AJH
eISSN- 0976-724X

THE ASIAN JOURNAL OF HORTICULTURE
Volume **10** | Issue 1 | June, 2015 | 36-40
Visit us -*www.researchjournal.co.in*

**RESEARCH PAPER**

DOI : 10.15740/HAS/TAJH/10.1/36-40

*Article history* :
Received : 04.06.2014
Revised : 20.03.2015
Accepted : 06.04.2015

# Studies on the influence of planting season and weather parameters on growth parameters of two different varieties of *G. grandiflorus* L.

■ **M. SUDHAKAR AND S. RAMESH KUMAR[1]**

**Members of the Research Forum**

**Associated Authors:**
[1]Department of Horticulture, Faculty of Agriculture, Annamalai University, ANNAMALAI NAGAR (T.N.) INDIA

**Author for correspondence** :
**M. SUDHAKAR**
Department of Horticulture, Faculty of Agriculture, Annamalai University, ANNAMALAI NAGAR (T.N.) INDIA
Email : sudhaflora@yahoo.com

**ABSTRACT :** An experiment was conducted in Factorial Randomized Block Design to investigate the growth and flowering of two gladiolus varieties ($V_1$-White friendship and $V_2$-American beauty) in early and late growing seasons. The seasons compared were, planting by first week of July ($S_1$), September ($S_2$), December ($S_3$) and February ($S_3$). The growth 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 growth parameters *viz.*, days to sprouting, sprouting percentage, plant height, number of leaves per plant, leaf area, dry matter production and days to spike emergence. Among different seasons compared, December planting ($S_3$) evinced better performance. The results of the correlation between the mean value of growth parameters in different seasons and weather parameters exhibited that the plant height and sprouting percentage were negatively correlated with maximum temperature (within a range of $29.9^0$C - $35.02^0$C), minimum temperature (within a range of $22.12^0$ C - $25.70^0$ C) and bright sunshine hours (within a range of 6.25 - 8.85 hrs). However, days taken for sprouting was positively correlated with these weather parameters.

**KEY WORDS :** *Gladiolus* sp., Season, Weather parameters, Growth parameters, Dry matter production

**HOW TO CITE THIS ARTICLE :** Sudhakar, M. and Ramesh Kumar, S. (2015). Studies on the influence of planting season and weather parameters on growth parameters of two different varieties of *G. grandiflorus* L. *Asian J. Hort.*, **10**(1) : 36-40.

The gladiolus (*Gladiolus grandiflorus* L.), popularly called "queen of bulbous" belongs to the family Irridaceae and sub family Ixoideae has its elegant flower spikes which have rich variation of colours 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 the states like West Bengal, Uttar Pradesh, Himachal Pradesh, Maharashtra, Karnataka and in some parts of Tamil Nadu and Andhra Pradesh. 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 Tamil Nadu, 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 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 Tamil Nadu 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.

## RESEARCH METHODS

The experiment was conducted during 2009-2010 in Floriculture unit, Department Horticulture, Faculty of Agriculture, Annamalai University, Annamalai Nagar. Four different planting seasons *viz.*, $S_1$-July, $S_2$-August, $S_3$-December, $S_4$-January and two different varieties *viz.*, $V_1$-White friendship and $V_2$-American beauty were compared in Factorial Randomized Bock 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 growth parameters *viz.*, days to sprouting, sprouting percentage, plant height, number of leaves per plant, leaf area, dry matter production and days to spike emergence 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 per cent 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.

## RESEARCH FINDINGS AND DISCUSSION

The results of the experiment clearly indicated that the days to sprouting and sprouting percentage were significantly differed due to *per se* effect of seasons but not due to varieties (Table 1). However, interaction of these two factors had a significant role on these characters. Though, the sprouting was significantly delayed in cooler seasons at December planting ($S_3$) and February planting ($S_4$), the sprouting percentage was significantly increased in these seasons. These results are in concomitant with the reports of Carpenter *et al.* (1995) who observed maximum sprouting in cooler months. Similarly, Hong *et al.* (1989) reported decrease in per cent sprouting of corms due to delayed planting. The growth attributes of gladiolus *viz.*, plant height, number of leaves and dry matter production were significantly influenced by both *per se* and interaction effects of planting season and varieties. Among the two varieties, White friendship ($V_1$) recorded the highest mean of all the growth parameters when compared with American beauty ($V_2$). Among the four different planting seasons compared, all the growth parameters mentioned above recorded the high when planted in cooler seasons like December ($S_3$) and February ($S_4$). During others seasons mean of these parameters were significantly low. These results are in accordance with the reports of Zubair *et al.* (2006) and Khan *et al.* (2008), who stated that the date of planting plays an important role in regulating growth and quality of gladiolus and helped to manage the consumer's demands.

