Pure Appl. Biol., 12(2):862-873, June, 2023
http://dx.doi.org/10.19045/bspab.2023.120086

Research Article

Effect of different planting dates on the growth and flower production of gladiolus under the agro-climatic conditions of Sohbat Pur Balochistan

Farman Ali[1*], Bhai Khan Solangi[2], Muhammad Jaffar Khan Bazai[3], Sher Muhammad Lahri[3], Faheem Shahzad[3], Asmat Ullah[3], Abdul Raoof Khan[3], Bilal Hussain[3], Maqbool Ahmed[1], Muhammad Amin[1], Naseer Ahmed Shahwani[3], Umer Zaib[3] and Jahan Zaib[3]
1. Agriculture and Cooperatives Department (Extension Wing), Balochistan, Pakistan
2. Agriculture University, Tando Jam, Sindh, Pakistan
3. Agriculture Research Institute, Balochistan, Pakistan
**Corresponding author's email:* farmanaliusta12@gmail.com

Citation
Farman Ali, Bhai Khan Solangi, Muhammad Jaffar Khan Bazai, Sher Muhammad Lahri, Faheem Shahzad, Asmat Ullah, Abdul Raoof Khan, Bilal Hussain, Maqbool Ahmed, Muhammad Amin, Naseer Ahmed Shahwani, Umer Zaib and Jahan Zaib. Effect of different planting dates on the growth and flower production of gladiolus under the agro-climatic conditions of Sohbat Pur Balochistan. Pure and Applied Biology. Vol. 12, Issue 2, pp862-873.
http://dx.doi.org/10.19045/bspab.2023.120086

Received: 29/12/2022 Revised: 17/02/2023 Accepted: 19/02/2023 Online First: 28/02/2023

Abstract
This study was carried out in the experimental and demonstration field of Sohbat Pur. in the month of January 2018 to check the impact of different planting dates on the growth and flowering of gladiolus under agro-climatic condition of Sohbat Pur. The field trial was conducted in Randomized complete block design (RCBC) with three replications. Gladiolus corms were sown with fifteen (15) days interval, the corms were sown as following dates. T_1= 2nd January, T_2= 17th January, T_3= 1st February, T_4= 16th February and T_5= 1st March. The results of planting time showed significant ($P<0.05$) effect on growth and flowering of gladiolus with the exception of floret size, as it remained statistically unaffected. The gladiolus in T_3 showed good results as compare to other treatments took minimum (10.25) days to sprouting, maximum (9,58) number of leaves, maximum plant Height (116.83cm), Maximum number of florets spike^{-1}(18.68), maximum floret size (8.00cm), Maximum number of corms (1.5) plant^{-1}. The gladiolus in T_2, also showed some good results, took minimum (81.8) days to first floret opening, maximum number of spikes (1.50) plant^{-1}, Maximum diameter of corm (6.9cm) and Maximum (116.58g) corm weight. It was concluded that the best gladiolus performance was witnessed with ($T_{3)}$ 1st February and (T_2) second fortnight of January could be an optimum planting time of gladiolus under agro-climatic conditions of Sohbat Pur.

Keyword: Different; Dates; Flowering; Growth; Galduolus; Planting; Sohbat Pur

Introduction

Gladiolus, (*Gladiolus grandiflora*) popularly known as "Sword Lily" is an ornamental cormelous plant native to South Africa. It belongs to monocot family Iridaceae. Having approximately one hundred and fifty known species [1]. This plant is commercially used for cut flowers and occasionally used for l and scape designing purpose. Due to very attractive, sphnat flowers gladiolus has great demand in market. To satisfy customer demand, it is important that gladiolus flower is available round the year. Gladiolus is one of the few plants which produce pleasant cut flowers with long spikes [2]. It is native to South Africa and Asia Minor. British people introduced it to the Indo-Pak subcontinent during sixteenth and seventeenth century [3]. The genus Gladiolus comprises about 250-300 species [4]. The flower belongs to the gnus gladiolus Thousands of present-day cultivars belong to *Gladiolus grandiflora* and *Gladiolus hybridus* [5]. The species existed in the range from a smaller one to an amazing gigantic flower spike [6]. Commercially, the gladiolusis worldwide considered as most popular flower [7]. Glorious inflorescence with multiple colors, make it attractive to use as cut flowers as well as in beddings, rockeries, herbaceous borders and pots [8]. mentioned that, internationally in cut flower trade, gladiolus ranks 4th year after rose, carnation and chrysanthemum.

