International Journal of Environmental Sciences & Natural Resources
ISSN: 2572-1119

Research Article
Volume 9 Issue 1 - February 2018
DOI: 10.19080/IJESNR.2018.08.555753

Int J Environ Sci Nat Res

Effect of Different Planting Dates on Gladiolus Production

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Submission: January 22, 2018; **Published:** February 26, 2018

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Abstract

An experiment "Effect of different planting dates on Gladiolus "Indian local cultivar" was conducted at Agriculture Research Institute Mingora, Swat during 2015. The experiment was laid out in Randomized Complete Block Design. The experimental data was analyzed statistically. Mean tables are briefed for interpreting the results regarding sprouting percentage, number of leaves plant^{-1},plant height, corm diameter, corm weight and number of cormels plant^{-1} of Gladiolus, where all the parameters were significantly affected by different planting dates. Maximum sprouting percentage (94.57%), corm weight (46.67g), number of cormels (12.01) plant^{-1}, plant height (114.16 cm), corm diameter (5.40cm) and number of leaves (14.03) plant^{-1} were observed on 10th February, while minimum sprouting percentage (86.66%), corm weight (34.33g), number of cormels (4.66) plant^{-1}, plant height (98.40 cm), corm diameter (4.11cm) and number of leaves (8.67) plant^{-1} were observed on 12th March.

Keywords: Planting dates, Cultivars and corms

Introduction

Gladiolus (*Gladiolus grandiflorus*) popularly known as "Sword Lily" is an ornamental cormelous flower Memon [1] native to South Africa. It belongs to monocot family Iridaceous, having approximately one hundred and fifty known species Negi et al. [2]. This plant is commercially used for cut flowers and occasionally used for landscape purpose. Gladiolus produces very attractive flowers having great market demand. For the satisfaction of consumer, gladiolus flower should be available round the year. Gladiolus is one of the few plants which produce pleasant cut flowers with long spikes. These spikes are an integral part of almost every cut flower arrangement ranging from table decoration to bouquet formation. Gladiolus is cultivated in most of the tropical and subtropical countries of the world. In plains of Pakistan, it blooms profusely during the spring and summer. Gladiolus spikes takes 60 to 100 days after planting to be harvested depending upon the cultivars and time of year Jenkins [3]; Jenkins et al. [4].

The stem of gladiolus is herbaceous and the leaves are narrowly linear, flattened at the sides and sheathing at the base. The flowers are bisexual, actinomorphic, having 3stamens Hutchinson [5]. The most preferred soil for flowering of gladiolus is sandy loam having light texture, more organic matter and free drainage. The optimum level of pH is 5.5 to 6.5for growth and development of gladiolus. Gladiolus is vegetative propagated by corm Ramachandrudu, Thanga [6] which is a food-storing underground stem. The corm has the ability to maintain the plant while dormant until growth resumes after the spring rains begin. Upon plantation, gladiolus corm produces on its top a new daughter corm each year and itself shrivels and dies. The bud development occurs on the upper surface of the daughter corm from which the new plant grows. The bases of old leaves are thin and dry, which cover the corm. These papery leaves are called husks. The husks overlap each other and meet to form a point at the top.

While the new daughter corm is forming on the top of old one, small new corms called cormels or cormlets arise. These corms and cormels are the chief means of gladiolus propagation. Cormels are usually graded in to three sizes: large more than 1.0cm diameter, medium 0.5cm to less than 1.0cm, and small less than 0.5cm. Cormels are treated before storage with hot water solution to eradicate latent fungi, insect and nematodes Larson [7]. The cormel formation starts with the initiation of the flower spikes. When the spikes attain full bloom, cormels are produced and continue to increase in size as the photosynthates are directed downward Hartmann et al. [8]. Planting schedule varies because of differences in photoperiods, temperature and light intensity Susan et al. [9]. Vegetative growth and quality of gladiolus is improved by proper planting times which also satisfies the consumer's demands Zubair et al. [10]. Date of planting plays an important role in regulating growth and quality of gladiolus Noor-ul-amin 2013. Growth and yield of gladiolus, like other plants, depends on proper planting time. The present

research work was planned to investigate the suitable planting time for better gladiolus production under the agro-ecological conditions of Swat, Pakistan.

Material and Methods

An experiment "Effect of planting dates on the growth of gladiolus" was conducted at the Agriculture Research Institute (N) Swat, during 2015. Gladiolus cultivar (cv.) Indian Local was used in the experiment. The cormels were planted on three different dates with a regular interval of 15 days. The planting dates were scheduled as P1: February-10, P2: Februauy-25, P3: March-12. For all the treatments the culture practices were the same. The experiment was laid down as Randomized Complete Block Design. The field was thoroughly prepared and cleaned from weeds before planting the cormels. The length of ridges was kept 100 cm and 10 cormels were planted on a single ridge. Plant to plant and row to row distance was kept 10cm and 30cm, respectively. The following parameters were studied.

