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PJBS

ISSN 1028-8880

Pakistan Journal of Biological Sciences

ANSInet
Asian Network for Scientific Information
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan

Pakistan Journal of Biological Sciences 5(5): 553-555, 2002

Effect of Corm Size and Depth of Planting on the Growth and Flowering of Gladiolus

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Abstract: The effect of corm size and depth of planting was studied on the growth and flowering of gladiolus cv. Friendship using the combination of four corm sizes (15, 10, 5 and 3 g) and three planting depths planting (10.0, 7.5 and 5.0 cm). Corm size had significant influence on all the parameters studied. Large corm (15 g) took shortest time to complete 80% emergence (15.89 days) and flower initiation (60.44 days). The depth of planting had no marked effect on the parameters studied except percent lodging of plant. The highest lodging of plants (19.83%) was observed in shallowest depth of planting (5.0 cm), and the lowest (7.91%) was found in deepest planting depth (10.0 cm). The combined effect of corm size and depth of planting had significant effect on all the parameters studied except number of spikelets per plant. The highest plant height (97.56 cm), number of leaves (62.33), length of flower stalk (26.07 cm) and lodging of plants (33.14%) in the treatment combination of large sized corm planted at 5.0 cm depth and the lowest in the treatment combination of very small corm with 10 cm depth.

Key words: Gladiolus, corm size, depth, growth, flowering

Introduction

Gladiolus (*Gladiolus grandiflorus* L.) is an important cut flower in the flower industry. It belongs to the family Iridaceae and occupies fourth place in international cut flower trade (Bose and Yadav, 1989). It is frequently used as cut flower in different social and religious ceremonies (Mitra, 1992). The spikes of gladiolus are the most popular in flower arrangements and for preparing high class bouquets (Mukhopadhyay, 1995). As a landscape plant, it improves the aesthetic look of the garden. Gladiolus is herbaceous and used as bedding flower or does quite well in pots (Bose and Yadav, 1989). It gained popularity in many parts of the world due to its unsurpassed beauty and economic value.

There is an increasing demand for its attractive spikes having florets of huge forms, dazzling colors, varying sizes and long vase life. It has recently become popular in Bangladesh and its demand in this country is increasing day by day. But its commercial production is still at the initial stage in this country due to lack of information regarding its cultivation technology. Different factors such as size of corm and cormel, depth of planting, planting time and fertilizer management influence the production and quality of gladiolus flower (Arora and Khanna, 1990). Among these, size of corm and depth of planting are very important. Size of corm influences the production of gladiolus. Large corms (4.6-5.0 cm in diameter) produced more flowers, corm and cormel than others (Mukhopadhyay and Yadav, 1984). Misra *et al.* (1985) suggested that quality spikes might be obtained from large corms (above 5.1 cm in diameter). A number of gladiolus cultivars are growing in the world. Among them the cv. Friendship is widely cultivated in Bangladesh. In consideration of the above facts, the present study was undertaken to investigate the effects of corm size and depth of planting on growth and flowering of gladiolus cv. Friendship under the conditions of Bangladesh Agricultural University, Mymensingh,

Materials and Methods

The present experiment was conducted at the Horticulture Farm of Bangladesh Agricultural University, Mymensingh during the period from October 1997 to May 1998 to study the effect of corm size and depth of planting on the growth and flowering of gladiolus. The experimental area is under the sub-tropical climate characterized by three distinct seasons, the monsoon or rainy season extending from May to October, winter or dry season from November to February and pre-monsoon period or hot season from March to April (Edris *et al.*, 1979). The experimental site was medium high land belonging to the Brahmaputra Floodplain (FAO, 1971). The soil was sandy loam in texture with pH 6.6. There were two factors in the experiment: Factor A composed of four corm sizes viz. Large (15 g), medium (10.0 g), small (5.0 g) and very small (3.0 g), and factor B consisted of three depths of planting, viz, 5.0, 7.5 and 10.0 cm. The experiment was laid out in Randomized Complete Block Design (RCBD) with three replications. Gladiolus corms used in the experiment were of Indian cultivar "Friendship.

