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Research Article

Evaluation of Different Hybrid Genotypes and Varieties for Growth, Flowering, Yield, Corm and Cormels Production

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Abstract

The present experiment was carried out at Horticulture Section, College of Agriculture, Dr. PanjabraoDeshmukhKrishiVidyapeeth, Akola; Maharashtra (India) during three years 2013-14 to 2015-16. The hybrid genotypes viz AK-GL-04-09, AK-GL-04-10 and AK-GL-04-16 were developed through hybridization which are the crosses between Peter Pears X Debonair, Darshan X White Friendship and Spin Gold X Peter Pears. To assess the performance of new hybrids, the experiment was laid out in a Randomized Block Design with nine treatments (varieties and genotypes) and replicated four times. The results of the present investigation indicate that the varieties Darshan and PhuleTejas flowered earlier. Varieties PDKV Roshni, AK-GL-04-16 and Darshan produced maximum number of spikes per plant (1.71, 1.66 and 1.62, respectively) and spikes per hectare (2.83, 2.77 and 2.69 lakhs, respectively). Significantly maximum number of florets per spike (16.60), spike length (104.12 cm) and length of rachis (41.31 cm) were recorded in variety PDKV Roshani and followed by genotype AK-GL- 04-16(16.55 cm, 103.35 cm and 45.78 cm, respectively). However, maximum corms (2.48) and cormels (103.89) were recorded in variety PhuleTejas.

Keywords: Gladiolus; Hybrids; Genotypes

Introduction

Gladiolus, popularly called sword lily, takes its name from the Latin word Gladius because of sword shaped leaves. Gladiolus is one of the most important cut flower commercially grown in almost all the countries of the world, over an area of 10,000 ha. It has gained wide popularity in many parts of the world owing to its unsurpassed beauty and economic value. It's elegant spikes with wide range of colours in various forms and size has won for it a place of pride in ornamental gardens and monetary value as a cut flower. It is widely used in flower arrangement, bouquets, bunches, baskets and indoor decorations (Ramachandrudu and Thangam , 2009). The most common method of improving gladiolus is through hybridization. (Kumar and Kulkarni, 2009).

Commercial success of any crop depends upon the availability of suitable cultivars to suit the needs of the consumers. Many cultivars, imported earlier through various sources, failed miserably due to various diseases viz., wilt, corm rot and rust. Some could not survive due to their inability to acclimatize to tropical climate. It was therefore, felt necessary to assess the available germplasm and determine the suitable parents for developing a strong breeding programme in gladiolus by hybridization and select the suitable type of hybrid genotype by testing them with commercial check varieties.

Materials and methods

To develop gladiolus hybrid having good growth, flowering, corms and cormel production with attractive flower colour and good vase life, promising gladiolus types were selected in the year 2005-06 for crossing programme at the Horticulture Section, College of Agriculture, Akola which were proposed to be used for hybridization programme. A total of 14 parents were randomly crossed in 45 cross combinations in the year 2006-07. The hybrids generated from these crosses were screened for various quantitative and qualitative characters. The promising hybrid genotypes in respect of novel floret colours i.e. AK-GL-04-09, AK-GL-04-10 and AK-GL-04-16 were selected. Then the experiment was framed after getting sufficient propagating material of hybrids using six varieties including PDKV Roshni in Randomized Block Design as a statistical tool with four replications and assessed their performance from 2013-14 to 2015-16.

The cormes of six varieties i.ePhuleTejas, Darshan, Peter-Pears, PDKV Roshni, White Friendship,Debonair and three genotypes, AK-GL-04-09, AK-GL-04-10 and AK-GL-04-16 were kept under dark for 10 days to initiate the sprouts. Browny scales were carefully removed without disturbing the growing point. The uniform size corms of 4-5 cm diameter were treated with 0.2% copper oxychloride for 30 minutes. One corm per hill at 45 x 15 cm spacing and at a depth 4-5 cm was planted.The data on growth, flowering, yield, and vase life were recorded and statistically analysed as per method suggested by Panse and Sukhatme (1978).

Results and Discussion

Three years (2013-14 to 2015-16) pooled data in respect of growth, flowering, spike yield, quality, corms and cormels production, vase life of different check varieties and genotypes is presented in Tables 1 to 4 exhibited significant differences.