The survey shows that annually production of the flowers are 12tones and area approximately 7080hac [9].

During 2017, 14.7 million gladiolus, stem and mery rosses were marketed and economy boastedby the various parts of the country except Kashmir, Gilgit Baldistan etc. [10].

Usually, the flowers are developed for esthetics, social functions as well as essential oil extraction and manufacture of perfumes [11]. Pakistan has better scope to adopt the floriculture as a lucrative industry due to its diversified agro-climatic conditions and cheap labor force [12]. Unfortunately, the research work been done on its quality production is sporadic and inconclusive. There are many factors limiting its quality production and nutrition is the most important of these factors [13]. Gladiolus is highly responsive to balanced fertilization and it gave better production with enhanced quality parameters when supplied with optimum dose of micronutrients [14]. The well fertilized flowers also perform better in the vase [15], thus can meet with the dems and of consumers. However, now-a-days particularly in the Punjab (Pakistan), floriculture has become potential trade due to farmers' trend to develop valued floral plants and utilize at high social and commercial scale. Thus, floriculture is emerging inside the country at commercial level. Pakistan cultivates rose, carnation, iris, gladiolus, tuberoses, narcissus, lilies, freesia, static and gerbera etc. that are most important floriculture plants to utilize for cut flower trade [16]. In past decade, along with production, tremendous increase in consumption of cut flowers has also been witnessed and such positive movement in this sector in Pakistan is probable [17].

Planting time in gladiolus has crucial role to regulate growth and establish flower quality. Gladiolus development and flower quality is enhanced when proper sowing time is adopted and consumer's demand in relation to gladiolus flower is better fulfilled [18]. Proper schedule of planting gladiolus not only supplies flower to the market steadily but also affix beauty for a longer period to the landscape. The grower is always predictable flowering time of gladiolus raised at different planting dates under normal ecological situation. The research Leena *et al.* [19] showed that growth and yield traits of gladiolus including florets number in a spike, length of spike, diameter of the floret, length of the floret are significantly ($P<0.05$) influenced by the planting time. According to Kumar [20], the planting time has great influence on the flower quality in gladiolus. Similarly, gladiolus sown during proper (optimal) planting period results in enhanced vegetative growth and flower quality which is elementary to develop market and earn more income. The schedule of gladiolus planting is mainly dependent of photoperiod and temperature, where light intensities and relative humidity work decisively [21]. Gladiolus planted in February-March produce greater number of quality spikes; while additional corms on a plant were recorded when the gladiolus was planted in January and February [22]. Akpinar and Bulut [5] reported that the planting time 20thJune could be considered as an optimum sowing time on the basis of sprouting and spiking time in gladiolus variety "white prosperity". In another investigation Kumar *et al.* [23] gladiolus corms in size were better in February-January planting. The research conducted by Kumar *et al.* [24] recommended 5th November to 20th October planting for gladiolus on the basis of corm weight to achieve desirable flower yield [25]. Among all varieties American Beauty produced flowers of maximum weight [26]. Planting time is considered as the primary input to improve growth and flower quality in gladiolus [27]. Sowing of Gladiolus on different times ensures steady flower supply to the market. The growth and yield traits of gladiolus including florets number in a spike, length of spike, diameter of the floret, length of the floret are significantly ($P<0.05$) influenced by the planting time [28]. However, optimum time of gladiolus march vary among varieties. There is need of evaluation of planting time of gladiolus under different ecological conditions of the country to optimize the proper sowing time, so that quality flower production is achieved. Considering the importance of gladiolus in cut flowers trade, the study was undertaken on the evaluation of gladiolus under different sowing dates to optimize sowing time for achieving desired growth and flower production in gladiolus under agro-climatic conditions of Sohbat Pur.