The corms were planted at different depths in furrows on 31 October, 1997. The plots were fertilized with 3.0 ton cowdung, 225 kg urea, 125 kg TSP and 130 kg MP per hectare. The experimental plots were irrigated four times during the whole period in flooding method. The soil was mulched frequently after each irrigation. Weeding and earthing up was done as and when needed. The spikes were harvested from 20 January to 28 March, 1998 when the basal florets showed color. Data were recorded from ten randomly selected plants from each unit plot on days required to 80% emergence, days required to first visible inflorescence initiation, days required to 80% inflorescence initiation, average plant height, number of leaves, percentage of lodging of plant, length and width of leaves, length of flower stalk and rachis, and number of spikelets per spike. The collected data on various characters were statistically analyzed and the mean for all the treatments was adjudged by Least Significance Difference (LSD) test.

Results and Discussion

Days to emergence of the crop: The number of days required to complete 80% emergence of the crop was significantly influenced by different corm sizes (Table 1). Very small corm (3g) took the longest time (33.56 days) and the large sized corm (15. g) took the shortest time (15.89 days). Emergence was found to be delayed gradually with the decrease in corm size. Ogele *et al.* (1995) also reported that large corm had shorter dormancy which helps in quick emergence of gladiolus. The days required to 80% emergence of the crop was not significantly influenced by depth of planting (Table 1). The combined effect of corm size and planting depth significantly influenced the days to complete 80% emergence (Table 2) The longest time (34.33 days) was required by the treatment combination of very small corm planted at 7.5 cm depth, while the shortest time (15.00 days) was required by large corm (15g) planted at 10.0 cm depth.

Days to first inflorescence initiation: The number of days required to first inflorescence initiation of the crop was significantly influenced by size of corm (Table 1). The average days required to first inflorescence initiation ranged from 60.44 to 73.00 days. The

Table 1: Main effect of corm size and planting depth on growth and flowering of gladiolus

Treatments	Time to 80% emergence (days)	Time to first inflorescence initiation (days)	Time to 80% inflorescence initiation (days)	Lodging (%)	Plant height (cm)	Number of leaves	Lenght of leaves (cm)	Width of leaves (cm)	Lenght of flower stalk at harvest (cm)	Length of rachis at harvest (cm)	Number of spikelets/ spike
Size of corm											
Large	15.89	60.44	77.56	22.69	89.22	59.56	23.22	2.00	66.00	23.49	11.94
Medium	25.22	64.00	82.44	12.27	81.67	49.36	22.48	1.69	60.76	22.45	11.29
Small	28.67	65.56	85.11	10.02	72.50	45.67	22.49	1.84	55.44	14.32	9.63
Very small	33.56	73.00	92.56	4.65	64.77	35.89	20.62	1.69	44.15	12.52	9.54
LSD (0.05)	3.25	0.98	1.21	5.49	NS	NS	NS	NS	4.96	3.35	1.52
(0.01)	4.42	1.33	1.65	7.46					6.74	4.55	2.07
Depth of planting (cm)											
5.0	22.50	66.25	85.00	19.88	81.41	50.25	23.04	1.96	58.37	18.44	10.74
7.5	25.75	65.58	84.25	12.29	76.42	49.75	20.92	1.69	55.50	20.13	10.76
10.0	26.25	65.42	84.00	7.31	78.53	48.83	22.64	1.76	55.89	18.27	10.31
LSD (0.05)	NS	NS	NS	4.76	NS	NS	NS	NS	NS	NS	NS
(0.01)				6.47							

NS = Not significant Size of corm: Large = 15 g Medium = 10 g Small = 5 g and Very small = 3 g.