Plant height

The pooled data pertaining to plant height is presented in Table 1. Significantly maximum plant height (117.13 cm) was recorded in variety AK-GL-04-10 which was at par with PDKV Roshni (116.64 cm), AK-GL-04-16 (116.21 cm) and AK-GL-04-09 (113.31). However, significantly minimum plant height was noticed in variety Debonair (84.89 cm). Kumar and Kulkarni (2009) reported highest plant height (84.63 cm) in hybrid of Melody x Summer Sunshine. Similar variation in plant height of gladiolus was reported by Gawaliet al. (2012), Prakash and Kumar (2009) and Swaroop and Singh (2007).

S.N	Varieties/ Genotypes	Plant height (cm)				Days to flowering				Spikes /plant			
		2013-14	2014-15	2015-16	Mean	2013-14	2014-15	2015-16	Mean	2013-14	2014-15	2015-16	Mean
1	PhuleTejas	99.8	100.78	98.33	99.63	71.82	70.33	70.27	70.8	1.52	1.57	1.43	1.51
2	Darshan	109.86	110.36	108.46	109.56	70.92	68.76	71.46	70.38	1.68	1.56	1.62	1.62
3	PDKV Roshni	115.79	118.31	115.82	116.64	73.28	73.36	74.44	73.69	1.71	1.72	1.69	1.71
4	White Friendship	105.16	104.45	107.12	105.57	79.86	78.52	82.92	80.43	1	1	1	1
5	Peter Pears	101.8	104.24	101.22	102.42	81.12	79.82	84.46	81.8	1	1	1	1
6	Debonair	84.42	85.88	84.38	84.89	85.82	84.12	87.36	85.76	1	1	1	1
7	AK-GL-04-09	114.92	113.68	111.83	113.31	74.42	73	77.81	75.07	1.28	1.58	1.43	1.43
8	AK-GL-04-10	115.92	118.1	117.37	117.13	71.79	70.92	73.12	71.36	1.56	1.67	1.58	1.6
9	AK-GL-04-16	117.38	115.33	115.92	116.21	73.46	73	76.43	74.3	1.68	1.6	1.72	1.66
	SE+	6.026	6.431	4.381	3.331	0.812	0.873	0.371	0.212	0.262	0.261	0.258	0.243
	CD at 5%	17.077	19.293	12.427	9.778	2.335	2.619	1.028	0.597	0.695	0.685	0.559	0.618

Table 1: Performance of gladiolus varieties and genotypes for growth, flowering, spike per plant.

Days required for flowering

The significantly early flowering was recorded with the variety Darshan (70.38 days), which was followed by variety PhuleTejas (70.80 days), and was at par with each other. However, the significantly late flowering was recorded in variety Debonair (85.76 days) followed by variety Peter Pears (81.80 days). Remaining all other varieties were mid late in flowering. Dalalet al. (2015) recorded significantly early flowering with the varieties Darshan and PhuleTejas. Remaining all other varieties were mid late in flowering.

Spikes yield

Data on spikes per plant and hectare presented in Table 1 and 2 exhibited significant differences due to different varieties and genotypes. Significantly maximum spikes per plant (1.71) and spikes per hectare (2.83 lakhs) were recorded with the variety PDKV Roshni which was at par with the genotype AK-GL-04-16 (1.66 and 2.77 lakhs, respectively), Darshan (1.62 and 2.69 lakhs, respectively), AK-GL-04-10 (1.60 and 2.73 lakhs, respectively) and PhuleTejas(1.51 and 2.51 lakhs, respectively) However, minimum spikes per plant and per hectare (1.00 and 1.66 lakhs, respectively), recorded in varieties Debonair, Peter Pears and White Friendship, respectively.Hossainet al. (2011) reported significant variation amongst the gladiolus genotypes with respect to morphological characteristics as well as with yield. Dalalet al. (2015) recorded maximum number of spikes per plant and spikes per hectare with hybrid PDKV Roshni.

