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EVALUATION OF GLADIOLUS GENOTYPES AT AKBARPUR, MOULVIBAZAR

M. A. SUMI[1], M. A. HABIB[2], M. S. UDDIN[3]
M. A. HOSSAIN[4] AND S. M. SHARIFUZZAMAN[5]

Abstract

Twelve gladiolus genotypes were collected and evaluated in the Research Field of Regional Agricultural Research Station, Akbarpur, Moulvibazar, during November 2018 to May 2020 for identifying suitable line(s) for commercial cultivation in north eastern region of Bangladesh. The genotype that produced flower stalk within minimum days of planting was GL-Akb-012 (66.16 days.The longest rachis length was recorded in GL-Akb-003 (80.12 cm) which was statistically significant from other eleven genotypes. Plant height varied considerably with the highest plant height in GL-Akb-012 (145.67 cm) and the lowest plant height was in GL-Akb-011 (89.33 cm). All of the genotypes in general, produced more than 12 florets per spike, however GL-Akb-001 produced the highest number of florets per spike (17.33). Vase life of the genotypes showed variation, GL-Akb-012 had the highest vase life of 9 days. The highest weight of corm found in GL-Akb-004 (320.00 g). In respect of variation in plants, for instance, flower quality, corm and cormel production characters, the gladiolus genotype GL-Akb-012 was most promising for commercial cultivation.

Keywords: Gladiolus, flower, corm, cormel, genotype, evaluation.

Introduction

Gladiolus (*Gladiolus grandiflorus L.*), popularly known as sword Lily, is an ornamental bulbous plant native of South Africa (Sharma and Sharma, 1984). It belongs to the monocot family Iridaceae. It is a very popular flowering plant in international cut flower trade grown throughout the world in a wide range of climatic conditions. In Bangladesh, the agro ecological conditions are very conducive for the survival and culture of gladiolus. Regarding area and production of gladiolus flowers, no authentic reports are available in the country. It was estimated that, currently about 10,000 ha of land was under this flower cultivation (Rakibuzzaman *et al*., 2018). In Bangladesh, commercial floriculture is expanding very rapidly. Today, floriculture has emerged as a lucrative profession in Bangladesh with a much higher potential for returns than most other fields and horticultural crops (Sultana, 2003).

[1&2]Scientific Officer, Regional Agricultural Research Institute, Akbarpur, Moulvibazar, Bangladesh Agricultural Research Institute (BARI), Gazipur, [3]Senior Scientific Officer, Pomoloy Division, HRC, BARI, [4]Principle Scientific Officer, Regional Agricultural Research Institute Akbarpur, Moulvibazar, [5]Director, Tuber Crop Research Centre (TCRC), BARI, Gazipur, Bangladesh.

The major production belts of this flower are found in Jessore Sadar, Sharsha, Chowgacha, Kushtia, Chuadanga, Chattogram, Mymensingh, Dhaka, Savar and Gazipur regions. Recently, cultivation of this crop in other parts of the country has been started in a small scale. It has great economic value as a cut flower and its cultivation is relatively easy. Studies have established by Momin (2006) that income from gladiolus flower production is six times more than the returns from rice. Its elegant spikes, varieties of colour with long vase life are the reason for its ever-increasing demand. Apart from ornamental value, gladiolus have extensively utilized in medicines for headache, lumbago, diarrhoea, rheumatism and allied pains (Bose *et al*., 2003). Flower and corm of some gladiolus are used as food in many countries (Guillarmod, 1977; De Meyer, 1982). The average cropping intensity in Sylhet region is low (167%) compared to the national average (190%). A survey conducted by DAE showed nearly 1.64 lakh hectares of land in Sylhet division remains fallow during winter (rabi season), (BARI, NATP phase 2, 2018). To utilize this vast fallow land a new crop with considerable commercial acceptance can be introduced in this region and gladiolus flower could be that crop. Considering the ever-growing popularity of gladiolus flower, it deserves evaluation in this area to know the possibility of adaptation and to undertake necessary future improvement for both quantitative and qualitative characters to increase the cropping intensity as well as utilization of large fallow lands.

