with different shades of red colour.

Maximum vase life was recorded by White Prosperity (10.96 days) followed by Pink Lady (9.53 days). The minimum vase life was recorded by Darshan (7.43 days). 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

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

Name of the hybrid	Days to sprouting	Plant height (cm)			Number of leaves per plant			Leaf area per plant (cm^2)		
		30 DAP	60 DAP	Maturity	30 DAP	60 DAP	Maturity	30 DAP	60 DAP	Maturity
American Beauty	11.93	36.50	51.20	71.13	3.06	5.73	7.06	109.76	425.94	714.79
Arun	9.13	31.31	59.96	99.73	3.20	6.23	7.40	172.26	551.16	787.99
Darshan	9.16	35.36	57.70	87.60	2.76	6.90	7.20	148.64	460.84	658.83
Green Star	5.56	39.56	68.83	104.23	3.66	7.86	8.66	246.6	725.40	1124.20
Limoncello	4.83	36.70	68.46	94.26	3.73	7.23	7.40	267.21	545.34	899.92
Meridiana	4.46	31.90	58.70	87.36	3.56	7.66	7.86	220.25	496.97	748.26
Pink Lady	6.36	44.53	69.72	114.67	3.40	6.73	7.40	318.39	579.86	766.79
White Prosperity	7.86	46.62	89.86	131.77	3.60	7.03	8.03	295.26	892.65	1148.40
Dhiraj (Check)	9.26	28.47	49.90	78.93	2.70	6.53	7.36	121.87	477.41	783.39
Mean	**7.62**	**36.77**	**63.81**	**96.63**	**3.29**	**6.88**	**7.60**	**211.14**	**572.84**	**848.07**
S. Em. ±	0.31	1.64	2.74	2.79	0.20	0.23	0.22	12.89	18.96	45.08
CD at 5%	0.94	4.97	8.30	8.44	0.62	0.71	0.67	38.98	57.34	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	**61.38**	**65.18**	**69.05**	**73.63**	**74.13**	**38.75**
S.Em.±	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

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. Sourcing good amount of photosynthates in such hybrids could effectively develop and strengthen the sinks *i.e*., florets with adequate protoplasm with all essential constituents to nourish for a prolonged period of life even after detachment from the plant. This fact is also evident from the relatively superior performance of the hybrids bearing bold sized florets in vase life. 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. These findings are in consonance with those reported by Lepcha *et al*. (2007).

Spike yield per plot and per ha height was recorded in Darshan (2.26, 63.46 and 377.76) followed by White Prosperity (1.86, 52.26 and 311.09). The minimum spike yield per ha (1.00, 28.00 and 166.66) was observed in Limoncello and Meridiana (166.66). Number of marketable spikes per plant is very much important as it decides the spike yield per unit area. In gladiolus, the number of spikes per plant depends on number of shoots per plant, which also decides the number of corms per plant (Shiramagondi and Hanamashetti, 1999). Spike yield per plant is the yield parameter, which is reckoned as the dependent character on so many independent characters spreading across vegetative and reproductive parameters of these genotypes. As discussed earlier, the high yielding genotypes were found to excel in the leaf area or number of leaves per plant and eventually in the plant height at maturity. 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

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

Name of the hybrid	Number of florets/ spike	Number of spikes/ plant	Floret length	Floret diameter	Floret colour	Vase life	Spike yield per plot	Spike yield per ha
American Beauty	9.70	1.40	8.88	9.18	Reddish pink with whitish throat.	7.66	39.20	233.32
Arun	10.80	1.40	9.18	9.28	Florets are streaked margins with red tinge.	7.76	39.20	233.32
Darshan	10.90	2.26	8.34	8.06	Red purple with white blotch.	7.43	63.46	377.76
Green Star	8.36	1.13	8.59	9.58	Greenish yellow	8.36	31.73	188.88
Limoncello	8.76	1.00	9.62	9.15	Florets yellow lemon colour	8.46	28.00	166.66
Meridiana	10.03	1.00	8.94	9.24	Purple	7.73	28.00	166.66
Pink Lady	11.80	1.33	9.18	9.07	Dark pink	9.53	37.33	222.21
White Prosperity	12.73	1.86	10.78	10.06	Florets white	10.96	52.26	311.09
Dhiraj (Check)	10.60	1.53	8.67	8.14	Red purple with light yellow blotch.	7.63	42.93	255.54
Mean	**10.41**	**1.43**	**9.13**	**9.08**		**8.39**	**40.23**	**239.49**
S.Em.±	0.48	0.09	0.36	0.36		0.32	2.71	16.14
CD at 5%	1.48	0.29	1.10	1.10		0.96	8.20	48.81

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*. (2007) and Punam *et al*. (2009).

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