Sprouting Percentage

Number of cormels sprouted was counted for all the treatments in each replication and percentage was calculated by the following formula

$$Sprouting\ percentage = \frac{No\ of\ cormels\ sprouted}{Total\ number\ of\ cormels\ planted} x100$$

Number of Leaves Plant

Number of leaves per plant was recorded by counting number of leaves from date of sprouting till the death of the plant and then average was calculated.

Plant Height (cm)

Plant height was measured with the help of measuring tape from soil surface to the apex of the plant and then average was calculated.

Cormel Diameter (cm)

Cormel size was measured with the help of vernier caliper and average data was calculated.

Corms Weight (g)

Each cormel of a treatment in each replication was weighted with the help of electric balance and then average was calculated.

Number of Corms Per Plant

Number of cormels per plant was counted in each treatment for each replication and then average was computed.

Statistical Procedure

All the data noted on plant growth parameters was subjected to *analysis of variance* process to confirm differences among various planting dates. Least significant difference (LSD) test was used for mean differences where the results were significant. Computer statistical software MSTATC was applied for calculating ANOVA and LSD Steel, Torrie 1980.

Results and Discussion

The experimental data was analyzed statistically. Mean tables are briefed for interpreting the results regarding sprouting percentage, number of leaves plant^{-1}, plant height, corm diameter, corm weight and number of cormels plant^{-1} of *Gladiolus grandiflorus*.

Sprouting Percentage

The data recorded for spouting percentage is presented in Table 1 and analysis of variance is placed in Table 1a. The analysis of variance showed that different planting dates had significant effect on number of leaves plant^{-1}. Mean table showed that maximum sprouting (94.28%) was found by cormels planted on 10th February followed by 25th February (90.37%), while minimum spouting (86.660 %)was produced by those planted on 12th March. The maximum sprouting percentage on 10th February might be due to the fact that the environmental conditions were favorable for the sprouting at that time Mc Kay et al. [11]. Similar results were also reported by Hong et al. [12], who observed decrease in sprouting percent of cormels due to delay planting.

Table 1: Sprouting percentage (%) of gladiolus as affected by different planting dates.

Planting Dates	Sprouting Percentage
10th Feb 2015	94.57 A
25^{t}h Feb 2015	90.24 AB
12th March 2015	86.66 B

LSD value at 0.05% level of probability for sprouting percentages = 5.3617

Table 1a: Analysis of variance for sprouting percentage (%) of gladiolus as affected by different planting dates.

SOV	DF	SS	MS	F	P
Replication	2	25.132	12.5660		
Duration	2	94.287	47.1433	8.43	0.0368
Error	4	22.376	5.5939		
Total	8	141.794			
Grand Mean	90.494	CV	2.61		

Number of Leaves Plant^{-1}

The data recorded for number of leaves plant^{-1} is presented in Table 2 and analysis of variance is placed in Table 2a. The analysis of variance showed that different planting dates had significant effect on number of leaves plant^{-1}. Mean table showed that maximum leaves (14.03) plant^{-1} was found by cormels planted on 10th February followed by 25th February (11.79) leaves plant-1, while minimum leaves (8.67) plant-1 was produced by those planted on 12th March. The maximum number of leaves plant^{-1}on 10th February might is due to the fact that at that time the plants might have acquired maximum efficiency for development due to ideal condition Ahmad et al. [13]; Ko et al. [14] also reported that earlier plantation results in maximum number of leaves per plant in gladiolus.

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Table 2: Number of Leaves plant-1 of gladiolus as affected by different planting dates.

Planting dates	No of Leaves plant^{-1}(cm)
10th Feb 2015	14.03 A
25th Feb 2015	11.79 B
12th March 2015	8.67 C

LSD value at 0.05% level of probability for number of leaves per plant^{-1} = 1.2051

Table 2a: Analysis of variance for Number of leaves plant-1of gladiolus as affected by different planting dates.

SOV	DF	SS	MS	F	P
Replication	2	0.8598	0.4299		
Duration	2	43.4310	21.7155	76.84	0.0006
Error	4	1.1304	0.2826		
Total	8	45.4212			
Grand Mean	11.502	CV	4.62		

Plant Height (cm)

The data recorded for plant height is presented in Table 3 and analysis of variance is placed in Table 3a. The analysis of variance showed that different planting dates had significant effect on number of leaves plant^{-1}. Mean table showed that maximum plant height (114.16cm) was observed in cormels planted on 10th February, followed by 25th Feb (106.23cm), while minimum plant height (98.40 cm) was observed in cormels planted on 12th March. The maximum plant height on 10th Feb might be the result of ideal condition for photosynthesis through which the plants acquired well developed structure and height. Ahmad et al. [15]. Almost similar results were found by Ko et al. [14] who mentioned that earlier planting produced larger corms and longer stems. Khan et al. [16] also stated that, planting time significantly influenced the vegetative growth of Tulip.