Materials and Methods

The experiment was conducted at the research field of Regional Agricultural Research Station, Akbarpur, Moulvibazar, Sylhet, during the Rabi season of 2018-2020. Twelve genotypes of gladiolus viz. GL-Akb-001, GL-Akb-002, GL-Akb-003, GL-Akb-004, GL-Akb-005, GL-Akb-006, GL-Akb-007, GL-Akb-008, GL-Akb-009, GL-Akb-010, GL-Akb-11 and GL-Akb-012 were collected from Floriculture division of Bangladesh Agricultural Research Institute, Jhikargacha upazila of Jessore district, and Jhenaidah district and were included in the experiment (Table 1). Before planting, land was prepared properly and manured with cowdung (10 t/ha), TSP and MoP were also applied @ 225 and 125 kg/ha at the time of final land preparation. Urea 200 kg/ha was applied in two equal installments of 25 and 45 days after emergence (Azad, 2017). Other intercultural operations such as watering, weeding, earthing up, stacking, plant protection measures etc. were applied as and when necessary. The unit plot size was 1.2 m*1.0 m. On October of the years 2018 and 2019, medium sized (3.5-4.0 cm) corms of different gladiolus germplasm were planted at about 6-9 cm depth in the plot. Distances between row to row and plant to plant were 20 cm and 20 cm, respectively. The experiment was laid out in a randomized complete block design (RCBD) with three replications. Data were recorded on different parameters like plant height, no. of leaves/plant, days to spike initiation, days to flowering, spike length, rachis length, number of floret/rachis, weight of single stick, number of

spike/hill, vase life, number of corms, number of cormel/hill and weight of corm. The spikes were cut when lower one or two florets showed colour but still in tight bud stage. The cut spikes were wrapped initially with newspaper in the field and then kept into water to study the vase life. Corms and cormels were harvested only when the leaves turned into brown color (Mukhopadhyay, 1995). The collected data were statistically analyzed using statistics 10 software.

Table 1. Source of collection and colour of gladiolus genotype

Genotype	Source of collection (Location)	Colour
GL-Akb-001	Floriculture division, BARI	Magenta
GL-Akb-002	Jhikargacha, Jessore	Purple
GL-Akb-003	Jhenaidah	White
GL-Akb-004	Floriculture division, BARI	Pink in periphery with red at center
GL-Akb-005	Jhenaidah	Red
GL-Akb-006	Jhikargacha, Jessore	Orange
GL-Akb-007	Jhikargacha, Jessore	Yellow-orange
GL-Akb-008	Floriculture division, BARI	Vermilion
GL-Akb-009	Floriculture division, BARI	Light-pink
GL-Akb-010	Jhikargacha, Jessore	Pink-red
GL-Akb-011	Jhikargacha, Jessore	Cream
GL-Akb-012	Floriculture division, BARI	Yellow

Results and Discussion

Vegetative and floral characteristics of Gladiolus genotype

In two years consecutive study the statistical comparative data showed almost similar pattern of result for all parameters taken. As regards to the color of flower, the genotypes showed remarkable variation which are shown in Table 1.

The plant height among the different genotypes varied significantly. The highest plant height was produced by the genotype GL-Akb-012 (145.44cm) which was followed by GL-Akb-003(144.15cm) and GL-Akb-005 (138.67cm). On the other hand, the lowest plant height was obtained by the genotype GL-Akb-011 (89.22cm). Variations in vegetative characters may be due to their genetic make-up as well as varietal differences. Similar, results were observed by Pragya *et al*. (2010) and Neha *et al*. (2012) in gladiolus.

Days to spike initiation is very important as it determines the earliness or lateness of the flower crop. Marked differences were observed for days to spike initiation among the genotypes (Table 2). The genotype GL-Akb-011 (67.17 days) took maximum days to spike initiation. On the other hand, the genotype GL-Akb-009 initiated spike within minimum days (50.17 days) followed by GL-Akb-007 and

GL-Akb-008 (53.17 days). Tirkey *et al.* (2018) reported to have spikes of gladiolus after 53.4-67.0 days of planting. Variation in days to spike initiation seem to be genetically controlled as reported by Pragya *et al*. (2010) in gladiolus.