Among the interaction treatments the highest values of the growth attributes like plant height, number of leaves, leaf area and dry matter production were recorded in the interaction treatment of white friendship planted during December season ($V_1 \times S_3$). In this treatment combination the highest plant height of 72.31 cm, number of leaves plant$^{-1}$ of 5.60 and dry matter production of 43.53 g plant$^{-1}$ were recorded. It was followed by white friendship planted during January season ($V_1 \times S_4$). All these growth parameters were recorded the least in the combination

of the variety American beauty planted during July season. These results are in concomitant to Leena *et al*. (1993). They observed enhancement in growth parameters of gladiolus planted during November than those planted during April season under the climatic conditions of Kerala. The findings of Bose *et al.* (1981) and Gursan (1990) stated that the maximum numbers of leaves were observed in plants grown under warmer temperature and long day lengths. Results of the present experiment is in analogous with the findings of Bose *et al.* (1981) as the temperature during December season in Tamil Nadu condition was mild (mean max. was 29.9°C and min. was 22.12°C) and bright sunshine hours (7.60 hrs.) was lengthy enough for the growth of gladiolus.

The results of the correlation between growth parameters and weather parameters evinced that the plant height was negatively correlated with the temperature (The maximum temperature in the range of 29.9°C - 35.02°C) and bright sunshine hours (in the range of 6.25 hrs–8.85 hrs). However, the plant height was positively correlated with increase in relative humidity (Fig. 1). The correlation between the climatic parameters

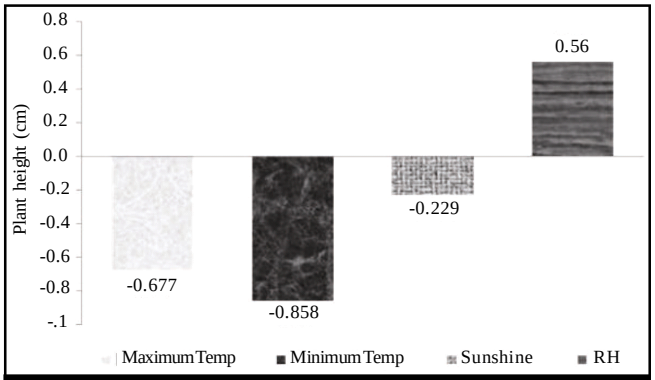


**Fig. 1 : Correlation between mean plant height (cm) at different seasons and weather parameters**

and sprouting parameters showed that the temperature had a positive correlation with days taken for sprouting; however, the sprouting percentage had a negative correlation with the temperature (Fig. 2). These results are in line with the findings of (Carpenter *et al.*, 1995) who reported that temperature between 20°C to 25°C promoted germination to 97 per cent in gladiolus. The positive influence of sunshine hours on plant height