Materials and Methods

Experimental area

The effect of different sowing time on growth and flower production of gladiolus was evaluated in an experiment during 2018 to optimize time for cultivation of gladiolus under climatic condition of Sohbat Pur. The experiment was carried out in experimental and demonstration field of Sohbat Pur. The plot size was 7m × 5m ($35m^2$) with 30 cm × 45 cm plant to plant and row to row spacing respectively. The experiment was conducted in randomize Complete Block Design (RCBD) with three (3) replications.

The soil of the experimental site was analyzed for basic physicochemical properties and texture. According to the soil analysis report, s and, silt and clay ratios in the experimental soil were 16.34, 46.66 and 37.00 percent, respectively and recognized as silty clay loamy in texture. The soil pH determined at 7.83, Calcium carbonate 6.98 percent, Electric conductivity 1.09 dSm^{-1}, organic matter 0.576 percent, available Phosphorus 7.11 mg kg^{-1}, and total Potassium 832.12 ppm. Accordingly, the soil was deficient of organic matter and available Phosphorus while pH and Electric conductivity levels were within acceptable limits.

All the cultural practices were carried out to prepare the experiment field before starting the experiment. After that experimental field was levelled to facilitate uniform watering to enter experimental plot. Well rotten Farm Yard Manure (FYM) was applied before experiment to increase the facility level of all sub-plots.

Treatments details are given as follows:

Treatments (Planting dates) = 05

T_1=2nd January
T_2 =17th January
T_3 =1st February
T_4 =16th February
T_5 =1stMarch

Morphological parameters

Observations recorded

Days taken to sprouting

The data Days taken to sprouting was observed days counted from date of sowing of corm to sprouting of corms and expressed in numbers.

Number of leaves plant^{-1}

Five healthy plants were randomly selected and the data number of leaves plant^{-1} recoded and expressed in numbers.

Plant height (cm)

Five healthy plants were randomly selected and the data of plant height was recoded with the help of measuring scale from the ground level to the tip of upper most part and expressed in centimetres.

Number of florets spike $^{-1}$

Data regarding number of florets spike^{-1} was recorded form five randomly selected healthy plants and data was given in numbers.

Days taken to first florets opening

The data days taken to first florets opening was observed days counted from sowing of corm to first florets opening of gladiolus and expressed in numbers.

Floret size (cm)

Floret size was measured from five randomly selected plants. The florets size was calculated with the help of varnier caliper.

Spike plant^{-1}

Number of spikes plants^{-1} was counted from randomly selected plants and average was noted.

Number of cormslet plant^{-1}

When gladiolus plants completed their life cycle corms of five plants were dig out and number of cormslet plant-1 counted and expressed in numbers.

Diameter of corm(cm)

Corms of selected plants were collected and data regarding diameter of comb was noted with the help of varnier calliper and average was calculated.

Cormlets plant-^{1}

When Cormlets/plants completed their life cycle corms of five plants were dig out and number of Cormlets plant were counted.

Corm weight

Collected corms of selected plants were individually weight on digital weighting machine and average was noted.

Statistical analysis

The collected data were analyzed by using statistical software SPSS (8.1), The ANOVA for each trait were examine. Statham, Helen, Josephine M. Green, and Kostas Kafetsios (1997).

Results and Discussion

The impact of planting date on flower production of gladiolus was investigated in an experiment carried out during 2017-18 to optimize sowing time for gladiolus. Five treatments based on different sowing dates were selected (T_1=2nd January, T_2 =17th January, T_3 =1st February, T_4 =16th February and T_5 =1stMarch). The characters of economic importance measured in this study included: days taken to sprouting, leaves plant^{-1}, plant height cm, days to opening of first floret, florets spike^{-1}, corms plant^{-1}, number of cormlets plant^{-1}, diameter of corm, floret size, number of spikes plant^{-1} and average weight of corms. The results on the above traits are shown in (Table 1); while ANOVA for each trait is shown as Appendices I-XI. The results on these gladiolus traits are interpreted in the following pages under various sub-headings.

