



STUDIES ON THE INFLUENCE OF PLANTING SEASON AND WEATHER PARAMETERS ON YIELD PARAMETERS OF TWO DIFFERENT VARIETIES OF *G. GRANDIFLORUS* L.

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Abstract

An experiment was conducted in factorial randomized block design to investigate the yield parameters of two gladiolus varieties (V_1 -White friendship and V_2 -American beauty) in early and late growing seasons. The seasons compared are, planting by first week of July (S_1), September (S_2), December (S_3) and February (S_4). The yield parameters were significantly influenced by the per se and interaction effects of different planting seasons and varieties of gladiolus. Among the varieties, White friendship (V_1) produced the highest values of all the yield parameters viz., spike length, number of floret per spike, length of rachis, number of daughter corms plant⁻¹, weight of daughter corms plant⁻¹, number of cormels plant⁻¹ and number of marketable spikes. Among different seasons compared, December planting (S_3) evinced better performance. The results of the correlation between the mean value of yield parameters in different seasons and weather parameters exhibited that the spike characters and corm characters were negatively correlated with maximum temperature (within a range of 29.9°C-35.02°C) minimum temperature (within a range of 22.12°C -25.70°C) and bright sunshine hours (within a range of 6.25-8.85 hrs).

Key words : *Gladiolus* sp, season, weather parameters, yield parameters and spike yield, corm yield.

Introduction

The gladiolus (*Gladiolus grandiflorus*), popularly called “queen of bulbous” belongs to the family Iridaceae and sub family Ixoidae has its elegant flower spikes, which have rich variation of colors and long vase life is commercially grown for its fascinating flowers, which are used as the most preferred line flowers in floral arrangements worldwide. Gladiolus is cultivated in most of the tropical and subtropical countries of the world. In India its cultivation dates back to 19th century and has attained considerable importance as cut flower in certain states. However, this crop can be cultivated and spread length and breadth of the country as it has good adaptability in wide range of agro-climatic conditions. In view of the fact that gladiolus production is being done under open field conditions, the research efforts revolve around the agro-techniques in open cultivation. Gladiolus is grown on all types of soils having good structure and drainage. It is a winter season crop but can be grown during rainy season in low rainfall areas with mild climate. Hence, in

Tamilnadu, this crop can be extended in other areas where mild climatic conditions occur.

Planting season is the most important feature in regulating growth of gladiolus (Zubair *et al.*, 2006; Khan *et al.*, 2008 and Ahmad *et al.*, 2011). It is important for achieving quality spikes and daughter corms. Vegetative growth and quality of gladiolus is improved by adopting proper planting times. Identifying the seasons suitable for this crop in a region is most important to schedule date of planting which intern is most essential to supply spikes progressively to the market. The climatic features like photoperiods, temperatures and relative humidity affects the growth and development. Light and photoperiod are the major factors as they affect development of two assimilate sinks in this crop *i.e.*, the inflorescence and corms. Gladiolus as most common flowering plant, prefer a growing location in full sun for most of the day. Flowering of gladiolus is controlled partially by day length provided temperatures are in the proper range. Planting schedule need to be varied for any location based on these climatic features. The present study was planned to investigate the growth parameters

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of gladiolus in early and late growing seasons and to study its correlation with temperature, sunshine hours and relative humidity under agro-ecological conditions of coastal region in Tamilnadu state and to find out best suitable season to grow this crop. In addition, genotype, soil, cultural practices and their interaction also have profound influence on the productivity of the crop. Hence, an attempt was made to choose a best suitable cultivar among the two commercial cultivars which are promising in Indian condition.

Materials and Methods

The experiment was conducted during 2009-2010 in Floriculture unit, Department Horticulture, Faculty of Agriculture, Annamalai University, Annamalai Nagar (Tamil Nadu), India. Four different planting seasons *viz.*, S₁-July, S₂-August, S₃-December, S₄-January and two different varieties *viz.*, V₁-White friendship and V₂-American beauty were compared in factorial randomized block design (FRBD) with three replications. According to the treatment schedule, gladiolus corms were planted during first week of the months mentioned. Uniform cultural practices of irrigation, weeding and manuring were followed for all the treatments. The yield parameters *viz.*, spike length, number of floret per spike, length of rachis, number of daughter corms plant⁻¹, weight of daughter corms plant⁻¹, number of cormels plant⁻¹ and number of marketable spikes were recorded and the data were analysed using the analysis of variance to draw the standard error and the critical difference was worked out at 0.5% probability as suggested by Panse and Sukhatme (1978). The weather parameters *viz.*, maximum temperature, minimum temperature, bright sunshine hours and relative humidity were recorded and season mean was correlated with mean value of growth parameters.