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

| Treatments schedule | Days to sprouting | Sprouting percentage | Plant height (cm) | Number of leaves per plant | Leaf area ($cm^2$) | Dry matter production (g $plant^{-1}$) | Days to spike emergence |
|---|---|---|---|---|---|---|---|
| $V_1$ | 23.10 | 71.75 (57.92) | 68.63 | 4.81 | 84.26 | 36.60 | 73.94 |
| $V_2$ | 23.00 | 71.60 (57.80) | 42.85 | 2.96 | 78.36 | 32.73 | 90.28 |
| S.E. ± | 0.28 | 0.28 | 0.28 | 0.03 | 0.28 | 0.28 | 0.28 |
| CD (P=0.05) | NS | NS | 0.62 | 0.07 | 0.61 | 0.62 | 0.61 |
| $S_1$ | 21.27 | 66.12 (54.39) | 50.51 | 3.32 | 58.27 | 22.24 | 88.84 |
| $S_2$ | 23.42 | 69.31 (56.35) | 54.42 | 3.58 | 80.12 | 36.31 | 83.18 |
| $S_3$ | 25.45 | 78.03 (62.03) | 60.34 | 4.46 | 98.70 | 41.85 | 76.73 |
| $S_4$ | 25.43 | 73.50 (59.02) | 57.69 | 4.19 | 88.16 | 38.25 | 79.71 |
| S.E. ± | 0.40 | 0.40 | 0.40 | 0.05 | 0.40 | 0.57 | 0.40 |
| CD (P=0.05) | 0.87 | 0.87 | 0.87 | 0.09 | 0.87 | 1.24 | 0.87 |
| **V × S Interaction** | | | | | | | |
| $T_1$-$V_1$×$S_1$ | 21.02 | 66.15 (54.45) | 63.72 | 4.20 | 61.85 | 24.30 | 79.34 |
| $T_2$-$V_1$×$S_2$ | 22.52 | 69.32 (56.35) | 68.33 | 4.34 | 83.72 | 38.45 | 76.13 |
| $T_3$-$V_1$×$S_3$ | 23.32 | 78.05 (62.10) | 72.31 | 5.60 | 100.20 | 43.53 | 68.13 |
| $T_4$-$V_1$×$S_4$ | 25.29 | 73.51 (59.02) | 70.17 | 5.13 | 91.28 | 40.12 | 72.18 |
| $T_5$-$V_2$×$S_1$ | 21.08 | 66.10 (54.39) | 37.31 | 2.45 | 54.70 | 20.18 | 98.33 |
| $T_6$-$V_2$×$S_2$ | 22.61 | 69.30 (56.35) | 40.52 | 2.82 | 76.52 | 34.18 | 90.23 |
| $T_7$-$V_2$×$S_3$ | 25.39 | 78.02 (62.03) | 48.37 | 3.32 | 97.21 | 40.18 | 85.34 |
| $T_8$-$V_2$×$S_4$ | 23.39 | 73.49 (59.03) | 45.22 | 3.25 | 85.04 | 36.38 | 87.24 |
| S.E. ± | 0.57 | 0.57 | 0.57 | 0.06 | 0.54 | 0.57 | 0.57 |
| CD (P=0.05) | NS | 1.24 | 1.22 | 0.14 | 1.21 | 1.24 | 1.23 |

$V_1$ - White friendship, $V_2$ - American beauty; $S_1$ - July, $S_2$ - September, $S_3$ – December, $S_4$ – February; Data in parenthesis are transformed values; NS = Non-significant

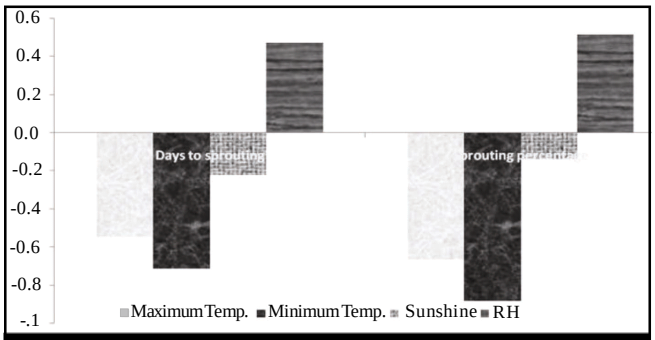


**Fig. 2 : Correlation between mean days to sprouting and sprouting percentage at different seasons and weather parameters**

observed in this experiment is in accordance with Lehri *et al.* (2011), who stated that the growth and quality of gladiolus varied in different seasons because of differences in photoperiods, temperatures and light intensity.

The result of the experiment clearly showed significant differences in the days taken for spike emergence due to individual and interaction effects of varieties and planting seasons in gladiolus. Early spike emergence (68.13 days) was recorded in the interaction treatment of white friendship planted during December season ($V_1 \times S_3$). The correlation studies revealed an increasing trend in days taken for spike emergence with respect to temperature and decreasing tend with respect to sunshine hours and relative humidity (Fig. 3). In the present experiment the mean temperature during December season was not too low and sunshine hours