Table 2: Combined effect of corm size and planting depth on growth and flowering of gladiolus

Treatments Combination		Time to 80% emergence (days)	Time to first inflorescence initiation (days)	Time to 80% inflorescence initiation (days)	Lodging (%)	Plant height (cm)	Number of leaves	Lenght of leaves (cm)	Width of leaves (cm)	Lenght of flower stalk at harvest	Length of rachis at harvest (cm)	Number of spikelets/ spike (cm)
Corn size	Depth (cm)											
Large	5.0	16.67	61.67	78.00	33.14	97.56	62.33	25.13	2.26	72.43	26.07	12.53
	7.5	16.00	59.33	76.67	23.62	86.61	60.67	22.09	1.74	64.73	25.21	11.99
	10.0	15.00	60.33	78.00	11.31	83.29	55.67	22.43	2.01	60.86	19.21	11.31
Med-	5.0	24.33	63.67	83.00	24.96	84.12	54.33	23.58	1.67	60.57	23.90	10.70
ium	7.5	24.67	64.67	83.33	10.80	77.24	51.33	17.78	1.54	59.45	25.48	12.82
	10.0	26.67	63.67	81.00	10.07	88.36	53.67	26.09	1.86	62.27	26.98	10.36
Small	5.0	28.33	66.33	86.00	15.55	77.96	51.33	21.64	1.81	56.33	11.90	10.13
	7.5	28.00	65.33	84.67	9.89	79.69	49.67	24.47	2.16	55.22	17.36	9.07
	10.0	29.67	65.00	84.67	4.64	76.12	48.67	21.35	1.54	54.77	13.70	9.70
Very	5.0	32.67	73.33	93.00	5.86	65.99	33.00	21.82	2.11	44.17	11.89	9.61
small	7.5	34.33	73.00	92.33	4.86	61.94	37.33	19.33	1.34	42.61	12.47	9.15
	10.0	33.67	72.67	92.33	3.23	66.37	37.33	20.70	1.61	45.67	13.20	9.87
LSD	(0.05)	5.63	1.69	2.10	9.52	9.36	7.77	3.99	0.52	8.60	5.80	NS
	(0.01)	7.65	2.22	2.85	12.94	12.72	10.56	5.42	-	11.69	7.88	

NS = Not significant Size of corm: Large = 15 g Medium = 10 g Small = 5 g and Very small = 3 g.

longest time (73.00 days) was required for very small sized corm (3 g), while the large sized corm took the shortest time (15.89 day). Time required to first inflorescence initiation was found to be delayed gradually with the decrease in corm size. The days required to first inflorescence initiation of the crop was not significantly influenced by depth of planting. The combined effect of corm size and planting depth significantly influenced the days required to first inflorescence initiation of the crop (Table 2). The longest time (73.33 days) was required by the treatment combination of very small corm planted at 5.0 cm depth and the shortest period (59.33 days) was found for the treatment combination of large corm with 7.5 cm depth of planting.

Days to 80% inflorescence initiation: The time taken to complete 80% visible first inflorescence initiation of the crop was significantly influenced by corm size (Table 1). The longest time (92.56 days) was taken when very small sized corm (3 g) was used and the large corm took the shortest time (77.56 days). The time taken to complete 80% visible first inflorescence initiation of the crop was found to be delayed gradually with the decrease in corm size. The time taken to complete 80% visible first inflorescence initiation of the crop was not significantly influenced by depth of planting (Table 1). However, it was noticed that the longest time (85.00 days) was required at shallow planting (5.0 cm) and the shortest time (84.00 days) required at deepest planting (10.0 cm). The combined effect of corm size and planting depth significantly influenced the time taken to complete 80% visible first inflorescence initiation of the crop (Table 2). The longest time (93.00 days) was required by the treatment combination of very small corm planted at 5.0 cm depth and the shortest period (76.67 days) was found from the large corm planted at 7.5 cm depth.

Plant height: There was a significant difference among different corm sizes for plant height. The highest plant height (89.22 cm) was found when large (15 g) sized corms were planted and the lowest (64.77 cm) was found in very small corm (Table 1). This might be due to more stored food materials in large corms, which helped in early and rapid vegetative growth of the plant. Plant height was not significantly influenced by depth of planting. However, shallowest planting (5.0 cm) gave the tallest plant (81.41 cm). Plant height was found to be significantly different due to the combined effect of corm size and planting depth (Table 2). The tallest plant (97.56 cm) was found in the treatment combination of large corm (15 g) planted at 5.0 cm depth, while the shortest plant (61.94cm) was found from the very small sized corm planted at 7.5 cm depth.