Results and Discussion

The flowering attributes *viz.*, spike length, number of floret per spike, and length of rachis were significantly influenced by individual and interaction effects of different planting seasons and varieties of gladiolus (table 1). Within the four different planting seasons, the mean highest values of all flowering parameters were recorded in December season (S₃), followed by February season (S₄). The interaction between varieties and seasons significantly influenced all the flowering parameters. Among the treatments compared, the highest spike length (58.41 cm), number of floret per spike (10.25) and length of rachis (25.41 cm) were recorded in white friendship planted during December season (V₁ × S₃). The shortest spike length, number of floret per spike and length of rachis

were recorded in American beauty planted during July season (V₂ × S₁). Increase in the spike characters might be attributed by the enhancement of growth attributes and development of healthy plants in these treatment combinations. This is in line with Leena *et al.* (1993) who evinced better performance of gladiolus in the climatic conditions of Kerala during November planting season.

Among the varieties, White friendship (V₁) performed better in terms of highest number of daughter corms plant⁻¹, weight of daughter corms plant⁻¹ and number of cormels plant⁻¹. Among the four different planting seasons, the mean highest values of corm and cormel characters were recorded in December season (S₃), followed by February season (S₄) and the least values were recorded in June season (S₁). The interaction between varieties and seasons significantly influenced all the corm and cormel characters. Among the treatments compared, the highest weight of daughter corms (23.20g plant⁻¹) and number of cormels (8.30 plant⁻¹) were recorded in white friendship planted during December season (V₁ × S₃). This was followed by the same variety planted during February season (V₁ × S₄). These values were the least in American beauty planted during July season (V₂ × S₁). Increment in the corm and cormel production during December season followed by February season in the present study might be attributed by partitioning of more photosynthates towards the underground sinks caused by the low temperature. This is in line with the reports of Ahmad *et al.* (2011), who evinced maximum percent increase in cormels size at February plantation in Pakistan condition. The number of marketable spikes produced are also significantly influenced by the per se and interaction effects of different planting seasons and varieties of gladiolus. Among the varieties, White friendship (V₁) produced the highest number of marketable spikes (99332 spikes ha⁻¹) and with in different seasons December planting (S₃) performed better with a mean of 97994 spikes ha⁻¹. Among the interaction treatments compared white friendship planted during December season (V₁ × S₃) produced 109332 spikes ha⁻¹.

Correlation of spike characters with the mean weather parameters revealed that the maximum temperature (within a range of 29.9°C-35.02°C) minimum temperature (within a range of 22.12°C-25.70°C) and bright sunshine hours (within a range of 6.25-8.85 hrs) had a negative correlation with spike length and number of florets per spike (table 2). This is evident for the better performance of gladiolus in this region during the December season at which the crop had a mild climatic condition. In December planting the 5 leaf stage of this

Table 1 : Influence of planting season and varieties on yield parameters of *Gladiolus grandiflorus* L.