Noticeable variations were observed in spectrum of days required for floral bud initiation in respect of germplasms (Table 2). The lowest days for flowering was observed in case of GL-Akb-009 (63.49 days) followed by GL-Akb-007 (64.16 days). In contrast, germplasm GL-Akb-011 (73.66 days) which was followed by GL-Akb-005 (73.16 days). This variation can be implied for larger duration of flower supply in the market.

Significant variation in respect of spike length was found among the genotypes (Table 2). The longest spike (106.15 cm) was produced by genotype GL-Akb-003 while the shortest spike (60.33 cm) was produced by GL-Akb-011. Whereas, Bhagur (1989) recorded spike length ranged from 50 to 120 cm in varietal evaluation of gladiolus.

The length of rachis varied widely from 45.66 cm to 80.00 cm (Table 2). The highest length was in GL-Akb-003 (80.12 cm). The lowest length (45.33 cm) was in genotype GL-Akb-008. Anuradha and Gowda (1994) observed the highest rachis length in gladiolus of about 50 cm. This variation in spike length and rachis length might be attributed to the inherent genetic characters associated with the genotypes. Similar, observations were reported earlier by Kishan *et al*., (2005); Manjunath and Jankiram (2006) and Neha *et al*. (2012).

Table 2. Vegetative and flowering parameters of Gladiolus genotype

Genotype	Plant height (cm)			Days to spike initiation			Days to flowering		
	Year 1	Year 2	Mean	Year 1	Year 2	Mean	Year 1	Year 2	Mean
GL-Akb-001	118.0	118.21	118.10	58.0	58.21	58.11	69.33	68.00	68.66
GL-Akb-002	110.33	110.12	110.23	59.66	59.00	59.33	70.0	70.66	70.33
GL-Akb-003	144.0	144.30	144.15	59.0	59.33	59.17	70.66	71.00	70.83
GL-Akb-004	114.0	114.55	114.28	54.0	54.66	54.33	66.33	66.99	66.66
GL-Akb-005	138.67	138.31	138.49	62.66	62.33	62.50	73.0	73.33	73.16
GL-Akb-006	110.33	110.42	110.38	59.33	59.00	59.17	69.0	70.00	69.5
GL-Akb-007	110.0	110.30	110.15	53.33	53.00	53.17	64.0	64.33	64.16
GL-Akb-008	112.67	112.13	112.40	54.0	54.33	54.17	66.33	66.00	66.16
GL-Akb-009	107.0	107.34	107.17	50.33	50.00	50.17	63.33	63.66	63.49
GL-Akb-010	105.33	105.12	105.23	63.0	63.66	63.33	72.66	72.00	72.33
GL-Akb-011	89.33	89.10	89.22	67.33	67.00	67.17	73.66	73.66	73.66
GL-Akb-012	145.67	145.21	145.44	54.0	54.66	54.33	66.33	66.00	66.16
CV (%)	3.83	3.81	3.82	4.01	4.03	4.02	2.96	2.98	2.97
LSD (0.05)	7.59	7.41	7.50	3.92	3.94	3.93	3.44	3.46	3.45

Appreciable variation regarding the number of florets per spike among the genotypes was observed and varied from 11.83 to 17.16. The highest number of

florets per spike was produced by GL-Akb-001 (17.16), which was closely followed by GL-Akb-003 (16.49). The genotype GL-Akb-012 produced the lowest number of floret (12.33) per spike. The number of florets per spike varied from 7-17 as reported by Negi *et al.,* (1982) and Lal and Plant (1989).

Table 2. Vegetative and flowering parameters of Gladiolus genotype (cont.)