Days to sprouting of corms

Corm sprouting is the crucial for achieving desired gladiolus flower production. The results concerning to days to sprouting in gladiolus under the effect of various sowing time are presented in (Table 1) and the relative ANOVA signifying the impact of treatments is shown as (Table 1). The ANOVA suggested that the sowing time impact on days to corm sprouting was highly significant ($P<0.01$).

The experimental outcome revealed that sprouting of gladiolus delayed when the planting was early or too late and relatively lesser days to corm sprouting was noted in plots sown in intermediary dates of the planting season. The gladiolus corms planted on 1st February showed earliest sprouting in 10.25 days; while there was a relative delay in sprouting when the gladiolus was planted on 16th February (11.65 days) or 17th January (11.96 days). However, the maximum delay in sprouting was noted when planting was done on 1st March (12.18 days) and 2nd January (12.62 days).

The sprouting of gladiolus delayed when the planting was early or too late and relative decrease in days to sprouting was noted in plots sown in intermediary dates of the planting season. These results are accordance with the findings of Fahad *et al.* [29], who reported that growth period of gladiolus was significantly influenced by sowing time in relation to temperature changes.

Table 1: Number of days taken to initiate sprouting under the influence of different planting dates

Treatments	REPLICATES				Mean
	I	II	III	IV	
T_1=2nd January	12.50	13.00	12.50	12.50	**12.62 A**
T_2=17thJanuary	11.75	12.62	12.00	11.50	**11.96 B**
T_3=1st February	10.50	10.50	10.00	10.00	**10.25 C**
T_4=16th February	12.50	12.62	11.50	11.00	**11.65 B**
T_5=1st March	12.62	12.50	11.96	11.65	**12.18 AB**

Note: Where, means carrying same letters in a column not significantly different, the values were mean of three replicates
S.E. (±) = 0.2172
LSD (0.05) = 0.4732
LSD (0.01) = 0.6634

Number of leaves plant^{-1}

The effect of planting time on leaves plant^{-1} was investigated and result in regards to number of leaves plant^{-1} are given in (Table 2). while relative ANOVA showing significance of treatment impact is given as (Table 2). The ANOVA describes that number of leaves plant^{-1} were significantly ($P<0.05$) influenced by different time of planting. The gladiolus planting on first February resulted in plants with maximum leaves in the (9.58) on average, and leaves number significantly decreased (9.08) when the gladiolus corms were planted on 16th February. The number of leaves plant^{-1} were statistically in similarity ($P>0.05$) when corms were planted on 17th January (8.91), 2nd January (8.66) and first March (8.58). The results suggested that gladiolus corms planted in last week of January or full month of February favored the development of more foliage (leaves plant^{-1}); while the delay in planting up to March caused least count of leaves plant^{-1}. Similarly, early sowing in January has also adverse effect on the leaves count plant^{-1}. It was assumed that leaves number plant^{-1} decreased when the planting was early or too late and number of leaves plant^{-1}exploited maximally when planting was done in the intermediary dates of the growing season.

Chaudhary *et al.* [30] found that number of leaves in gladiolus affected significantly by sowing dates; while Baloch [18] reported that sowing of gladiolus in January and February resulted in more number of leaves per plant in more leaves per plant^{-1}.

Plant height (cm)

The impact of planting dates on the height of gladiolus plants was ascertained and relative results are given in (Table 3). while the ANOVA demonstrating the significance of treatment impact is shown as (Table 3). The ANOVA suggests that plant height was significantly ($P<0.05$) influenced by different planting time. The maximum plant height (116.83 cm) were found in plots where planting of corms was done on 1st February, followed by 114.91 cm and 114.41 cm plant height was observed in plots where the gladiolus plants were sown on 17th January and 16th February, respectively. The plant height further decreased to 113.49 cm when corms were planted on 2nd January; while minimum height of plants (113.08 cm) was observed in 1st March planting. It is evident from the findings that gladiolus corms planted in last week of January up to second fortnight of February maximally favoured plant development, while the delay in planting up to late February and March produced relatively shorter plants. Likewise, early sowing in January could hamper the plant height. Hence, planting gladiolus corms too early or too late march not grow and flower vigorously. The LSD test indicates that though the height of plants differed significantly ($P<0.05$) among all the planting dates.