Table 3: Plant height of gladiolus as affected by different planting dates.

Planting dates	Height (cm)
10th Feb 2015	114.16 A
25th Feb 2015	106.23 B
12th March 2015	98.40 C

value at 0.05% level of probability for Plant Height= 1.3885

Table 3a: Analysis of variance for plant height of gladiolus as affected by different planting dates.

SOV	DF	SS	MS	F	P
Replication	2	1.590	0.795		
Duration	2	372.414	186.207	496.38	0.0000
Error	4	1.501	0.375		
Total	8	375.505			
Grand Mean	106.26	CV	0.58		

Corms Diameter (cm)

The data recorded for corms diameter (cm) is presented in Table 4 and analysis of variance is placed in Table 4a. The analysis of variance showed that different planting dates had significant effect on diameter. Mean table showed that maximum corm diameter (5.40 cm) was observed in cormels planted on 10th February followed by those planted on 25th Feb (4.72 cm), while minimum corm diameter (4.11cm) was produced by those planted on 12th March. The 10th February plantation had produced maximum corm diameter which showed that at that time the plants had best performance due to which they produced more photosynthesis which caused big sized corms. Zubair [10]. Similar results were also obtained by Asif et al. [17] who found that the biggest tuberose corms were produced in the month of February.

Table 4: Corms diameter (cm) of gladiolus as affected by different planting dates.

Planting dates	Diameter(cm)
10th Feb 2015	5.40 A
25th Feb 2015	4.72 B
12th March 2015	4.11 C

LSD value at 0.05% level of probability for Diameter of Corms= 0.4657

Table 4a: Analysis of variance for corms diameter of gladiolus plant as affected by different planting dates.

SOV	DF	SS	MS	F	P
Replication	2	0.11016	0.05508		
Duration	2	2.48549	1.24274	29.45	0.0040
Error	4	0.16878	0.04219		
Total	8	2.76442			
Grand Mean	4.7456	CV	4.33		

Corms Weight (g)

Table 5: Corm weight of gladiolus as affected by different planting dates.

Planting dates	Weight (g)
10th Feb 2015	46.67 A
25th Feb 2015	40.53 B
12th March 2015	34.33 C

LSD value at 0.05% level of probability for Corm weight =3.6194

Table 5a: Analysis of variance for corms weight of gladiolus as affected by different planting dates.

SOV	DF	SS	MS	F	P
Replication	2	1.002	0.501		
Duration	2	228.415	114.208	44.80	0.0018
Error	4	10.196	2.549		
Total	8	239.614			
Grand Mean	40.513	CV	3.94		

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The data recorded for corm weight (g) is presented in Table 5 and analysis of variance is placed in Table 5a. The analysis of variance showed that different planting dates had significant effect on corm weight. Mean table showed that maximum corm weight (46.67g) was observed in cormels planted on 10th February was followed by those planted on 25th February (40.53), while the lowest corms weight of gladiolus (34.33) was recorded for cormels planted on 12th March. The cormels planted on 10th February gave maximum corm weight which might be due to the best adaptation of gladiolus for that time in which it had obtained well developed plants which promoted the cormels enlargement. The findings of Suh, Kwack [18] also confirmed the findings that the formation of good quality corms was promoted with early planting dates.

Number of Cormels Plant^{-1}

Table 6: Number of corm plant-1 of gladiolus as affected by different planting dates.

Planting dates	No of Corms plant-1
10th Feb 2015	12.01 A
25th Feb 2015	8.65 B
12th March 2015	4.66 C

LSD value at 0.05% level of probability for No of corm plant-1= 1.6165

Table 6a: Analysis of variance for number of corms plant-1 of gladiolus as affected by different planting dates.

SOV	DF	SS	MS	F	P
Replication	2	0.2125	0.1062		
Duration	2	81.1525	40.5762	79.80	0.0006
Error	4	2.0339	0.5085		
Total	8	83.3988			
Grand Mean	8.4433	CV	8.45		

The data recorded for number of corms plant^{-1} is presented in Table 6 and analysis of variance is placed in Table 6a. The analysis of variance showed that different planting dates had significant effect on number of corms plant^{-1}. Mean table showed that more number of corms (12.01) plant^{-1} was produced by cormels planted on 10th February followed by those planted on 25th February (8.65), while less number of corms (4.66) plant-1 was produced by those planted on 12th March. Maximum number of cormels production by 10th February plantation might be due to the reason that gladiolus requires slightly high temperature for cormels production Ahmad et al. [13]. Laskar [19] also reported best corm production in February plantation as compare to March plantation [20-28].

Conclusion

Conclusions based on experimental results are as: Maximum sprouting percentage, number of leaves plant^{-1} and plant height was recorded on 10th February. Maximum corm diameter, corm weight and number of corms plant-1was obtained those planted on 10th February.

Recommendation

Based on above conclusion 10th February is recommended as the best time for growth of gladiolus.

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