Genotype	Length of spike (cm)			Length of rachis (cm)			No. of floret/stick		
	Year 1	Year 2	Mean	Year 1	Year 2	Mean	Year 1	Year 2	Mean
GL-Akb-001	100.67	100.0	100.33	67.00	67.33	67.16	17.33	17.00	17.16
GL-Akb-002	89.33	89.20	89.26	56.33	56.00	56.16	13.00	13.00	13.00
GL-Akb-003	106.0	106.30	106.15	80.00	80.25	80.12	16.33	16.66	16.49
GL-Akb-004	84.33	84.00	84.16	50.33	50.00	50.16	13.66	13.33	13.49
GL-Akb-005	74.0	74.63	74.315	56.66	56.96	56.81	14.33	15.00	14.66
GL-Akb-006	69.67	69.21	69.44	53.00	53.86	53.43	15.00	14.66	14.83
GL-Akb-007	67.33	67.00	67.16	49.00	49.69	49.34	14.00	14.33	14.16
GL-Akb-008	71.33	71.52	71.42	45.66	45.00	45.33	11.66	12.00	11.83
GL-Akb-009	69.0	69.21	69.10	51.66	51.00	51.33	13.00	13.00	13.00
GL-Akb-010	71.0	71.20	71.1	47.66	47.23	47.44	12.33	12.66	12.49
GL-Akb-011	60.33	60.23	60.28	51.00	52.14	51.57	13.66	13.33	13.49
GL-Akb-012	93.0	93.10	106.15	58.33	59.00	58.66	12.00	12.66	12.33
CV (%)	3.9	3.92	3.91	3.59	3.62	3.60	5.32	5.41	5.365
LSD (0.05)	5.25	5.23	5.24	3.37	3.39	3.38	1.24	1.25	1.245

Table 2. Vegetative and flowering parameters of Gladiolus genotype (cont.)

Genotype	Weight of single stick (gm)			Vase life (days)		
	Year 1	Year 2	Mean	Year 1	Year 2	Mean
GL-Akb-001	84.67	85.00	84.83	8.33	9.00	8.66
GL-Akb-002	80.33	80.00	80.16	7.33	7.66	7.49
GL-Akb-003	97.67	98.21	97.94	8.0	8.33	8.16
GL-Akb-004	106.67	106.00	106.33	8.33	8.00	8.16
GL-Akb-005	91.00	91.21	91.10	9.0	9.00	9.00
GL-Akb-006	73.33	74.00	73.66	8.0	8.33	8.16
GL-Akb-007	64.00	63.50	63.75	8.66	8.33	8.49
GL-Akb-008	63.33	63.00	63.16	8.66	8.66	8.66
GL-Akb-009	49.33	50.12	49.72	8.0	8.33	8.16
GL-Akb-010	62.67	62.85	62.76	8.0	8.00	8.66
GL-Akb-011	72.33	72.00	72.16	7.66	7.66	7.49
GL-Akb-012	96.33	95.82	96.07	9.0	8.66	8.16
CV (%)	3.64	3.60	3.62	NS	NS	NS
LSD (0.05)	4.83	4.81	4.82	NS	NS	NS

Genotypes showed a wide range of variation among them in respect of spike weight. It ranged from 49.72g to 106.33g (Table 2). Maximum spike weight (106.33 g) was recorded in the genotype GL-Akb-004 and the minimum (49.72 g) was in GL-Akb-009.

A great deal of genotypic variation was observed in case of vase life. Among genotypes, vase life varied from 7.33 to 9 days. The maximum vase life (9 days) was found in the genotype GL-Akb-005 and closely followed by GL-Akb-008 (8.66 days) while the minimum (7.49 days) in genotype GL-Akb-002 and GL-Akb-011. In a varietal performance trial, Lal and Plant (1989) reported that the vase life of gladiolus ranged from 8 to 15 days. Negi et al., (1982) indicated that vase life was an essential character for selection of gladiolus varieties. The difference in vase life might be due to different genetic configuration of the genotypes.

Table 3. Corm and cormel production influenced by gladiolus genotypes

Genotype	No. of corm/plant			No. of cormel/plant		Mean
	Year 1	Year 2	Mean	Year 1	Year 2	
GL-Akb-001	1	1	1	63.66	64.0	63.83
GL-Akb-002	1.33	1.66	1.49	38.33	39.0	38.66
GLAKB 003	1.33	1.33	1.33	75.00	74.15	74.57
GL-Akb-004	1.33	1.0	1.16	54.66	53.36	54.01
GL-Akb-005	1.33	1.33	1.33	79.66	79.25	79.45
GL-Akb-006	2.00	2.00	2	69.33	68.75	69.04
GL-Akb-007	1.33	1.0	1.16	65.33	65.0	65.16
GL-Akb-008	1.33	1.66	1.49	60.66	60.0	60.33
GL-Akb-009	1.33	1.0	1.16	73.33	73.85	73.59
GL-Akb-010	1.66	1.33	1.49	70.33	70.21	70.27
GL-Akb-011	2	2	1	73.33	72.96	73.14
GL-Akb-012	1.66	1.66	1.66	71.00	71.25	71.12
CV (%)	NS	NS	NS	15.39	15.41	15.4
LSD (0.05)	NS	NS	NS	17.25	17.12	17.18

Table 3. Corm and cormel production influenced by gladiolus genotypes (Cont.)