Similar results have also been reported by Bhat and Khan [9] who reported that plant height was significantly affected by sowing dates; while Gonzalez *et al.* [16] reported that apart from the varietal effect on flowering behaviour of gladiolus, the sowing time had also significant impact on plant height.

Table 2: Number of leaves plant-1 of gladiolus under the influence of different planting dates

Treatments	REPLICATES				Mean
	I	II	III	IV	
T_1=2nd January	8.66	8.66	9.00	8.33	**8.66 B**
T_2=17th January	8.66	8.33	9.33	9.33	**8.91 B**
T_3=1st February	9.33	10.00	9.33	9.66	**9.58 A**
T_4=16th February	9.00	8.66	9.33	9.33	**9.08 AB**
T_5=1st March	8.33	8.33	8.66	9.00	**8.58 B**

Note: Where, means carrying same letters in a column not significantly different, the values were mean of three replicates
S.E. (±) = 0.2364
LSD (0.05) = 0.5152
LSD (0.01) = 0.7222

Table 3: Plant height (cm) of gladiolus under the influence of different planting dates

Treatments	REPLICATES				Mean
	I	II	III	IV	
T_1=2nd January	113.33	115.66	113.33	111.66	113.49 CD
T_2=17th January	116.00	115.00	114.66	114.00	114.91 B
T_3=1st February	118.66	116.66	117.00	115.00	116.83 A
T_4=16th February	115.66	114.66	114.00	113.33	114.41 BC
T_5=1st March	113.00	113.66	114.00	111.66	113.08 D

Note: Where, means carrying same letters in a column not significantly different, the values were mean of three replicates
S.E. (±) = 0.5885
LSD (0.05) = 1.2821
LSD (0.01) = 1.7974

Number of florets spike^{-1}

The flower quality in gladiolus is mainly associated with number of florets spike^{-1}, which also reflects the treatment effect. The data in relation to number of florets spike^{-1} in gladiolus are given in (Table 4). While the ANOVA examining the significance of treatments is given as (Table 4). According to the ANOVA, various planting dates had significantly affected number of florets spike^{-1} in gladiolus ($P<0.05$). The (Table 4) describes that number of florets spike^{-1} were highest in number (18.68) when the gladiolus planting was done on 1st February and florets decreased considerably to 15.50 and 15.15 spike^{-1} when the gladiolus planting was carried out on 16th February and 1st March, respectively. Similarly, the gladiolus early planting on 17th January and 2nd January decreased the number of florets spike^{-1} to 18.18 and 17.80, respectively. It is evident from the results that last two weeks of January and up to 1st week of February march be considered as the optimum planting time of the gladiolus so far the parameter florets spike^{-1} is concerned. Planting earlier than third week of January or later than first week of February caused reduction in the florets spike^{-1} count over the described optimum planting period. This indicates that early planting could somehow compensate the loss due to environmental change, but late planting showed severe adverse effects and environment on the number of florets spike^{-1}.

The results of the present study are in accordance with those of Fahad *et al.* [29] who reported that florets number spike^{-1} were higher at optimum sowing date, but delayed sowing caused reduction in florets spike^{-1}. Similarly, Chaudhary *et al.* [30] found that sowing gladiolus too early would result in decreased florets number spike^{-1}.

Table 4: Number of florets spike-1 of gladiolus under the influence of different planting dates

Treatments	REPLICATES				Mean
	I	II	III	IV	
T_1=2nd January	19.00	18.75	18.00	17.00	18.18 AB
T_2=17th January	18.00	17.60	17.80	17.80	17.80 B
T_3=1st February	19.00	18.00	19.00	18.75	18.68 A
T_4=16th February	15.40	15.40	15.21	16.00	15.50 C
T_5=1st March	15.20	15.00	15.40	15.00	15.15 C

