*Available online at* www.ijpab.com

DOI: http://dx.doi.org/10.18782/2320-7051.6451

**ISSN: 2320 – 7051**

*Int. J. Pure App. Biosci.* **6 (3):** 529-533 (2018)

*Research Article*

International Journal of Pure & Applied Bioscience

OPEN ACCESS

# Combination Effect of Corm Size and Spacing on Growth and Corm Yield of Gladiolus

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Received: 30.04.2018 | Revised: 28.05.2018 | Accepted: 7.06.2018

**ABSTRACT**

*The present experiment was conducted during winter season on gladiolus cv. Punjab Morning at Horticultural Research Farm Department of Horticulture, Banaras Hindu University, Varanasi, 221 005 (Uttar Pradesh) during the year 2016-17. The investigation was laid out factorial randomized block design with three replications. The treatment comprises nine combination with three corm sizes viz. $C_1$ (2-3 cm), $C_2$ (3.1-4 cm) and $C_3$ (4.1-5 cm) and three spacing $S_1$ (30 × 20 cm), $S_2$ (30 × 25 cm) and $S_3$ (30 × 30 cm). The data on various growth and corm production parameters recorded from 5 randomly selected plants from each treatment in each replication to standardize the combination of optimum corm sized and spacing. Results revealed that combination effect of 4.1-5.0 cm corm size and 30 × 30 cm spacing result maximum length of longest leaf (42.7 cm), width of longest leaf (4.8 cm), number leaves per plant (15.7) and diameter of corm (7.7 cm) whereas maximum number of corms per hill (3.7) and maximum weight of corms per plant (147.7 g) recorded in $T_7$, highest (9.8 days) days for 1$^{st}$ sprouting in $T_2$, maximum number of sprouts per hill (3.90) in $T_6$, number of cormels per hill (24.7) in $T_8$, weight of cormels per plant (16.6 g) in $T_5$ and maximum plant height (94.5 cm) was recorded with $T_1$.*

***Key words***- *Gladiolus, Cormels, Leaf, Corms*

## INTRODUCTION

Floriculture sunshine industry of India as it offers excellent self-employment and good remuneration for the small and marginal farmers. The world annual growth rate for this industry is 8% to 10% per annum. There are more than 120 countries that are active in floriculture production on large scale; the world floriculture trade is characterized by a high degree of concentration by product and sources. Developed countries in Europe, America and Asia account for more than 90% of demand. International trade in floriculture, to a large extent is organized along the regional lines. Floriculture has now become a source of potential business because of the inclination of the farmers towards the high valued flower crops and their use at various social and industrial levels in India.

**Cite this article:** Singh, S.B., Pal, A.K., Mauriya, S.K., Yadav, K.S., and Pal, S.K., Combination Effect of Corm Size and Spacing on Growth and Corm Yield of Gladiolus, *Int. J. Pure App. Biosci.* **6(3):** 529-533 (2018). doi: http://dx.doi.org/10.18782/2320-7051.6451

It has now rapidly grown into a profitable industry for income generation, creation of employment opportunities and to earn precious foreign exchange. Recently there has been a significant increment in flower production, trade and consumption in the world and in our country. Commercial floriculture is one of the most profitable agro-industries in the world and has potential to contribute to the national economies by providing millions of dollars.

Gladiolus (*Gladiolus grandiflorus* L.) is a popular flowering plant which belongs to family Iridaceae and having chromosome number (2n) = 30-120. It was introduced into cultivation towards the end of the sixteenth century. It is used in various ways by amateurs, professional and commercial growers for their attractive spikes and long keeping quality. In India its cultivation dates back to nineteenth century. Gladiolus is an herbaceous plant that sprouts from axillary buds of the underground corms which is a vertical compressed stem covered with 4-6 dry scales which are based of old leaves. Its inflorescence is spike, bearing large number of florets arranged alternately on the axis in opposite and opening one by one in acropetal manner. Its cut spikes are in huge demand for bouquets and flower arrangements because of long length of spikes, different colors and forms of florets. Different factors such as size of corms, spacing, planting depth, planting time and fertilizer management influence the production and quality of gladiolus flower Arora and Khanna [2]. There is a direct relation between corm size, flower production and corm and cormel yield as reported by Ogele *et al.*[14]. Large corms produced more quality flowers, corms and cormels than others Misra *et al.*[11]. Similarly, spacing affects the photosynthetic activities as well as availability of nutrients to the plants. Hence, affect the quality of spikes and corms considerably. It is, therefore, essential to find out the best corm size, spacing and its combination in order to standardize conventional propagation methods for getting more corm and cormel production[13]. In considering of the above fact, therefore the present study "Combination effect of corm size and spacing on growth and corn yield of gladiolus cv. Punjab Morning" was undertaken.