Genotype	Wt. of single corm (g)			Wt. of cormel (g)		
	Year 1	Year 2	Mean	Year 1	Year 2	Mean
GL-Akb-001	128.33	128.00	128.16	2.70	7.75	5.22
GL-Akb-002	145.00	145.25	145.12	1.83	1.80	1.81
GLAKB 003	151.67	151.12	151.39	2.90	2.95	2.92
GL-Akb-004	320.00	319.00	319.50	1.96	1.92	1.94
GL-Akb-005	175.00	175.21	175.10	4.16	4.14	4.15
GL-Akb-006	71.67	70.75	71.21	0.73	.76	0.74
GL-Akb-007	81.67	81.00	81.33	1.50	1.52	1.51
GL-Akb-008	130.00	129.25	129.62	1.06	1.05	1.05
GL-Akb-009	145.00	145.20	145.10	0.73	.75	0.74
GL-Akb-010	96.67	96.45	96.56	1.03	1.00	1.015
GL-Akb-011	207.00	206.78	206.89	0.76	.80	0.78
GL-Akb-012	286.67	285.96	286.31	2.23	2.25	2.24
CV (%)	29.11	30.06	29.58	28.23	28.26	28.24
LSD (0.05)	79.64	79.46	79.55	0.86	.87	0.86

Corm and cormel characteristics in gladiolus genotype

Data on corm production of twelve lines of gladiolus genotypes are presented in Table 3. The number of corm per plant was the highest in GL-Akb-006 and GL-Akb-011 (2.00). The genotype GL-Akb-001produced 1 corm per plant, and GL-Akb-12 produced 1.66 corm per plant. The variation in corm production among the genotypes might be due to difference in genetic constituents as well as environmental effects. Variation (1.0 to 4.0) in corm production among some genotypes of gladiolus was observed at Bangalore in India by Anuradha and Gowda (1994).

Number of cormel per plant was significantly affected by the genotypes (Table 3). The highest number of cormels per plant was obtained from the genotypes GL-Akb-005 (79.45), which was closely followed by GL-Akb-003 (74.57) the lowest was in GL-Akb-002 (38.66). Misra and Saini (1988) recorded 5 to 20 cormels per plant in gladiolus genotypes in a trial.

Genotypes showed a wide range of variability in respect of corm weight. It ranged from 71.21 g to 319.50g. The maximum corm weight was recorded from the genotype GL-Akb-004 (319.50 g) closely followed by GL-Akb-012(286.31 g) and the minimum (71.21 g) in genotype GL-Akb-006. Sharma and Sharma (1984) reported that corm weight varied from 15 g to 60 g in varietal trial of gladiolus conducted in India which was more or less in consonance with the present investigation

Genotypes exhibited a wide range of variability in respect of cormel weight that ranged from 0.74 g to 4.17 g. The maximum weight was found in GL-Akb-005 (4.15 g). The minimum weight 0.74 g was in the genotype GL-Akb-006 and GL-Akb-009 which was closely followed by GL-Akb-011 (0.78 g). Negi *et al.*, (1982) reported that cormel weight in gladiolus ranged from 0.5 g to 1.7 g which is more or less similar with the findings of the present investigation.

Conclusion

The collected gladiolus genotypes showed substantial variation in terms of different characteristics. From two years study, it may be concluded that the gladiolus genotypes such as GL-Akb-001, GL-Akb-003, GL-Akb-005, GL-Akb-008 and GL-Akb-012 were promising in respect of vibrant colours, floret number, rachis length, spike length, vase life and cormel production and can be suggested for cultivation in north eastern climatic condition of Bangladesh.

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