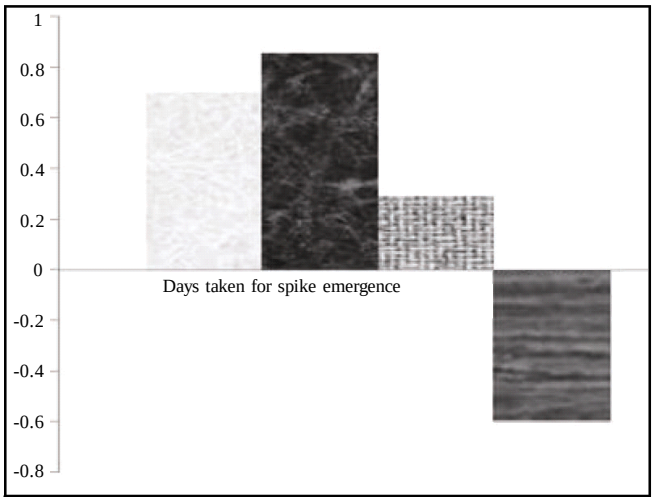


**Fig. 3 : Correlation between mean days taken for spike emergence and days taken for first to floret open at different seasons and weather parameters**

were lengthy enough for the growth of gladiolus. Findings of present study is in line with Imanishi and Imae (1990) who found that flowering is affected at low light intensities and flower development was most sensitive at the 4-5 leaf stage at which floret differentiation occurs, while photoperiod affects flower development, temperature affects the number of days to flower. Present results confirm these findings and corroborates with the reports of Halevy (1985), who stated that the plants flower under warm temperatures in 60-80 days while those growing under cool temperatures take 120-140 days. Further, little delay in the spike emergence during July and September might be due to the damaging effects of high temperatures experienced which would have affected plant water balance. These effects are earlier observed by Shillo and Halevy (2005) in gladiolus.

## REFERENCES

**Ahmad, I., Khattak, A.M., Ara, N. and Amin, N.U. (2011).** Effect of planting dates on the growth of gladiolus corms in Peshawar. *Sarhad J. Agric.*, **27**(2) : 195-199.

**Bose, T.K., Jana, B.K. and Mukhpadhyay, T.P. (1981).** Effect of day length on growth and flowering in Hippeastrum. *Indian J. Hort.*, **38** : 110-112.

**Caroebter, M. Damann, P. and Lyons, R.E. (1995).** Juvenility and photoperiodic flowering requirements of Chrysanthemum × superbum 'G. Marconi' and 'Snow Lady' under short- and long-day conditions. *J. Amer. Soc. Hort. Sci.*, **120** (2) : 241–245.

**Gursan, K. (1990).** *Growing gladiolus*, Ataturk Horticultural Research Institute, Yalova.

**Halevy, A.H. (1985).** *Gladiolus, In : The Handbook of Flowering* **3**. CRC Press, Boca Raton.

**Hong, Y.P., Goo, D.H. and Huh, K.Y. (1989).** Studies on corm formation in *Gladiolus gandavensis.* The effect of planting date of cormels on corm production, dormancy and flowering of the corm in the next generation. *Res. Rep. Rural Dev. Adm. Hort. Manual*, **31**(4) : 54-59.

**Imanishi, H. and Imae, Y. (1990).** Effects of low light intensity and low temperature given at different developmental stages on flowering of gladiolus. *Acta Hort.*, **266** : 189-192.

**Khan, F.U., Jhon, A.Q., Khan, F.A. and Mir, M.M. (2008).** Effect of planting time on flowering and bulb production of tulip under polyhouse conditions in Kashmir. *Indian J. Hort.*, **65** (1): 79-82.

**Leena, R., Rajeevan, P.K. and Aravindakshan, M. (1993).** Influence of the performance of selected gladiolus varieties. *J. Trop. Agric.*, **31**(2) : 210-214.

**Lehri, S. M., Kurd, A.A., Rind, M.A. and Bangulzai, N.A. (2011).** The response of *GLadiolus tristis* L. to N and $P_2O_5$ fertilizers. *Sarhad J. Agric.*, **27**(2): 185-188.

**Panse, V.G. and Sukhatme, P.V. (1978).** *Statistical methods for agricultural workers*. ICAR Pub., NEW DELHI (INDIA).

**Shillo, R. and Halevy, A.H. (2005).** The effect of various environmental factors on flowering of gladiolus. *Scientia Horticulturae*, **4**(2) : 147-155.

**Zubair, M., Wazir, F.K., Akhtar, S. and Ayub, G. (2006).** Planting dates affect floral characteristics of gladiolus under the soil and climatic conditions of Peshawar. *Pak. J. Biol. Sci.*, **9**(9) : 1669-1676.