Note: Where, means carrying same letters in a column not significantly different, the values were mean of three replicates
S.E. (±) = 0.3608
LSD (0.05) = 0.7862
LSD (0.01) = 1.102

Days taken to first floret opening

The planting time impact on the number of days to opening of first floret in gladiolus was explored and data are given in (Table 5), while ANOVA describing the treatments impact is shown as (Table 5). As ANOVA suggests, the days taken to opening of first floret of gladiolus was significantly affected by varying planting time ($P<0.05$). The gladiolus corms planted 17th January took least number of days (81.8) to opening of first floret; while there was a successive delay in opening of first floret when the gladiolus was planted on 1st February (85.9 days), 16th February (92.62 days) and 1st March (93.45 days). However, the early planted gladiolus corms took (89.8) days to opening of first floret. The results showed that last three weeks of January up to 1st week of February could be considered as the optimum planting time of the gladiolus to get optimally early opening of first floret of the corms. However, planting earlier than second week of January and later than first week of February would cause delay in opening of first floret over the optimum planting period suggested in this study. The days to opening of first floret showed similarity ($P>0.05$) when corms were planted on 16th February and 1st March; while dissimilarity ($P<0.05$) was observed in days to opening of first floret when compared with remaining planting dates.

The results of Kumar [20] concluded that earliness and delayed sowing delayed the opening of first floret in gladiolus; while Halder *et al.* [17] found that optimum sowing time resulted in early opening of florets in gladiolus.

Table 5: Days taken to first floret opening of gladiolus under the influence of different planting dates

Treatments	REPLICATES				Mean
	I	II	III	IV	
T_1=2nd January	90.0	89.2	89.6	90.4	**89.8 B**
T_2=17th January	78.6	82.2	84.2	82.2	**81.8 D**
T_3=1st February	82.4	85.8	87.8	87.6	**85.9 C**
T_4=16th February	93.2	92.0	92.4	92.8	**92.62 A**
T_5=1st March	94.0	93.6	92.2	93.6	**93.35 A**

Where, means carrying same letters in a column not significantly different, the values were mean of three replicates
S.E. (±) = 1.1079
LSD (0.05) = 2.4138
LSD (0.01) = 3.3840

Floret size (cm)

Floret size in gladiolus is one of the components that not only represent flower quality, but the flower production as well. This trait is generally associated with genotypes but the soil fertility and other management aspects also influence this trait. The results pertaining to floret size of gladiolus are shown in (Table 6) and the ANOVA illustrating the significance of effect from treatments is given as (Table 6). The ANOVA describes different planting dates of gladiolus did not influence the floret size significantly ($P>0.05$). The floret size was relatively greater (8.00 cm) in gladiolus was planted on 1st February, followed by the average floret size of 7.87 cm and 7.8 cm observed in plots planted on 17th January and 2nd January, respectively. There was greater adverse effect of delayed planting and gladiolus planted on 16th February resulted in 7.77 cm floret size; while the considerable decrease in floret sizes (5.5 cm) when gladiolus corms were planted on 16th February; while the smallest florets (7.75 cm) on average were recorded in plots sown on 1st March. There was a great association of floret size with the diameter of corms and other studied traits. The findings explain that early sowing would not affect the floret size considerably; however, the late sowing i.e. after first week of February would severely affect the floret size in negative direction. So far the floret size is concerned; the optimum planting time of gladiolus would be second fortnight of January up to first week of February.

The trait floret size not only represents flower quality, but also significantly associates to flower production. The generally the trait is associated with genotypes but the crop management aspects also affect this parameter. The planting dates did not influence floret size of gladiolus ($P>0.05$) and relatively greater size (8.00 cm) was found in 1st February planting; while the smallest florets (7.75 cm) were recorded in 1st March planting. There was a great association of floret size with the diameter of corms and other studied traits. The findings explain that early sowing would not affect the floret size considerably; however, the late sowing i.e. after first week of February would severely affect the floret size in negative direction. So far the floret size is concerned; the optimum planting time of gladiolus would be second fortnight of January up to first week of February. Similar results have also been obtained by suggested that the gladiolus growers should adopt the optimum time of sowing for achieving desired floret size in gladiolus.