## MATERIAL AND METHODS

The experiment was conducted during winter season on gladiolus cv. Punjab Morning at Horticultural Research Farm Department of Horticulture, Banaras Hindu University, Varanasi, 221 005 (Uttar Pradesh) during the year 2016-17. During the experiment the maximum temperature ranges from $14.2^0$C to $43.0^0$C in summer and minimum temperature $7.1^0$C to $28.1^0$C in winter. The maximum relative humidity ranged from 25-94% and minimum relative humidity 06-73%. The average annual rainfall of this area is 1110 mm. Properties of the soil at the trial site were analyzed for different physical and chemical properties. It is obvious that soil of the trial area is sandy clay loam with neutral pH. The treatment comprises nine combination viz. $T_1$- $C_1$× $S_1$, $T_2$- $C_1$× $S_2$, $T_3$- $C_1$× $S_3$, $T_4$- $C_2$× $S_1$, $T_5$- $C_2$× $S_2$, $T_6$- $C_2$× $S_3$, $T_7$- $C_3$× $S_1$, $T_8$- $C_3$× $S_2$, $T_9$- $C_3$× $S_3$ with three corm sizes viz. $C_1$ (2-3 cm), $C_2$ (3.1-4 cm) and $C_3$ (4.1-5 cm) and three spacing $S_1$ (30 × 20 cm), $S_2$ (30 × 25 cm) and $S_3$ (30 × 30 cm) to standardize the combination of optimum corm sized and spacing for the production of gladiolus with better growth and yield potentials. The investigation was laid out factorial randomized block design with three replications. The results of the experiment have been analyzed statistically for interpretation of results.

## RESULTS AND DISCUSSION

### Growth Parameters

The data on growth parameters is presented in Table 1 and clearly indicates that the interaction effect of corm size and planting spacing significantly affected the growth and development of gladiolus plants. The highest (9.8 days) days for 1st sprouting were noted with $T_2$, whereas it was the lowest (7.7 days) in $T_9$. Never the less, days for sprouting did not differ significantly among $T_5$, $T_6$, $T_7$ and $T_8$. The highest (19.3 days) days were noted with $T_1$ for 80% sprouting where it was minimum

(14.5 days) days taken to 80% sprouting in $T_9$ which was statistically at par with $T_8$, and $T_3$. This is also in keeping with the observation made by Syamal *et al.*[19] and Bijimol and Singh (2001[3]) who was recorded beneficial effect to reduce the days of sprouting, while Kumar and Singh (1988[10]) reported that large sized bulbs (2.6-3.0 cm) delayed in sprouting in tuberose. The maximum number of sprouts per hill (3.90) were recorded in $T_6$ which was statistically at par with $T_8$ (3.8), $T_9$ (3.7) and $T_7$ (3.6) whereas minimum number of sprouts per hill was recorded in $T_4$ (2.6). Similar findings were also reported by Singh and Singh [17]. Corm size and planting spacing significantly affected the plant height at 90 DAP. The maximum plant height (94.5 cm) was recorded with $T_1$ which was significantly higher with other all treatments. The minimum plant height (51.3 cm) was recorded in $T_2$. Several workers substantiated significant effect of corm sized and spacing on growth of plant in terms of height and concluded that bigger sized corm and higher spacing had beneficial effect in improving the growth of plant than smaller sized corm and closer spacing Bijimol and Singh [3]; Uddin *et al.*[20] and Singh and Singh [17]. The maximum length of longest leaf (42.7 cm) was recorded in $T_9$ followed by $T_6$ (40.2 cm), $T_8$ (39.8 cm), $T_4$ (39.9 cm), $T_5$ and $T_7$ (38.9 cm) whereas minimum was recorded in $T_2$ (32.7 cm) and it was statistically at par with $T_3$. The maximum width of longest leaf (4.8 cm) was recorded in $T_9$ followed by $T_8$ (4.3 cm), $T_7$ (3.8 cm) and $T_6$ (3.5 cm) whereas minimum was recorded in $T_3$ (2.9 cm) and it was statistically at par with $T_2$, $T_3$, $T_4$ and $T_5$. Enhanced the leaf growth due to bigger sized corm and wider spacing could to attributed to less competition for smaller sized corm then the plant at closer spacing. The present findings also bear semblance with the observations made by Singh[18], Bijimol and Singh[3], Hatibarna and Paswan[6] and Singh and Singh[17]. The maximum number leaves per plant (15.7) was recorded in $T_9$ followed by $T_8$ (14.2), $T_7$ (11.7) and $T_3$ (12.0) and $T_6$ (9.1) whereas minimum was recorded in $T_2$ (7.5). The favorable response of bigger size corms and wider spacing in promoting number of leaves per plant might be due to the fact that wider spacing lessened the completion among the plant which helps the individual plant to utilize more water, nutrition, air and light to helm them to put better growth. These result an in close conforming with the finding of Bijimol and Singh[3], Hatibarua and Paswan[6], Uddin *et al.*[20], Sharma and Gupta[16] and Anwar and Maurya[1].