S.N	Varieties/ Genotypes	Spikes/ha (Lakh)				Floret/spike)				Spike length (cm)			
		2013-14	2014-15	2015-16	Mean	2013-14	2014-15	2015-16	Mean	2013-14	2014-15	2015-16	Mean
1	PhuleTejas	2.25	2.32	2.38	2.51	14.1	14	14.2	14.1	86.28	85.33	85.8	85.8
2	Darshan	2.49	2.31	2.69	2.69	15.82	16.4	16.17	16.13	85.86	83.44	83.36	84.22
3	PDKV Roshni	2.53	2.55	2.81	2.83	16.14	16.88	16.8	16.6	104.8	103.8	103.78	104.12
4	White Friendship	1.48	1.48	1.66	1.66	16.18	15.12	16.71	16	100.23	101.12	102.28	101.21
5	Peter Pears	1.48	1.48	1.66	1.66	15.08	15.12	14.78	14.99	78.82	88.12	83.46	83.46
6	Debonair	1.48	1.48	1.66	1.66	11.88	11.32	10.38	11.19	68.44	73.12	66.18	69.24
7	AK-GL-04-09	1.89	2.34	2.38	2.38	15.8	12.8	14.24	14.28	97.8	100.2	98.36	98.78
8	AK-GL-04-10	2.52	2.51	2.63	2.73	16.27	16.56	16.74	16.52	102.23	103.25	103.78	103.08
9	AK-GL-04-16	2.79	2.66	2.86	2.77	16.32	16.37	16.96	16.55	103.24	102.46	104.36	103.35
	SE+	0.021	0.091	0.043	0.353	0.081	0.071	0.062	0.058	0.083	0.231	0.432	0.481
	CD at 5%	0.063	0.278	0.124	0.707	0.243	0.213	0.172	0.164	0.247	0.693	1.172	1.229

Table 2: Performance of gladiolus varieties and genotypes for spike yield,floret per spike and spike length

Spike quality

The data with regard to florets per spike, spike length, length of rachis, floret length and diameter of florets is presented in Table 3 shows significant differences among all the varieties and genotypes. The maximum number of florets per spike (16.60), spike length (104.12 cm) and length of rachis (48.31 cm) were recorded with variety PDKV Roshni and it was followed by genotypeAK-GL-04-16 (16.55 cm,103.35 cm and 45.78cm,respectively). Inter floret length was recorded maximum with Darshan (6.77 cm) and maximum diameter of floret (10.17 cm) was recorded with AK-GL-04-10. However, significantly minimum number of florets per spike (11.19), spike length (69.24cm), length of rachis (32.09 cm), were recorded in variety Debonair. Similarly minimum interfloret distance was recorded with PhuleTejas(6.29cm) and diameter of floret was recorded minimum in variety Debonair(7.66cm). Ramachandrudu and Thangam (2009) reported that Peter Pears produced spike length (112.79 cm), rachis length (40.61 cm) and florets per spike (13.1) under Goa conditions.Similar variation in length of spike and florets per spike was recorded earlier by Rani

S.N.	Varieties/ Genotypes	Length of rachis (cm)				Diameter of floret (cm)				Corms/plant			
		2013-14	2014-15	2015-16	Mean	2013-14	2014-15	2015-16	Mean	2013-14	2014-15	2015-16	Mean
1	PhuleTejas	41.8	41.5	40.68	41.32	9.64	9.62	9.61	9.62	2.43	2.54	2.5	2.48
2	Darshan	40.52	40.88	39.36	40.25	9.38	9.76	9.53	9.55	2.1	2.36	2.21	2.22
3	PDKV Roshni	47.82	48.88	48.24	48.31	9.65	9.88	9.71	9.74	2.11	2.17	2.21	2.16
4	White Friendship	39.72	42.48	40.12	40.77	8.6	8.43	8.52	8.51	2.4	2.57	2.48	2.48
5	Peter Pears	40.16	41.42	41.27	40.95	8.14	8.03	8.11	8.09	2.27	2.13	2.21	2.2
6	Debonair	32.78	33.12	30.38	32.09	7.73	7.6	7.67	7.66	2.12	2	2.17	2.09
7	AK-GL-04-09	46.12	40.13	43.23	43.16	8.76	9.5	8.81	9.02	2.47	2.4	2.43	2.43
8	AK-GL-04-10	45.22	44.41	43.36	44.33	10.59	10.62	9.32	10.17	2.48	2.38	2.32	2.39