Table 6: Floret size (cm) of gladiolus under the influence of different planting dates

Treatments	REPLICATIONS				Mean
	RI	RII	RIII	RIV	
T_1=2nd January	7.8	7.6	8.0	8.1	7.8B
T_2=17th January	8.0	8.0	7.6	7.9	7.87B
T_3=1st February	8.1	8.0	7.9	8.0	8.00A
T_4=16th February	7.6	7.6	8.0	7.9	7.77AB
T_5=1st March	7.6	7.9	7.9	7.6	7.75C

Note: Where, means carrying same letters in a column not significantly different, the values were mean of three replicates

S.E. (±) = 0.1395

LSD (0.05) = --

LSD (0.01) = --

Spikes Number of plant^{-1}

The planting date impact on spikes number plant^{-1} of gladiolus was searched in the experiment and the relative data are presented as (Table 7); the analysis of variance signifying the treatment impact (Table 7), pointed out significant ($P<0.05$) effect of varying planting time on spikes number plant^{-1}of gladiolus.

Gladiolus corms implanted on 17th February produced averagely more spikes (1.50 plant^{-1}), and 1st February planting produced 1.45 spikes plant^{-1}; while 2nd January planting of gladiolus caused 1.30 spikes plant^{-1}. Likewise, the late

http://dx.doi.org/10.19045/bspab.2023.120086

planting of gladiolus on 16th February and 1st March equally produced least count of spikes (1.25 plant^{-1}). It is apparent from the experimental outcome that apart from the 17th January and 1st February sowing, all other rest of sowing dates resulted in a significant reduction in the number of spikes plant^{-1}. Planting earlier than third week of January or later than first week of February resulted in severe reduction in the number of spikes plant^{-1} over the optimum planting time. Moreover, early planting up to 17th January did not show greater adverse effects on this trait, but planting gladiolus later than first week of February caused significant loss to the number of spikes plant^{-1}. The number of spikes plant^{-1} showed similarity (P>0.05) when corms were planted on 16th February and 1st March as well as between 2nd January and 1st February sowing.

Dod *et al.* [12] reported that apart from the varietal influence on the number of spikes plant^{-1}, the sowing temperature also had significant impact on spikes number in gladiolus have suggested that there should be an effective role of extension workers to train the farmers for sowing of ornamental plants at proper sowing time (Table 7).

Table 7: Number of spikes plant-1 of gladiolus under the influence of different planting dates

Treatments	REPLICATE				Mean
	I	II	III	IV	
T_1=2nd January	1.2	1.4	1.4	1.2	**1.30 AB**
T_2=17th January	1.6	1.4	1.4	1.6	**1.50 A**
T_3=1st February	1.6	1.6	1.2	1.4	**1.45 AB**
T_4=16th February	1.2	1.4	1.2	1.2	**1.25 B**
T_5=1st March	1.2	1.2	1.4	1.2	**1.25 B**

Note: Where, means carrying same letters in a column not significantly different, the values were mean of three replicates
S.E. (±) = 0.0975
LSD (0.05) = 0.2124
LSD (0.01) = 0.2977

Summary

The influence of planting time on flower production of gladiolus was investigated in an experiment carried out during 2017-18 to optimize sowing time for gladiolus. Five treatments based on different sowing dates were formed (T_1=2nd January, T_2 =17th January, T_3 =1st February, T_4 =6th February and T_5 =1stMarch). The characters of economic importance measured in this study included: days taken to sprouting, leaves plant^{-1}, plant height, days to opening of first floret, florets spike^{-1}, corms plant^{-1}, number of cormlets plant^{-1}, diameter of corm, floret size, number of spikes plant^{-1} and average weight of corms. The findings of the study are summarized as under:

The results show that the effect of planting time on all the studied gladiolus traits were statistically significant (P<0.05) with the exception of floret size, as floret size remained statistically unaffected by the planting time. The gladiolus planting on 2nd January resulted in 12.62 days taken to initiate sprouting, 8.66 leaves plant^{-1}, 113.49 cm plant height, 89.8 days to opening of first floret, 18.18 florets spike spike^{-1}, 1.2 corms plant^{-1}, 20.95 cormlets plant^{-1}, 6.5 cm diameter of corm, 7.8 cm floret size, 1.30 spikes plant^{-1} and 101.0 g average weight of corms.