Treatment Schedule	Spike length	Number of floret per spike	Length of rachis	Number of daughter corms plant ⁻¹	Weight of daughter corms plant ⁻¹	Number of cormels plant ⁻¹	Number of marketable spikes
V ₁	52.55	9.35	19.59	1.06	21.30	6.55	0.82
V ₂	45.45	7.83	13.68	1.06	19.94	3.95	0.65
S.Ed.	0.28	0.04	0.28	0.40	0.28	0.14	0.02
CD (P=0.05)	0.62	0.09	0.62	NS	0.62	0.28	0.04
S ₁	44.53	7.76	13.67	1.04	18.65	4.31	0.64
S ₂	46.20	8.37	15.96	1.06	18.79	4.83	0.70
S ₃	54.80	9.28	19.57	1.08	22.65	6.39	0.83
S ₄	50.45	8.95	17.35	1.07	22.39	5.47	0.76
S.Ed.	0.40	0.06	0.40	0.57	0.40	0.22	0.03
CD (P=0.05)	0.88	0.13	0.87	NS	0.87	0.44	0.06
V × S Interaction							
T ₁ -V ₁ ×S ₁	47.30	8.34	14.50	1.05	19.20	5.48	0.71
T ₂ -V ₁ ×S ₂	50.10	9.01	17.10	1.06	19.85	5.80	0.80
T ₃ -V ₁ ×S ₃	58.41	10.25	25.41	1.08	23.20	8.30	0.92
T ₄ -V ₁ ×S ₄	54.38	9.80	21.38	1.07	22.95	6.63	0.85
T ₅ -V ₂ ×S ₁	41.76	7.18	12.85	1.04	18.10	3.15	0.58
T ₆ -V ₂ ×S ₂	42.30	7.73	14.82	1.06	17.73	3.87	0.60
T ₇ -V ₂ ×S ₃	51.20	8.32	13.73	1.08	22.10	4.49	0.75
T ₈ -V ₂ ×S ₄	46.53	8.10	13.32	1.07	21.83	4.32	0.68
S.Ed.	0.57	0.08	0.62	0.28	0.57	0.39	0.04
CD (P=0.05)	1.24	0.19	1.23	NS	1.24	0.79	0.09

V₁ - White friendship, V₂ - American beauty;S₁ - July, S₂ - September, S₃ - December, S₄ - February

*Data in parenthesis are transformed values.

crop occurs during mid of February month at which the maximum temperature is mild within 20° - 30° C range and the sunshine available treatment the day favorable for its growth and development. The present results are in line with the reports of Halevy (1985), Carpenter (1995) and Shillo and Halevy (2005). They have reported better performance of gladiolus in terms of its flowering parameters in similar climatic conditions. Under long day lengths, flowers grow and develop fully resulting in the inflorescence becoming a sink for assimilates (Halevy, 1985). Similar result was observed in the reports of Muhammad Adil *et al.* (2013). Correlation of cormel characters with the mean weather parameters revealed that the maximum temperature (within a range of 29.9°C -35.02°C) minimum temperature (within a range of 22.12° C -25.70°C) and bright sunshine hours (within a range of 6.25 -8.85 hrs) had a negative correlation with number

and weight of cormels however, relative humidity (within a range of 67 - 76.5%) had a positive correlation. This could be due to the reason that the mean maximum temperature during December season was 29.9°C and mean relative humidity was 76%, which cannot be considered too high. This is in accordance with the earlier findings that under low temperature (Halevy, 1962) and low air humidity (Shillo and Halevy, 1976) the corm again becomes a sink while decreased assimilates are directed to the inflorescence (Halevy, 1985). The present results are in line with the reports of Suh and Kwack (1990) and Laskar and Jana (1994), who observed production of good quality corms in mild climatic condition.

By considering performance of gladiolus plants in terms of their yield parameters, it was decided that planting during first week of December as the best season to grow gladiolus in Tamilnadu condition and white

Table 2 : Correlation between mean weather parameters at different seasons and growth attributes of *Gladiolus grandiflorus* L.

Growth and yield parameters	Maximum Temp	Minimum Temp	Sunshine	RH
Range	29.9° C -35.02° C	22.12° C -25.70° C	6.25 -8.85 hrs.	67 -76.5%
Days taken for spike emergence	.700	.855	.293	-.601
Days taken for first floret to open	.014	.378	-.648	.244
Spike length (cm)	-.622	-.870	-.046	.449
Number of florets per spike	-.641	-.828	-.207	.528
Number of cormels per plant	-.694	-.909	-.146	.536
Weight of cormels per plant (g)	-.812	-.900	-.456	.738

*Correlation at 0.05 (2-tailed).

Weather parameters

Month	Temperature C ⁰		Sunshine (hrs)	RH (%)
	Maximum	Minimum		
2009 (July to October)	35.02	25.17	8.85	67
2009 (September to December)	31.15	23.92	6.25	76.5
2009 (December to 2010 March)	29.9	22.12	7.60	76
2010 (February to May)	33.95	24.32	8.35	69.5

friendship as the best suitable variety.

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