9	AK-GL-04-16	46.01	45.78	45.57	45.78	9.73	8.76	8.32	8.93	2.19	2.28	2.17	2.22
	SE+	0.064	0.024	0.012	0.027	0.042	0.071	0.017	0.049	0.016	0.006	0.013	0.016
	CD at 5%	0.191	0.072	0.036	0.079	0.124	0.229	0.048	0.137	0.047	0.018	0.038	0.046

Table 3: Performance of gladiolus varieties and genotypes for length of rachis, diameter of floret and corms per plant.

Corm and Cormel production

The data regarding corm and cormel production presented in Table 4 and 5. Maximum (2.48) corms per plant were recorded in varieties PhuleTejas and White Friendship and were significantly superior than rest of the varieties and genotypes. It was followed by genotypes AK-GL-04-09(2.43) and AK-GL-04-10 (2.39). However, significantly minimum corms per plant were recorded in PDKV Roshni (2.16). Maximum number of cormels were recorded in variety PhuleTejas (103.89) followed by AK-GL-04-09(79.63) and PDKV Roshni (52.54). Rest of the varieties were shy producer. However, significantly minimum (12.03) cormels per plant were recorded by variety Debonair. Chopdeet al. (2012) observed that varieties Psittacinus Hybrid and PhuleTejas were superior in respect of quantitative yield of spikes and corms. Poon et al. (2010) reported regarding corm and cormel production that genotype 'Psittacinus hybrid' performed better.

S.N.	Varieties/ Genotypes	Diameter of corm (cm)				Cormels/plant				Vase life (Days)			
		2013-14	2014-15	2015-16	Mean	2013-14	2014-15	2015-16	Mean	2013-14	2014-15	2015-16	Mean
1	PhuleTejas	5.32	5.34	5.31	5.32	103.4	110.42	97.86	103.89	8.16	9.19	8.23	8.52
2	Darshan	5.48	5.18	4.32	4.33	38.44	36.12	33.12	35.89	8.27	8.73	8.24	8.41
3	PDKV Roshni	5.68	6.06	5.17	5.63	53.23	58.12	46.26	52.54	10.27	10.29	10.32	10.29
4	White Friendship	4.23	4.01	4.12	4.12	27.83	36.12	33.43	32.46	9.28	9.11	9.07	9.15
5	Peter Pears	4.5	3.9	4.33	4.24	38.12	43.12	42.12	41.12	8.87	9.19	8.52	8.86
6	Debonair	3.66	3.82	3.43	3.64	10.16	12.72	13.23	12.03	7.28	7.5	7.23	7.33
7	AK-GL-04-09	4.36	4.2	4.1	4.22	82.36	85.3	71.23	79.63	8.42	8.17	8.32	8.3
8	AK-GL-04-10	5.66	5.71	4.1	5.15	47.54	42.34	37.46	42.44	10.29	10.18	10.08	10.18
9	AK-GL-04-16	4.88	4.23	4.78	4.63	41.23	38.46	37.23	38.97	10.24	10.28	10.18	10.23
	SE+	0.089	0.18	0.023	0.031	1.284	2.012	1.362	1.439	0.114	0.327	0.287	0.324
	CD at 5%	0.266	0.544	0.069	0.092	3.623	6.002	4.027	4.125	0.34	0.989	0.841	0.961

Table 4: Performance of gladiolus varieties and genotypes for diameter of corm, cormels per plant and vase life

Vase Life

The significantly long vase life (10.29 days) was recorded with the variety PDKV Roshni followed by genotype AK-GL-04-16 (10.23 days) and AK-GL-04-10 (10.18 days). However, significantly minimum vase life (7.33 days) was observed in variety Debonair. Gawali et al.(2012) reported thatsignificantly maximum vase life in the variety Monte Alto (9.33 days). Sankariet al. (2012) revealed that 'PusaShagun' and 'PusaSwarnima' recorded higher vase life. Dalalet al. recorded that significantly long vase life was recorded with the varieties PhuleNeelrekha and PDKV Roshni which were at par with each other.

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