Similarly, the gladiolus planted on 17th January initiate sprouting in 11.96 days, produced 8.91 leaves plant^{-1}, 114.91 cm plant height, 81.8 days to opening of first floret, 17.80 florets spike spike^{-1}, 1.47 corms plant^{-1}, 22.65 cormlets plant^{-1}, 6.9 cm diameter of corm, 7.87 cm floret size, 1.50 spikes plant^{-1} and 116.56 g average weight of corms.

The gladiolus sown on 1st February took 10.25 days to initiate sprouting, produced 9.58 leaves plant^{-1}, 116.83 cm plant height, 85.9 days to opening of first floret, 18.68 florets spike spike^{-1}, 1.5 corms plant^{-1}, 22.95 cormlets plant^{-1}, 6.7 cm diameter of corm, 8.00 cm floret size, 1.45 spikes plant^{-1} and 111.62 g average weight of corms.

The plantation of gladiolus on 16th February took 11.65 days to initiate sprouting, produced 9.08 leaves plant^{-1}, 114.41 cm plant height, 92.62 days to opening of first floret, 15.50 florets spike spike^{-1}, 1.3 corms plant^{-1}, 18.95 cormlets plant^{-1}, 5.5 cm diameter of corm, 7.77 cm floret size, 1.25 spikes plant^{-1} and 82.90 g corms weight.

Gladiolus sown on 1st March took 11.65 days to initiate sprouting, produced 8.58 leaves plant^{-1}, 113.08 cm plant height, 93.35 days to opening of first floret, 15.15 florets spike spike^{-1}, 1.05 corms plant^{-1}, 16.10 cormlets plant^{-1}, 4.8 cm diameter of corm, 7.75 cm floret size, 1.25 spikes plant^{-1} and 75.45 g corms weight.

The maximum days to initiate sprouting (12.62) were recorded in 2nd January planting, and minimum (10.25) in plantation sown on 1st February. The leaves plant^{-1} was maximum (9.580 IN 1ST February planting, and minimum (8.58) in 1st March planting. Maximum plant height (116.83) was recorded in 1st February planting and minimum (113.08) in 1st March sowing. Maximum days to open first floret (93.35) were noted in 1st March planting and minimum (81.8) in 17th January planting. Similarly, florets spike^{-1} was highest (18.68) in 1st February sowing and lowest (15.15) in 1st March planting. The corms plant^{-1} was maximum (1.5) in gladiolus planted on 1st February and minimum (1.05) in 1st March sowing; while the cormlets plant^{-1} were maximum (22.95) in 1st February sowing and lowest (18.10) in 1st March sowing. The corm diameter was highest (6.9 cm) in 17th January planting and minimum (4.8 cm) in 1st March sowing. The average floret size was highest (8.00 cm) in gladiolus planted on 1st February and least (7.75 cm) in 1st March planting. The spikes plant^{-1} was maximum (1.5) in gladiolus planted in 1st February and least (1.25) equally in 16th February and 1st March sowing. Likewise, the corn weight was maximum (116.56 g) in 17 January sowing, and least (75.45 g) in gladiolus planted in 1st March.

Conclusion

It was concluded that most of the gladiolus plant traits showed their best performance when planted on 17th January and 1st February, suggesting that gladiolus planting second week of January and first week of February could be an optimum planting time of gladiolus under agro-ecological conditions of Sohbat Pur, Balochistan.

Authors' contributions

Conceived and designed the experiments: F Ali, BK Solangi & MJK Bazai, Performed the experiments: SM Lahri, F Shahzad, A Ullah & AR Khan, Analyzed the data: B Hussain, M Ahmed, M Amin, NA Shahwani, U Zaib & J Zaib, Contributed reagents/ materials/: F Ali & A Ullah, WROTE the paper: F Shahzad & F Ali.

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