Lodging of plants: The lodging of the crop was significantly influenced by corm size (Table 1). The average percentage of lodging of plants ranged from 4.65 to 22.69. The highest lodging (22.69%) was found when large sized corm (15 g) was used and the very small corm showed the lowest (4.61%). Lodging of the plants was found to be decreased gradually with the increase in corm size. The lodging of plants was also significantly influenced by the depth of planting (Table 1). The highest lodging (19.88%) was observed at shallow planting (5.0 cm) and the lowest (7.31%) in the deepest planting (10.0 cm). Mattos *et al.* (1993) also reported higher lodging in shallow planting and lower in deeper planting. The combined effect of corm size and planting depth significantly influenced the lodging of the crop (Table 2). The highest lodging (23.62%) was noted from the large corm planted at 7.5 cm depth and the lowest lodging (3.23%) was found in the treatment combination of very small corm with 10.0 cm depth.

Number of leaves per plant: The number of leaves was significantly influenced by corm size (Table 1). The large sized corm (15 g) gave the maximum number of leaves (59.56) and the lowest

number of leaves (35.89) was found from very small sized corm. The variation in number of leaves was not significant due to the effect of planting depth. The shallowest planting (5 cm) gave the highest number of leaves (50.25) and the lowest (48.83) was obtained from the deepest planting of 10 cm depth. The combined effects of corm size and planting depth significantly influenced the number of leaves per plant. The maximum number of leaves (62.23) was found in large corm (15 g) with shallowest planting depth (5.0 cm), while the very small sized corm planted at 10.0 cm depth gave the minimum number of leaves per plant (37.33).

Length and width of leaves: The average length and width of leaves was significantly influenced by corm size. The large sized corm (15 g) gave the maximum length (25.30 cm) and width (2.0 cm) of leaves and the minimum length (19.76 cm) and width (1.69 cm) was found in the very small sized corm (3g). The variation in length and width of leaves was not significant due to the effect of planting depth (Table 1). The combined effect of corm size and planting depth significantly influenced the length and width of leaves (Table 1). The highest length (26.09 cm) and width (2.26 cm) was observed in the treatment combination of medium (10 g) and large corm (15 g) respectively planted at 5.0 cm depth and the lowest length (17.78 cm) and width (1.34 cm) from medium and very small corm respectively with medium depth (7.5 cm).

Length of flower stalk and rachis: The length of flower stalk increased significantly with the increase in corm size (Table 1). The longest flower stalk (66.00 cm) and rachis (25.45 cm) were obtained when the large (15 g) and medium (10 g) sized corm was used respectively. On the other hand, the shortest flower stalk (44.15 cm) and rachis (12.52) were found in the very small corm (3 g). Similar result was also reported by Bhattacharjee (1981) and Dod *et al.* (1989). The length of inflorescence stalk and rachis was not significantly influenced by depth of planting. The combined effect of corm size and planting depth had significant influence on length of flower stalk and rachis (Table 2). It was observed that the length of flower stalk and rachis increased gradually with increasing corm size and decreasing planting depth and the shortest flower stalk (42.62 cm) and rachis (11.89 cm) was recorded in the treatment combination of very small corm planted at 7.5 cm and 5.0 cm depth, respectively. On the other hand, the longest flower stalk (72.43 cm) and rachis (26.07 cm) was found in large corm (15 g) planted at 5.0 cm depth.

Number of spikelet per spike: The variation in number of spikelets per spike due to the corm size was statistically significant (Table 1). The highest number of spikelets/spike (11.94) was obtained in the plants grown from large corm (15 g) and the lowest number (9.54) from very small corm (3 g). This might be due to higher food reserve in the large corm. The number of spikelets per spike was not significantly influenced by the depth of planting and there was no significant interaction effects between the corm size and depth of planting in respect of number of spikelets per spike.

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