**Table 1: Combination effect of corms size and spacing on growth parameters of gladiolus**

| Treatments | Day taken to 1st sprouting | Day taken to 80 % sprouting | Number of sprout per hill | Plant height (cm) | Length of longest leaf (cm) | Width of longest leaf (cm) | Number of leaves per plant |
|---|---|---|---|---|---|---|---|
| $T_1$ | 9.6 | 19.3 | 2.7 | 52.1 | 35.4 | 3.0 | 7.6 |
| $T_2$ | 9.8 | 17.0 | 2.7 | 51.3 | 32.7 | 3.1 | 7.5 |
| $T_3$ | 9.4 | 15.9 | 3.4 | 51.6 | 33.7 | 2.9 | 12.0 |
| $T_4$ | 9.3 | 16.6 | 2.6 | 60.3 | 39.9 | 3.3 | 8.0 |
| $T_5$ | 8.4 | 16.3 | 2.9 | 57.2 | 38.9 | 3.2 | 8.3 |
| $T_6$ | 8.5 | 16.3 | 3.9 | 59.2 | 40.2 | 3.5 | 9.1 |
| $T_7$ | 8.6 | 17.2 | 3.6 | 55.9 | 38.9 | 3.8 | 11..7 |
| $T_8$ | 8.2 | 15.8 | 3.8 | 57.5 | 39.8 | 4.3 | 14.2 |
| $T_9$ | 7.7 | 14.5 | 3.7 | 62.6 | 42.7 | 4.8 | 15.7 |
| C.D. at 5% | 1.12 | 1.59 | 0.37 | 1.87 | 1.73 | 0.39 | 1.14 |

## Corm parameters

The data related to corn parameter is presented in Table 2 and clearly indicates that the interaction effect of corm size and planting spacing significantly affected corn production of gladiolus plants. The maximum number of corms per hill (3.7) was recorded in $T_7$ and $T_3$ (3.7) which was statistically at par with $T_9$ (3.5), $T_8$ (3.3), $T_2$ (3.1) and $T_4$ (3.7) whereas the minimum number of corms per hill (2.4) recorded in $T_6$. The maximum number of cormels per hill (24.7) was recorded in $T_8$ which was statistically at par with $T_3$ (24.1), $T_7$ (21.6) and $T_9$ (21.0) whereas minimum number of cormels per hill was recorded in $T_2$ (15.1). There was decrease in the production

of corms per plant with smaller size corm and closer spacing and this could be ascribed to reduction in the scope with less forgiving of nutrients from smaller size corm and closer spacing causing a decrease in number of corm. The similar findings were observed for diameter of corm. The diameter of corm was strikingly increased due corm size, spacing and their interactions. The maximum diameter of corm (7.7 cm) was recorded in $T_9$ which was statistically at par with $T_8$ (7.2 cm) whereas the minimum diameter of corm (5.8 cm) was recorded in $T_4$. Reduced diameter of corms due to smaller sized corm and closer spacing might be due to shadowing effect of plants on each other which causing interaction on photosynthesis and accumulation of dry matter. The present findings are in agreement with the results of Kumar and Singh[10], Sharma and Gupta[16], Kohale *et al*. [7], Anwar and Maurya[1]. The maximum weight of corms per plant (147.7 g) recorded in $T_7$ whereas minimum weight of corms per plant was recorded in $T_2$ (128.5 g). The results corroborated with findings Hatibarua and Paswan[6], Kumar and Yadav [8], Ramachandrudu and Thangam[15]. The maximum weight of cormels per plant (16.6 g) was recorded in $T_5$ whereas minimum weight of cormels per plant was recorded in $T_3$ (8.3 g). The results were supported with work of Sharma and Gupta[16], Kumar and Yadav [8], Kumar *et al.* [9], Memon *et al*.[12], Dogra *et al*.[4].

**Table 2: Combination effect of corms size and spacing on corm production in gladiolus**

| Treatments | Number of corms per plant | Number of cormels per plant | Diameter of corm (cm) | Weight of corms per plant (g) | Weight of cormels per plant (g) |
|---|---|---|---|---|---|
| $T_1$ | 2.6 | 16.1 | 5.9 | 128.5 | 12.7 |
| $T_2$ | 3.1 | 15.1 | 5.9 | 130.8 | 10.4 |
| $T_3$ | 3.7 | 24.1 | 7.0 | 138.6 | 8.3 |
| $T_4$ | 3.1 | 18.3 | 5.8 | 131.9 | 13.1 |
| $T_5$ | 2.8 | 18.9 | 6.2 | 138.9 | 16.6 |
| $T_6$ | 2.4 | 19.3 | 5.9 | 130.4 | 13.2 |
| $T_7$ | 3.7 | 21.6 | 6.8 | 147.7 | 11.4 |
| $T_8$ | 3.3 | 24.7 | 7.2 | 132.7 | 13.6 |
| $T_9$ | 3.5 | 21.0 | 7.7 | 133.4 | 13.3 |
| C.D. at 5% | 0.679 | 4.249 | 0.552 | 5.334 | 2.830 |

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